Program Specifications of the
Post graduate programs offered by the department

1. **Name of the program: Master of Science in Electronics**
2. **Specializations available:**

Communication Electronics

3. Program Specifications

School of Studies: School of Physical Sciences
Department: Pure & Applied Physics
Program: M.Sc. (Electronics)
Head of the Department: Prof. P.K. Bajpai

Date of Approval in Board of Studies: 30.04.2019
Date of Last revision: 2019
Next revision due: 2021

4. Mode of Study: Full time (Semester system):

Class room teaching; experiential learning; Tutorials; experimental laboratory training; minor projects with hands on training in all semesters, One semester major project in final semester and industrial training.

Back ground and purpose of the course:

Science & Technology has emerged as the most important vehicle for the national development and social transformation. With the make in India program, the need for qualified human resource for various electronics based industries such as Solving the major challenges country is facing today needs skilled human resource well versed in the basic fields of physics. A sound knowledge of physics plays an important role in the years to come for managing the Science & technology driven developmental efforts as well as to provide and transfer this knowledge to the next generation. In our country, teaching/research in Electronics is being carried out in limited universities and establishments. After nearly two decades of IT revolution and its booming economic impact on the country, there is a positive trend and appreciation for the role and importance of basic sciences for further technological advancement. There is a need for qualified and competent post graduate students with sound knowledge in Physics in general and specialized technology related to the above specializations in particular. Although there are numerous institutions and universities which offer post graduate degree courses in Solid State Physics, vast majority of them offer more conventional content based academic curriculum which inherently lacks application oriented approach, which is essential to make the degree programme more fulfilling and professional from student career perspective. The School of Physical Science offers the M.Sc.(Electronics) course with an outcome based curriculum emphasizing the Critical, Analytical and Problem Solving skills to equip the students to pursue their scientific and research career with better preparedness and matured professional outlook. The presence of other allied Faculties of the University provides additional exposure to students the multi-disciplinary approach which is emerging as a key differentiator in the success of modern scientific and engineering endeavors.

Learning outcome

M.Sc. Electronics is a four-semester course spread over the period of two years. It is designed to offer in depth knowledge of the subject starting from its basic concepts of electronic Science to the state of art technologies used in ICT enabled systems, telecommunication, computer electronics, Defense and other critical sectors. Students are also provided extensive laboratory training on the course content and the current requirements of industries and R and D. In the final semester every student has to go to industries, academic institutions to undertake a project, which is based on the specialization, he/she opts for. Specialization in the areas of communications electronics is offered. Special feature of the course is the

course Mathematical methods in electronics offered with the objective of strengthening the mathematical foundations of Electronics of the students. In addition the course caters to the requirements of providing complete exposure to NET/SET syllabus for Electronics. Advantages of the course include: -

- The course revised in the year 2019 to be implemented from the academic year July 2019 provides exposure to the students to the technologies in-vogue and trains them to take up projects relevant to the industrial needs, the R& D activities and self –employment opportunities.

- The student after passing the M.Sc course has many opportunities of employment, self-employment and higher studies. Employment Opportunities: - – Electronics and Telecommunication Industries. I.T. Industries (India and Abroad). – Process and Manufacturing Industries. – Research and Development Laboratories. – Employment as a teacher and Other Govt. Organizations. Educational Opportunities: - – Higher studies in I.I.T, I.I.Sc, and CEERI Pilani. Knowledge gained.

After completing the program, a student is expected to attain

- Substantial knowledge in Electronics, basic knowledge in mathematics, and knowledge in supported fields like computer science, Physics and/ or chemistry.
- Has some research experience within a specific field of physics, through a faculty supervised Master Dissertation (project).
- Has advanced knowledge in some areas in physics (Field of specialization).
- Gets significant exposure of various domains and contemporary research within various fields of physics.

Skills

The students are inculcated

- the background and experience required to model, analyze, and solve advanced problems in physics.
- is able to apply advanced theoretical and/or experimental methods, including the use of numerical methods and simulations in applied fields.
- can combine and use knowledge from several disciplines.
- can critically and independently assess and evaluate research methods and results.
- has the ability to develop and renew scientific competence -- independently,
- is able to enter new problem areas that require an analytic and innovative approach.
- can disseminate subject matter and results to both specialists and a broader audience.

General competence

The candidate

- Understands the role of physics in society and has the background to consider ethical problems.
- Knows the historical development of physics, its possibilities and limitations, and understands the value of lifelong learning.
- Is able to gather, assess, and make use of new information.
- Has the ability to successfully carry out advanced tasks and projects, both independently and in collaboration with others, and also across disciplines.
- Has an adequate background for pursuing pedagogic education.
- Has an international perspective on her/his discipline.

