Curriculum for Electronics

CHRIST
UNIVERSITY

UNDER GRADUATE DEPARTMENT OF ELECTRONICS

CHRIST UNIVERSITY
BANGALORE – 560 029

2009 – 10 BATCH

Index

CHRIST UNIVERSITY, BANGALORE-29

DEPARTMENT OF ELECTRONICS

APPROVED B.Sc. SYLLABUS

UNDER DEEMED UNIVERSITY SYSTEM (2009-10 BATCH)

SUBJECT: ELECTRONICS

Course Objective

The omnipresence of electronics in modern life suggests the need of electronics as one of the major subjects in the undergraduate level. It is at the core of wide variety of specialized technologies that have been developing over several decades. Whether it is wireless communication, information technology, nanotechnology, robotics, wearable electronics, Television broadcasting, digital home or bio-technology, electronics is the core subject.

The three years of study covers the analysis of DC circuits, Network theorems, Semiconductor devices and applications, amplifiers, oscillators, operational amplifier circuits, digital electronics, Radio and TV communication, Satellite communication, fiber optic communication, Digital and advanced communication systems, Microprocessor and interfacing , Microcontroller and applications etc.

Electronic instrumentation is introduced as a special paper. Students are required to complete a project work as a part of the curriculum.

After completing this three-year degree course, students can opt for higher studies; get into R & D institutions like IISc, ISRO, DRDO, BEL, BPL, ITI etc, electronics industry or IT enabled service sections.

Methodology

Apart from conventional methods of teaching, audiovisual interactive sessions, CBT, interaction with experts from Industry, quiz, seminars and Industry visits will be adopted. In addition to this, students will have regular practical sessions in the well-equipped electronics laboratory to correlate between theory and practical. Students are also encouraged to take up live industrial projects.

COURSE STRUCTURE- ELECTRONICS UG

I SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 131	Electronic Devices and Applications	4	100	3
ELE 151	Practical-I	2	50	1

II SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 231	Operational Amplifiers and Applications	4	100	3
ELE 251	Practical-II	2	50	1

III SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 331	Digital Electronics	4	100	3
ELE 351	Practical-III	2	50	1

IV SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 431	Microprocessor and Interfacing	4	100	3
ELE 451	Practical-IV	2	50	1

V SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 531	Communication-I	3	100	2
ELE 532	Microcontroller and Applications	3	100	2
ELE 551	Practical-V	2	50	1
ELE 552	Practical-VI	2	50	1

VI SEMESTER

Course code	Title	Hours	Marks	Credits
ELE 631	Communication-II	3	100	2
ELE 632	Special Paper: Electronic Instrumentation	3	100	2
ELE 651	Practical-VII	2	50	1
ELE 652	Practical-VIII	2	50	1

ELECTRONICS PAPERS

ELE 131: Electronic Devices and Applications

This paper enables the students to understand.

- The basic methods of solving electrical dc networks using different network theorems.
- The designing of half wave rectifier, full wave rectifier, filter circuits and clippers and clampers
- The basic theory of bipolar junction transistor, various transistor-biasing techniques and transistor applications
- The principles of field effect transistor and applications, switching devices

ELE 231: Operational Amplifiers and Applications

This paper enables the students to understand

- . The basic theory of differential amplifier and construction of Op-amp using differential amplifiers
- The Op-amp characteristics and applications
- Basic principles of oscillators and applications
- Principle and applications specialized ICs like 555 timer LM 317, 78xx and 79xx series.

ELE331: Digital Electronics

After completing this paper, students will be able to understand

- Basics of number systems, codes, Boolean algebra and logic gates
- Different logic families and characteristics
- The design of combinational circuits
- The design of sequential circuits and theory of various memory devices

ELE431: Microprocessor and Interfacing

This paper enables the students to understand

- Basics of microcomputer and microprocessor 8085
- Instruction set and Programming of microprocessor 8085
- Interfacing with 8085
- Features and modes of PPI 8255

ELE531: Communication-1

This paper enables the students to understand

- Electromagnetic spectrum, propagation of EM wave and Noise
- Principles of AM and FM radio transmitters and receivers

- Principles of Television
- The theory of transmission lines, Antennae

ELE532: Microcontroller and applications

This paper enables the students to understand

- Basics of microcontroller
- Instruction set and Programming of microprocessor 8051
- Interfacing with 8051
- Features of other microcontrollers

ELE631: Communication-2

This paper enables the students to understand

- Basics of pulse modulation and digital modulation systems
- Theory and applications satellite communication
- Theory and applications of optical fiber communication and RADAR
- Other advanced communication systems