M.Sc. (Electronics)

PROGRAMME SPECIFIC OBJECTIVES:

- To develop strong student competencies in Physics and its applications in a technology-rich, interactive environment.
- To develop strong student skills in research, analysis and interpretation of complex information.
- To prepare the students to successfully compete for employment in Electronics, Manufacturing and Teaching and to offer a wide range of experience in research methods, data analysis to meet the industrial needs. Programme outcomes On completion of program, the graduates will
- Apply knowledge and skill in the design and development of Electronics circuits to cater to the needs of Electronic Industry.
- Become professionally trained in the area of electronics, optical communication, nonlinear circuits, materials characterization and lasers.

Course Specific Objectives & Learning Outcomes		
Course Code	**Course name**	**Objectives and Learning outcomes**
El-101	Electronic Materials	**Students will try to learn:** 1. The subject of Electronic Materials has been one of the key drivers for the advancement of Science and Technology. This course aims to build the foundation and inspire the interest of freshmen enrolled. This course will focus on fundamental concepts and basic principles that are related to the Materials for Electronics and the latest progress in this field. 2. The courses are designed to teach timeless fundamentals underlying the discipline, while preparing the students to apply modern day approaches to materials problems. In addition to coursework, there is ample opportunity to become involved in cutting edge Materials Science. 3. The curriculum consists of a carefully chosen set of core courses, accompanied by a set of selective topics enabling the student to excel in a sub-discipline of their choosing either tailored especially for them (through discussions with their academic advisor). 4. Use the fundamental science and engineering principles relevant to materials that include the relationships between nano/microstructure, characterization, properties, processing, performance and design of materials. 5. Use their knowledge of the significance, the value of continued learning and environmental/social issues surrounding materials. **After successful completion of the course student will be able to** 1. Understand the structure and properties of electronic materials. 2. Understand the structure property correlations. 3. Describe the underlying physical phenomena of magnetic, semiconductor materials, dielectrics and organic materials 4. Explain the new developments made in materials for design and fabrication of electronic devices. 5. The course provides an introduction to materials that are used in the realization of electronic devices. The materials encountered include semiconductors, dielectrics, and organic materials. The electrical, thermal and physical properties of these materials are covered with reference to their applications in electronic devices. The course will also cover typical synthesis and characterization methods for these materials. Recent advances in the applications of these materials for energy, optical, and flexible devices will be presented.

El-102	Electrodynamics	**Course outcome:** • Understanding of the interrelation of the electric and magnetic fields. Solving the core equations using different coordinate systems. • Understanding of the propagation of electromagnetic wave in different medium and related phenomena. • Understanding of the reflection, refraction, polarisation and dispersion phenomena in depth. • Understanding of the waveguide and cavity resonators
El-103	Integrated Devices And Circuits	**Course Objectives:** • To study the basic principles, configurations and practical limitations of op-amp. • To understand the various linear and non-linear applications of op-amp • To analyze and deign op-amp oscillators, single chip oscillators and frequency generators • To analyze, design and explain the characteristics and applications of active filters, including the switched capacitor filter, sensors. • To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor. • To analyze different types of Multi vibrators and their design procedures. **Course Outcome:** • This course provides the foundation education in operational amplifier and other linear integrated circuits. Through lecture, laboratory, and out-of-class assignments, students are provided learning experiences that enable them to: • To discuss the op-amp's basic construction, characteristics, parameter limitations, various configurations and countless applications of op-amp. • To analyze and deign basic op-amp circuits, particularly various linear and non-linear circuits, active filters, signal generators, and data converters. • Able to design non-linear wave shaping circuits Clippers and Clampers. • Able to Analyze and design multivibrators.
El-104	Digital Electronics	**Course Objective**- 1. To understand number representation and conversion between different representation in digital electronic circuit. 2. To analyze logic process and implement logical operation using combinational and sequential logic circuit. 3. To understand characteristics of memory and their classification. **Course Outcomes**- 1. Develop a digital logic and apply it to solve real life problems. 2. Analyze design and implements combinational and sequential logic circuits.
El-105	Basic Electronic Laboratory	**Course Objective-** • To understand the physical construction, working and operational characteristics of Semiconductor devices and digital electronic concepts. **Course Outcomes-** This course provides students the fundamental concepts of Electron Devices through lecture, laboratory, and out-of-class assignments, students are provided learning experiences that enable them: • To demonstrate the ability to design and conduct experiments, analyze and interpret data of Semiconductor devices and digital electronic concepts.