ELE632: Special Paper: Electronic Instrumentation

This paper enables the students to understand

- Performance characteristics and applications of electronic instruments
- Principle and applications of electrical transducers
- Signal conditioning concepts and circuits
- Data acquisition and digital instruments

CHRIST UNIVERSITY, BANGALORE-29

DEPARTMENT OF ELECTRONICS

APPROVED B.Sc. SYLLABUS

UNDER DEEMED UNIVERSITY SYSTEM (2009-10 BATCH)

SUBJECT: ELECTRONICS

SEMESTER I

ELE 131: ELECTRONIC DEVICES AND APPLICATIONS (60hrs)

UNIT 1:DC Network Analysis(12hrs):Review of passive components, Ohm's law, Voltage and current sources, Charging & discharging of capacitor in RC circuit, time constant ,graphical representation ,Growth and decay of current in RL circuit ,time constant, graphical representation ,DC resistive circuits, voltage divider theorem, current divider theorem ,Kirchoff's Laws(loop equations), superposition theorem, Thevenin's theorem, Norton's theorem, conversions, maximum power transfer theorem, , T & Π networks and Interconversion. Numerical examples

UNIT 2: Diode Applications (15 hrs)

Intrinsic and extrinsic semiconductors, p type, n type, unbiased p-n junction, forward and reverse bias of a p-n junction, diode symbol, V-I characteristics of p-n junction. Zener diode characteristics, Zener and Avalanche breakdown mechanisms in diodes.

Half wave rectifier, Center tap Full wave rectifier and Bridge Rectifier - Working, Ripple factor, Efficiency (expressions), PIV of diode and Frequency of output in each case. Comparison of rectifier circuits.

Filter circuits and Regulators: Types of Filters: Series Inductor filter, Shunt Capacitor filter, LC filter, Π filter, Performance and comparison.

Zener diode as a regulator- line and load regulation, Power supply.

Voltage Multipliers: Half wave voltage doubler, voltage tripler and Quadrupler- circuit diagram and working.

Clipping circuits: Positive clipper, negative clipper, biased clipper, and combinational clipper. Clamping circuits: Positive clamper and negative clamper, biased clampers**.** Numerical problems

UNIT 3: Bipolar Junction Transistor (08 hrs)

Transistor construction, Transistor Symbol, Transistor biasing, Operation of NPN and PNP transistor, Transistor currents, Input and Output Characteristics of CE configurations. Comparison of CE, CB and CC configurations

Transistor Biasing: Need for biasing, The D.C operating point and load line, Factors affecting stability of Q point, Stability factor definition, Methods of transistor biasing: Fixed bias, Fixed bias with emitter resistor and Voltage divider bias circuits. Operating point, Stability factor, Advantages and disadvantages**.** Numerical problems

UNIT 4: Transistor Applications (15hrs)

Transistor as an amplifier, Classification of Amplifiers. Small signal operation of CE amplifier: ac and dc equivalent circuits, r_e model, Gain and impedance derivation. Hybrid Parameters (qualitative)

Multistage Amplifiers**:** Introduction, Types of coupling, analysis of a two stage RC coupled Amplifier, Frequency response, Direct coupled Amplifier, Frequency response, calculation of voltage gain. Darlington pair, Advantages, disadvantages and applications of multistage amplifiers..

Power Amplifiers: Difference between voltage and power amplifiers, AC load line, Classification of power amplifiers, Class A amplifier: Resistive load and Transformer coupled, efficiency derivations, Limitations. Class B amplifier:

Characteristics, Push-pull operation, efficiency derivation, crossover distortion, and Complementary symmetry amplifier, heat sink. Numerical examples

Tuned Amplifier: Resonance- series and parallel, impedance, frequency response Class C operation, Single tuned and double tuned Amplifiers- working, Frequency response, , Limitations and applications.

UNIT 5: Field –Effect Transistors (10 hrs)

Construction and working of JFET, Drain characteristics, Transfer characteristics, JFET parameters, FET approximation- Shockley's equation, CS FET amplifier, working, comparison between BJT and JFET. MOSFET: Depletion type MOSFET, working principle, Drain characteristics, Enhancement type MOSFET, Characteristics, construction and symbol, MOSFET Applications. Numerical examples.

Switching devices: UJT construction working-characteristics, SCR – construction, characteristics, diac, triac- characteristics and application

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Recommended Books

1. Principles of Electronics, A.P Malvino, TMH, 6th edition, 2005.
2. Introductory circuit analysis, Robert L Boylestad, Universal Book Stall Fifth edition, 2003.
3. A Text book of Applied Electronics, R.S.Sedha, Chand and Company Ltd. New Delhi, Edition 2005

Reference Books

1. Electronic Devices and circuits, T.F. Bogart, Beasley, Pearson Education, 6th Edition, 2004.
2. Basic Electronics and Linear Circuits. N.N. Bhargava, D.C Kulshreshta, and S.C Gupta, TMH, 40th Reprint, 2005.

3. Electronics Devices and circuit theory, Robert Boystead and Louis Nashelsky, Pearson Education, 8th edition, 2004
4. Electronic Devices and circuits, T.L.Floyd, PHI, fifth edition, 2005.

ELE 151: Practical I

List of experiments (Practical I)

Study of resistance color code, soldering practice, test and measuring instruments and Ohm's Laws (1 practical class)

1. Kirchhoff's Laws
2. Superposition Theorem
3. Thevenin's Theorem
4. Maximum Power Transfer Theorem
5. Semiconductor diode and Zener diode characteristics
6. Half wave rectifier with and without capacitor filter
7. Center tap full wave rectifier with and without capacitor filter
8. Voltage tripler using diodes
9. Zener regulator- Line and Load regulation
10. Fixed bias circuit with emitter resistor
11. Voltage divider bias circuit
12. CE amplifier- Frequency response
13. Tuned amplifier

SEMESTER II

ELE 231: OPERATIONAL AMPLIFIERS AND APPLICATIONS

UNIT1: Differential amplifiers (5)

Differential amplifier, circuit configurations, ac and dc analysis dual input balanced output configurations, derivation for voltage gain, input and output impedances, current mirror, differential amplifier with current mirrors

UNIT 2 : Op-amp theory(15)

Introduction to IC's: Advantages, limitations, linear and digital IC. Scale of integration, op-amps and other types of op amps. Op amp Block diagram, equivalent circuit, pin diagram of IC 741, specification, Characteristics of ideal and practical op-amp, op-amp parameters- input bias current, input offset voltage, output offset voltage, CMRR, slew-rate, open loop op-amp, limitations, Negative feedback, Block diagram of a negative series feed back amplifier. op-amp negative feedback, Inverting and Non-inverting voltage feedback- circuit, derivation for voltage gain, open and closed loop gain, Input and output impedance. Virtual ground, bandwidth, Inverting and Non-inverting current feedback circuits.

UNIT 3: Op-amp applications (12 hrs)

Adder- Inverting and non-inverting, Subtractor, Scale changer, Buffer, Comparator- basic comparator, , zero cross detector and Schmitt trigger, comparator characteristics

Active Filters: Advantages, Types. First order Butterworth filters: Low pass, High pass, Gain derivation and frequency response, filter design, second order Butterworth low pass and high pass filters, equations, Band pass, Band reject and all pass filter, circuit diagrams and frequency response.

UNIT 4: Oscillator circuits (15 hrs)

Basic principle of oscillator, Positive feed back, Barkhausen's criterion. Classification of oscillators, Sinusoidal Oscillators: LC tank circuit, damped and undamped oscillations, Hartley and Colpitt's oscillators- working, expression for frequency (no derivation) limitations. RC oscillators- Phase shift Oscillator-working, expression for frequency (no derivation), Wien Bridge Oscillator – working, derivation for frequency of oscillations, limitations. Crystal oscillators- Equivalent circuit and applications. Non-sinusoidal Oscillators: Multivibrators: Astable, monostable and bistable- circuit (Transistor based), working, applications.

UNIT 5: Specialized IC applications (15 hrs)

IC 555 timer: Functional block diagram, Astable and mono-stable operations, working-expression for frequency and duty cycle. Applications- Voltage controlled oscillator, Schmitt trigger Phase-locked loops, operating principle, monolithic PLL, 565 PLL application, Power amplifiers using power boosters. Monolithic power amplifiers

Voltage regulators, fixed and variable, IC LM 317, switching regulators 78xx series and 79xx series, Block diagram, working, pin out diagram and applications, power supply, block diagram and design

Recommended Text Books

1, Operational amplifier and linear circuits, Ramakanth Gayakwad PHI, 3rd Edition, 2005.

Reference Books

1. Electronic Devices and circuits, T.F. Bogart and Beasley, Pearson Education, 6th Edition, 2004.
2. Electronics Principle-AP Malvino, Tata McGraw-Hill, 6th edition, 2005.
3. Electronic Devices and Circuits, T. L. Floyd, PHI, 5ht Edition 2005.
4. Micro electronics Circuits, Sedra and Smith, 5th Edition, Oxford University Press

ELE251: Practical II

List of experiments

1. Colpitts Oscillator
2. Construction of regulated power supply using IC 7805 and IC 7905
3. Op-amp Adder, subtractor and scale changer

4. Phase-shift oscillator using IC 741
5. Wien-Bridge oscillator using IC 741
6. Op-amp comparator
7. Hartley Oscillator
8. Astable multivibrator using transistors
9. Current and voltage regulation using IC LM 317
10 Op - amp inverting amplifier
11 Crystal oscillator
12. Monostable multivibrator using IC 555

Reference Books:

Basic Electronics- A Text Lab Manual, Paul B Zbar, A.P. Malvino, TMH, 7th Edition, 1995.