El-106	Minor Project Work	After successful completion of the course, students will be able: • To develop an optimal solution through extensive research work. • To understand the practical implementation of theoretical learning. • To interact with the renowned research institutions with the innovative ideas and latest development in the field of research , etc.
El-201	Signals And System	**Course Outcomes** • After successful completion of the course, students will be able to: • How to know about signal and system, to differentiate and to relate them, their types and properties. • System modelling with examples of mechanical and electrical circuit using differential and difference equation. • State equation and how to get state matrix in continuous and discrete system, multi input and output system and similarity transformation. Numerical of continuous and discrete time system with analysis of their input and output relation. • Understanding the connection to theory and project work, practical.
El-202	Electronic Communication Methods & Radar	**Course objective:** • The fundamentals of basic communication system need of modulation, modulation processes and different amplitude modulation schemes. • Different angle modulation schemes with different generation and detection methods. • Various radio receivers with their parameters. • Generation and detection of pulse modulation techniques and multiplexing. • Study different RADAR and its supporting systems. **Course Outcome:** • Understand different blocks in communication system. • Distinguish between different amplitude modulation schemes with their advantages, disadvantages and applications. • Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes. • Identify different radio receiver circuits and role of AGC. • Able to discriminate different Radars, find applications and use of its supporting systems. • Able to find various applications of Radar.
El-203	Semiconductor Devices & Fabrication	**Course Outcome:** After successful completion of the course students will be able to : • Know the physics of semiconductor junctions, metal-semiconductor junctions and metal-insulator-semiconductor junctions. • Know the physics and application of semiconductor hetero junctions and quantum-confined structures. • Understand the fundamental principles and applications of modern electronic and optoelectronic semiconductor devices • Understanding the connection to theory and project work , practical.
El-204	Computer Application In Electronics	**Course Objectives-** • To understand basic architecture of 16 bit microprocessor. • To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system designs. • To provide complete basic knowledge of C language. Students will be able to develop logics which will help them to create program. **Course Outcomes-** • Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor and write programs to run on 8085 based systems. • Understand the device techniques for faster execution of instructions. • The students will be able to develop applications on C programing.

El-205	Digital & Communication Electronic Laboratory	
El-206	Minor Project Work	
El-301	Communication Electronics	
El-302	Fiber Optics & Optical Comm	**Course Objectives** • To prepare students to compete for a successful career in Electronics and Communication profession through global education standards. • To produce skillful students to analyze, design and develop a optical fiber based communication system /component/ process to cater the essential communication need of the society • To train the students to approach ethically any multidisciplinary challenges with economic, environmental and social contexts. • To create awareness among the students about the need for lifelong learning to succeed in their professional career as Electronics and Communication service Engineers.
El-303	Digital Comunication & Networking	**Course Objective-** • Investigate the fundamental issues driving network design • learn about dominant network technologies. **Course Outcomes-** • Demonstrate the ability to unambiguously explain networking as it relates to connection of computers media and devices(routing) • Distinguish between analog and digital signals and understand their characteristics (Fourier representation signals)
El-304	Sensor And Transducers	**Course Objective :** • To make students familiar with the constructions and working principle of different types of sensors and transducers. • To make students aware about the measuring instruments and the methods of measurement and the use of different transducers. • To know the construction and working of frequently used equipment's like CRO, Signal generator, spectrum analyzer etc. **Course Outcomes:** At the end of the course, a student will be able to: • Use concepts in common methods for converting a physical parameter into an electrical quantity. • Classify and explain with examples of Sensors. • Classify and explain with examples of transducers, including those for measurement of temperature, strain, motion, position and light. • Locate different type of sensors used in real life applications and their importance • To be familiar with various computers controlled test systems.
El-401	Major Project Work With Dissertation	
El-402	Practical Training In Any Of The Fields	

COURSE STRUCTURE OF M. SC. ELECTRONICS			
First Semester	CODE	SUBJECT	MARKS
Paper–I	El-101	Electronic Materials	100
Paper-II	El-102	Electrodynamics	100
Paper-III	El-103	Integrated Devices And Circuits	100
Paper-IV	El-104	Digital Electronics	100
Paper-V	El-105	Basic Electronic Laboratory	100
Paper-VI	El-106	Minor Project Work	100
Second Semester			
Paper-I	El-201	Signals And System	100
Paper-II	El-202	Electronic Communication Methods & Radar	100
Paper-III	El-203	Semiconductor Devices & Fabrication	100
Paper-IV	El-204	Computer Application In Electronics	100
Paper-V	El-205	Digital & Communication Electronic Laboratory	100
Paper-VI	El-206	Minor Project Work	100
Third Semester			
Paper-I	El-301	Communication Electronics	100
Paper-II	El-302	Fiber Optics & Optical Comm.	100
Paper-III	El-303	Digital Communication & Networking	100
Paper-IV	El-304	Sensor And Transducers	100
Fourth Semester			
Paper-I	El-401	Major Project Work With Dissertation	100
Paper-II	El-402	Practical Training In Any of the Following Fields	100

M.Sc (Electronics)

FIRST SEMESTER

Paper –I : **EL-101 Electronic Materials**

Unit-1 Fundamentals of materials science – Relative stability of Phases, Phase rule, Phase Diagram, **Phase Transformations:** Elementary idea of Nucleation and Growth, methods of crystal growth.