SEMESTER III

ELE 331: DIGITAL ELECTRONICS (60 hrs)

UNIT 1: Number systems: (8 hrs)

Decimal, binary, octal and hexadecimal and their inter conversion. digital codes, BCD (8421) code, Gray, Excess 3, alphanumeric codes-ASCII, and EBCDIC codes, error detecting and error correcting codes, arithmetic operation in binary and hexadecimal, BCD addition, and excess 3 addition, Sign magnitude conversion, 1's and 2's complements subtraction, signed number arithmetic addition

UNIT 2: Logic gates and Boolean algebra (12 hrs)

Positive and negative logic, basic logic gates, AND, OR and NOT gates, Boolean algebra-laws and theorems, NAND and NOR gates, De-Morgan's theorems, XOR and XNOR gates- symbol, truth table, realization using basic gates, NAND and NOR gates as universal gates. Simplification of logic expression using Boolean algebra, SOP and POS expression, Karnaugh maps, K-map technique to solve 3 and 4 variable equations, don't care conditions.

UNIT 3: Pulse characteristics and logic families (10 hrs)

Pulse characteristics- ideal and practical pulse, rise time, fall time, turn on time; turn OFF time, pulse width, duty cycle. Classification of digital IC's, Characteristics of digital IC's- propagation delay, power dissipation, fan–in, fan–out, current and voltage parameters, noise immunity, noise margin, operating temperature range, power supply requirements, DTL and TTL families- characteristics, standard TTL NAND circuit with

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totem pole output. Comparison of propagation delay time and power dissipation of different TTL families, MOS Logic (NMOS, PMOS) – characteristics, CMOS logic.

UNIT 4: Combinational logic circuits (15hrs)

Arithmetic logic circuits –half adder, full adder, 4-bit parallel binary adder, half and full subtractors. Two bit and 4-bit magnitude comparators, IC 7485- pin diagram, decimal to BCD encoder, priority encoder-IC 74147- pin diagram, truth table, BCD to decimal decoder, IC 7445, BCD to seven segment decoder, IC 7446 and IC 7447, logic diagram and truth table of each IC. Multiplexers-4: 1, 8:1 and 16:1 multiplexers, logic diagram and truth table of each, IC 74150- pin diagram, applications, Demultiplexers-1: 4, 1:8 and 1:16 de-multiplexers, logic diagram and truth table of each, IC 74154- pin diagram, applications.

UNIT 5: Sequential logic circuits (15 hrs)

Flip- flops – Basic RS latch (NAND and NOR latches), Clocked RS flip-flops, D flip-flop and JK flip- flop, T flip-flop, edge triggering and level triggering. Edge triggered Master-slave JK flip-flop, Clear & Preset inputs. IC 7473 and IC 7476. Shift registers– 4 bit serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out. Counters: Asynchronous counters, logic diagram, truth table and timing diagrams of 3 bit ripple counter, 4 bit up-down counter, mod-3 and mod-5 counters, 4-bit synchronous counter, decade counter. IC 7490, synchronous 2-bit and 3-bit counter design using K-maps, Ring counter, applications.

Memory Devices: Introduction –primary and secondary memories, RAM –static and dynamic, ROM, EPROM & EEPROM –memory capacity, advantage, disadvantage and application, secondary memory, floppy disk, hard disc, and CD ROM- memory capacity, advantage, disadvantage and applications.

Books Recommended:

1. Digital fundamentals: T.L.Floyd, Universal Book Stall, 8th edition, 2005.
2. Digital principles and application: Malvino and Leach –TMH 5th edition, 2000

Reference books:

1. Fundamentals of digital circuits: A Anand Kumar, PHI, 3rd edition, 2004.
2. Digital logic and computer design: M. Morris Mano – PHI4th edition, 2002
3. Modern digital electronics R.P Jain –TMH publication, 3rd edition, 2003.

ELE 451: Practical IV

List of experiments

1. Realization of Basic gates using diode and transistor
2. Realization of Basic gates using NAND gates using IC 7400
3. Realization of Basic gates using NOR gates using IC 7402
4. Half Adder and Half Subtractor using NAND gates

5. Full Adder using IC 7486 and IC 7400
6. Binary to Gray code and Gray code to Binary conversion
7. Clocked RS, D Flip-flops using NAND gates
8. 4 –bit binary ripple up counter using IC 7476
9. Decade counter using IC 7490.
10. Study of De-Multiplexer using IC 74154
11. Study Multiplexer using IC 74150
12. BCD to seven segment conversion using IC 7447

Reference books:

1. Experiments in Digital Electronics: Malvino and Leach – TMH, 2000
2. Digital Lab Primer- K A Krishnamurthy, Pearson education 2003

SEMESTER IV
ELE 431: MICROPROCESSOR AND INTERFACING (60 hrs)

UNIT 1: Microprocessor 8085 (15 hrs)

Review of computer fundamentals, Basic block diagram, hardware, software, Firmware, Interpreter, and Assembler.

Introduction to Microprocessor, Applications, Basic block diagram, speed, word size, memory capacity, classification.

Features of 8085, Architecture of 8085–Block diagram, Internal registers, Register pairs, Flags, Stack pointer, Program counter, Types of Buses. Clock circuit, Pin diagram of 8085.Instruction-Operation code, Operand, Mnemonics. Instruction set, Instruction classification, Addressing modes.

UNIT 2: 8085 Instruction set (15 hrs)

Data transfer and Memory operations, Arithmetic operations, Increment & Decrement operations, Logical operations, Branch operations, Stack operations, I/O and Machine control operations, Interrupts. Delay loops, use of counters, Timing diagrams— T- states, Instruction cycle, Machine cycle, Op- code fetch, I/O read, I/O write, memory read, Memory write.

UNIT 3: Programming of 8085 (15 hrs)

Programs for Data transfer and Memory operations (direct & indirect addressing), Addition and Subtraction of two 8-bit & 16- bit numbers, Multiplication, Display of smallest / largest number in a given array of numbers, Sorting of numbers in descending / ascending order. Number of 1's and 0's in a given byte, testing for zero condition. 1's and 2's complement verification of truth tables of logic gates.

UNIT 4: Interfacing of 8085 (15 hrs)

Basic interfacing concepts, Compatible ICs of μP 8085, Data transfer, Synchronous I/O data transfer using interrupts. Memory interfacing—address decoding, Interfacing RAM and ROM.

Interfacings I/O devices—Input port, Output Port, IN & OUT instructions, Interfacing input devices Interfacing output devices (LED display interfacing-block diagram). Interfacing matrix key board-block diagram, Programmable Peripheral Interface IC 8255 —Features, Pin diagram, Functional block diagram, Ports & their modes,

Book Recommended:

Microprocessor Architecture, Programming and Applications with 8085, Ramesh S Gaonkar- Wiley Eastern Limited-IV Edition, 2003

Reference Books:

1. Fundamentals of Microprocessor & Microcomputer- B.Ram- Danpat Rai Publication, 2000
2. Introduction to Microprocessors- Aditya P Mathur- Tata Mc Graw Hill- 3rd edition, 2000

ELE 552: Practical VI

List of Experiments

1. Program to add & subtract two 8- bit numbers
2. Program to add two 16 bit numbers
3. Program to subtract two 16 – bit numbers
4. Program to multiply two 8-bit numbers
5. Program to find the square of an 8-bit number
6. Program to display the smallest number in a given array of numbers
7. Interfacing with Seven segment Display
8. Interfacing with DAC
9. Interfacing with a square wave generator
10. Interfacing with a stepper motor
11. Interfacing with ADC

Reference Books:

1. Microprocessor Lab primer- K A Krishnamurthy, Interline publishing Co, 1995
2. Hand book of experiments in electronics and communication engineering- S Poornachandra Rao and B Sasikala, VIKAS Publishing House, 2004

SEMESTER V

ELE 531: COMMUNICATION –I (45 hrs)

UNIT I: Electromagnetic spectrum, propagation of EM waves &Noise (8hrs)

EM spectrum Terrestrial propagation of EM waves: Ground wave .Space wave (line of sight) propagation-Microwave propagation radio horizon

Sky wave propagation, formation of ionosphere, importance, Propagation terms and definitions: Virtual height, Critical frequency, maximum usable frequency and skip distance

Noise-definition: Types of noise –Internal and External Noise

Signal to Noise ratio-definition and equation

Noise figure definition and equation

Unit 2: Analogue Modulation Techniques (15 hrs)

Introduction to communication system. , Block diagram of general communication system-function of each block. Modulation-definition of communication and modulation, Need for Modulation Types of modulation-AM.FM &PM –definitions

Amplitude modulation –waveform representation, Expression for instantaneous voltage –derivation, Frequency spectrum. Modulation index, Power relations-derivation of the expressions for total power radiated, side band power and current calculations

Modulation by several sine waves –derivation of the expression for m

Numerical problems on all the above expressions

Generation of AM –Principle, requirements. Collector Modulator –circuit, working advantages

Block diagram of AM transmitter, Function of different stages, Advantages of SSBSC-Limitations of AM.

Frequency modulation-Definition and wave form representation. Definitions of the terms frequency derivation, carrier swing, Modulation index, deviation ratio and percentage modulation.

Expression for instantaneous voltage –derivation, Frequency spectrum (qualitative mention only with general diagram) Bandwidth requirements .Generation of FM

Varactor diode modulator –circuit diagram and working, FET reactance Modulator, circuit diagram and working.
Block diagram of FM Transmitter –Function of different stages with AFC. Pre emphasis and de emphasis, Comparison of AM and FM

UNIT 4: Transmission lines, Antenna (7 hrs)

Transmission line–definition examples-Two wire parallel line, Coaxial line, wave-guides optical fibre cable, ideal transmission line (definition) Equivalent circuit of transmission line –diagrams for low frequency and for high frequency equivalent. Primary and secondary constants-L, R, C, Z, Y –definitions
Characteristic Impedance-definition $Z_0 = \sqrt{Z/Y}$ .For high frequencies $Z=\sqrt{L/C}$, Z of parallel wire line, Z of coaxial line –no derivations
Propagation constant-definition $Y=\alpha+j\beta=\sqrt{ZY}$ no derivation
Reflection coefficient definition expression for K for a loaded line-derivation SWR-definition in terms of I &V, expression for SWR for a loaded line, derivation of relation between K&S, standing wave patterns for shorted and open lines.
Numerical problems on all above equations
Antenna: radiation mechanism-Evolution of the dipole from open circuited transmission line ,elementary doublet, radiation pattern ,expression for radiation field-no derivation
Resonant antenna-definition, radiation pattern and current distribution for $l=\lambda/2$, $2\lambda/2$, $3\lambda/2$ grounded antenna
Non resonant antenna-definition, radiation pattern for a long wire antenna-qualitative
Antenna parameters-definitions and expressions for gain, directive gain, power gain, directivity, beam width and band width

Radiation resistance definition, derivation of expressions for total power radiated and radiation resistance considering expression of electric field intensity
Expression for radiation efficiency –mention
Numerical problems
Yagi antenna-design of three element yagi antenna and applications

UNIT 5: Television (15 hrs)

Introduction to TV-Basic principles of picture transmission –Scanning Horizontal and vertical scanning ,interlaced scanning –explanation with diagram, requirements and advantages .horizontal and vertical scanning frequencies and calculations-numerical problems. TV camera tube-Vidicon –diagram, principle and working
Composite Video signal-diagrammatic representation &explanation of various components
Blanking &Synchronizing Pulses, Vestigial Side band Transmission –explanation with diagram
Simplified Block diagram of Monochrome TV Transmitter-Function of each block
Simplified Block diagram of Monochrome TV Receiver –Function of each block
TV Systems &Standards-Mention about NTSC, PAL &SECAM.Comparison between American and European systems

Basic Principles of colour TV-Primary and Secondary colours, Compatibility
Colour Combinations-chromo &Luminescence processing as per PAL system-luminance equation
Simplified block diagram of PAL colour TV Receiver –Function of each block. Numerical problems

Books Recommended:

1. Electronic Communication, Dennis Roddy &John Coolen –IV edition-PHI, 2005
2. Electronic Communication systems, Kennedy &Davis IV the edition, TATA Mc GRAW Hill, 2005.
3. Electronic Communication systems, Wayne Tomasi –V edition –Pearson education, 2005

Reference Book:

Advanced Electronic Communication System,, Wayne Tomasi –VI edition, Pearson education, 2005

ELE 551: Practical V

List of experiments

1. Astable Multivibrator using IC 555
2. Monostable Multivibrator using IC 555
3. Saw- tooth wave generator using IC 555
4. Voltage Controlled oscillator using IC 555
5. Schmitt Trigger using IC 555
6. Amplitude Modulator
7. Pre- emphasis
8. De-emphasis
9. Frequency Modulator
10. Automatic gain control

Reference Books:

1. Handbook of experiments in electronics and communication-Poorna Chandra Rao & Sasikala, VIKAS Publishing house, 2004
2. Basic Electronics -A text lab manual,-PaulB.Zbar, Albert P.Malvino &Michael A.Miller-Tata Mc GRAW Hill, 1997.

SEMESTER V

ELE 532: MICROCONTROLLER AND APPLICATIONS (45 hrs)

UNIT 1: Introduction (5 hours)

Comparison between micro controller and general purpose microprocessor, different types of microcontrollers- embedded and external memory type, classification based on word size, applications. Qualitative description of RISC and CISC CPU architectures-

UNIT 2: Architecture of 8051(10 hours)
Architecture of 8051, key features of 8051, I/O ports, memory organization, counters and timers, serial I/O ports, interrupts.

UNIT 3: 8051 instruction set (12 hours)
Addressing modes of 8051, instruction set, data move, arithmetic, logical, jump and call instructions

UNIT 4 : Assembly Languge programming of 8051 (6 hours)
Programmes for data transfer. Memory operations, arithmetic, logical , sorting

UNIT 5 Applications of 8051(12 hours)
Review of basic concept of interfacing, PPI 8255, Interfacing of keyboards, Interfacing of display devices, pulse measurement, analog to digital and digital to analog converters, Interfacing – hardware circuits using 8255, multiple interrupt programs.
Different microcontrollers

Book Recommended:
1. The 8051 microcontroller and embedded system- Muhammad Ali Mazidi and J G Mazidi & R.D McKinlay , Edition 2006
2. The 8051 microcontroller Architecture programming and Applications- Kenneth J Ayala second Edition 2005 Pen ram International Publishing PVT. Ltd.

Reference Books:
1. Microcontroller Architecture programming Interfacing and system design, Raj Kamal Edition 2005 Pearson Education.
Fundamentals of Microprocessor & Microcomputer- B.Ram- Danpat Rai Publication, 2000
2. Microprocessor and Interfacing – Douglas V Hall, Tata Mc Graw Hill- 3rd edition, 2000

ELE 552: Practical VI

List of Programs

1. Program to add & subtract two 16- bit numbers
2. Program to multiply& divide two 8-bit numbers
3. Program to display the smallest number in a given array of numbers.
4. Program to find the ascending /descending order of the numbers given in an array
5.Interfacing with keyboard
6. Interfacing with DAC

7.Interfacing with stepper motor
8.Interfacing with ADC

SEMESTER VI

ELE 631: COMMUNICATION –II (45 hrs)

Unit 1: Pulse and Digital communication systems (10Hrs)
Introduction-sampling theorem, Pulse modulation types-PAM, PWM, PPM, brief description, waveforms, PCM-Quantization
Digital communication systems –Introduction to digital modulations. FSK, PSK and ASK- brief description, waveforms, Advantages and disadvantages of digital transmission. Applications.
Characteristics of data transmission circuits-Shannon limit for information capacity Bandwidth requirements, data transmission speeds, Noise, Cross talk, Echo suppressors, Distortion and equalizer, Modems-Classifications, modes of modem operation.

UNIT2: Satellite Communications (12 hrs)
Introduction, satellite orbits, satellite system-block diagram of satellite sub systems (space segment), ground station (simplified block diagram of earth station), uplink, downlink, cross-link, Transponder (C-band multi channel), antenna systems
Multiple access methods - TDMA, FDMA, and CDMA.GPS –services like SPS & PPS

UNIT 3: Optical fibre Communications (12 hrs)
Introduction-need for optical fiber communication, Block diagram of OFC system, Core and clad concept, light propagation through optical fibre, Expressions for acceptance angle and numerical aperture.
Light sources-Requirements and examples. Construction and working of unguided LASER diode.
Photo detector –requirements and examples. Construction and working of Avalanche photo diode. Advantages and disadvantages of fibre optic communication, Losses in optical fiber cables.

UNIT 4: RADAR (5 Hrs)
Principles-introduction –frequencies and power
Block diagram of Pulsed radar system-Elementary block diagram and function of each block.
RADAR range equation Derivation of the expression and factors influencing maximum range
Applications of RADAR-classification under military, civilian and scientific

UNIT 5: Advanced Communication systems (06 hrs)

Facsimile –Block diagrams of transmitter and receiver, Electronic CCD scanning. Concept of cellular mobile communication-cell and cell splitting, frequency response, Roaming and Hand off, Block diagram of cellular mobile communication system, Simplified block diagram of cellular phone Hand set, Advantages and disadvantages.

Books Recommended

1. Electronic Communication, Dennis Roddy &John Coolen –IV edition-PHI, 2002
2. Electronic Communication systems, Kennedy &Davis IV the edition _TATA McGraw Hill, 2005
3. Advanced Electronic Communication System, Wayne Tomasi, PHI, VI Edition, 2005.

Reference Books:

1. Electronic Communication systems, Wayne Tomasi–Pearson education, Vth edition 2005
2. Basic Electronics, A text lab manual,-PaulB.Zbar, Albert P.Malvino &Michael A.Miller-Tata Mc GRAW Hill, 1997.
3. Electronic devices and circuit theory, Robert Boylestad and Louis Nashelsky, PHI, 6th Edition, 2002
4. Satellite communication-Agarwal-Khanna publishers, New Delhi, 2000
5. Communication Electronics, Frenzel, TMH, 3rd Edition, 1999

ELE 651: Practical VII

List of Experiments:

1. PWM and PPM using IC 555
2. PAM using transistor
3. FSK modulation using IC 555
4. ASK Modulation using Op-Amp
5. Construction of regulated power supply using IC 7805 and IC 7905
6. Audio cross over network
7. Characteristics of Optical fiber
8. Transmission and reception through optical fiber.
9. Frequency Multiplier using transistors
10. Frequency Mixer using IC 565

Reference Books:

Handbook of experiments in electronics and communication-Poorna Chandra Rao &Sasikala, VIKAS Publishing House, 2004

SEMESTER VI

ELE 632: ELECTRONIC INSTRUMENTATION (45 hrs)

UNIT 1: INTRODUCTION (7 hrs)

Performance characteristics: static and dynamic. Errors in measurement, Types of errors, sources of errors (qualitative), dynamic characteristics- Speed, Lag, Fidelity and dynamic error. Dynamic response- zero order, II and I order instruments -expression, description and examples.

UNIT 2: TRANSDUCERS (15 hrs)

Introduction, electrical transducers, advantages. Selecting a transducers, classification of transducers- Passive, active, digital and analog types, definition and examples

Resistive transducers- Strain gauge- theory, types- unbonded, bonded metal wire, foil and semiconductor type, Basic theory, advantages, disadvantages.
Thermistor- construction, types, resistance- temp characteristics, applications
Thermocouple- principle of operation, advantages and disadvantages, IC temperature sensors LM 34/35 (mention only), Resistance thermometer – construction, advantages, limitations, Inductive transducers-Reluctance type- construction, working
Linear variable differential transformer (LVDT) - construction, working, advantages.
Capacitive transducer-Principle, Pressure transducer- construction, working.
Photo electric transducers, Photovoltaic cell, photo diode and photo transistor- working principle, applications.Piezo electric transducer, working principle, applications.

UNIT 3: SIGNAL CONDITIONING (8 hrs)

Introduction, Block diagram of signal conditioning, review of op-amp basics, Op-amp basic block diagram. Voltage to Current converter, Current to Voltage converter, expression for output. Integrator, differentiator using IC 741 - derivation for output and waveforms. Practical differentiator Practical integrator

Basic Instrumentation amplifier- important features, differential instrumentation amplifier using transducer Bridge, output voltage derivation. Logarithmic amplifier, circuit description and output expression.

UNIT 4: DATA ACQUISITION AND CONVERSION (7 hrs)

Introduction, general data acquisition system (DAS), objective of DAS, Single channel and multi channel DAS block diagrams qualitative description.

Digital to Analog converter- R-2R ladder and binary weighted ladder circuits, brief analysis. D to A using op-amp summing amplifier. Analog to Digital converter- Successive approximation method, Flash ADC, block diagram explanation.

UNIT 5: ELECTRONIC INSTRUMENTS (8 hrs)

Digital voltmeter- features, advantages and performance characteristics, digital voltmeter types, ramp type digital voltmeter, dual slope type digital voltmeter,- block diagram, working principle, advantages and disadvantages, Digital multimeter, Electronic Counter, Frequency meter, capacitance meter- Block diagram, working and applications, resolution and sensitivity of digital multimeter,. Oscilloscopes-analog dual trace type, block description and principle of operation.

Storage Oscilloscopes- analog and digital Principle of operation. Basic spectrum analyzer- concept and block diagram, qualitative description.

Book Recommended:

Electronic Instrumentation, H.S.Kalsi, 2nd Edition, TMH, 2005

Reference Books:

1. Electronic Instrumentation and measuring Techniques, W.D. Cooper, A.D. Helfrick 3rd Edition, PHI, 2000
2. A Course in Electrical, Electronics Measurement and Instrumentation, A.K. Sawhney, Dhanpat Rai & sons, 1996.
3. Instrumentation devices and systems, C.S.Rangan, G.R.Sarma, VSV Mani, TMH, 1998

ELE 652: Practical VIII

Project Work

Project work to be completed in eight classes

Students will independently assemble one Electronic Project. The members of the faculty will guide the students. Each student should write a brief report about the project including the components used and their specification, working of the circuit, applications of the project and submit the same at the time of practical examination duly certified by the concerned faculty and HOD

Disclaimer: The II and III year B.Sc.curriculum are subjected to the approval of the Board of Studies