Defects in crystals: Elementary idea of point, line and planar defects.

Materials in thin film form: Concept of thin films, preparation of thin films, and deposition of thin film using sputtering methods (RT and Glow discharge).

Unit-2 Special Materials in Electronics:

Composite material: Composites of glasses, polymers metals and ceramics, properties and applications.

Polymers: Mechanism of polymerization, conducting polymers, application of polymers in electronics.

Metallic Materials: Functional gradient materials, shape memory alloys, amorphous materials, IC package materials.

Liquid crystal polymers: Optical properties of cholesteric and chiral nematics liquid crystal displays, optical fiber materials.

Unit-3 Dielectric and Ferroelectric Materials:

Dielectric materials as capacitive elements, polar dielectrics, properties and applications in electronics.

Ferroelectrics: physical properties and classification, properties modifications, non-linearities, applications in electronic devices.

Unit-4 Magnetic materials:

Ferro magnetic materials and their application transition metals and alloys as ferro- magnets, hard and soft magnetic materials.

Ferrites: Elementary idea of spinels. Garnets and Hexagonal ferrites, application of ferrites in electronics, magnetic bubbles.

Books Recommended:

1. Material science in engineering :V. Raghavan
2. Element of material science and Engineering :L.H.Van Vlanck
3. The structure and properties of materials : R.M. Rose and J. Wulf
4. Liquid Crystal : S.Chandrasekhar
5. Material Science, C.M. Gupta.

PAPER - II : EL-102 : ELECTRODYNAMICS

UNIT-I Gauss's law, Scalar potential, Poisson's and Laplace equation and their solution in Cartesian coordinates, Electrostatic potential energy. Dielectrics and its polarization. Polarization of non-polar molecules (Classius- Mossatti relation). Bio–Savart Law. Vector Potential, Ampere's Circuital law, Energy Density in Magnetic field.

Unit –II Maxwell's equation in terms of Scalar and Vector potential, Gauge transformations, Lorentz and Coulomb gauge. Retarded potentials. Radiation from an oscillating electric and magnetic dipole with simple applications.

Unit-III Polarization by reflection, Total internal reflection, Electromagnetic waves in conducting medium, Normal and anomalous dispersions.

The dielectric tensor of an anisotropic medium, the structure of monochromatic plane wave in an anisotropic medium, the phase velocity and ray velocity. Fresnel's formula for the propagation to E.M. waves in crystals.

Unit-IV Wave guides and resonant cavities, cylindrical cavities and wave guides, modes in rectangular wave guides, energy flow and attenuation in wave guides, modes in rectangular. Resonant cavities, power losses in cavities.

Books Recommended :

1. Classical Electrodynamics :Jackson .J.D
2. Introduction to electrodynamics : Griffit hD.J.
3. Optics : Mathur B. K.
4. Electromagetrics : Laud.B.B.
5. Electrodynamics, Satya Prakash

Paper -III: EL-103 : INTEGRATED DEVICES AND CIRCUITS

Unit-I The feedback concept, generalized voltage and current feedback (series and shunt). General characteristic of negative feedback amplifiers, current and voltage feedback circuit s, Emitter follower, Amplifier distortion, amplifier classification and characteristics, power and efficiency of amplifiers, Direct and Transformer coupled amplifiers, theory and applications of class A push-pull amplifier, working principle of class-B push-pull amplifier.

Unit-II Basic operational amplifier, Differential amplifier, transfer characteristics of a differential amplifier, IC operational amplifier, OP- AMP parameters and their frequency response. Application of OP- AMP as adder, Substractor, active filter, Noise in OP- AMP.

Unit-III Differentiating and Integrating circuit s, Clipping and Clamping circuits, co mparators, Multi-vibrators, waveform generators (sine, square and triangular), Frequency to voltage and Voltage of frequency conversion.

Unit-IV Active filters, Butterworth and Chebyshy, Salen and Key filters, Low and High Band Pass/Reject filters.
Fundamental definitions related to Opto-electronic devices, photo conductive sensors, application of photodiode and pho to-transistors (light operated relays and paper tape reader). Photo-multiplier tube. Light emitting diode, photo couplers.

Books Recommended:

1. Integrated Electronics : Millman & Haikias
2. Electronic Devices & circuit s : Mottershed
3. Electronic principles : Malvino
4. Operational Amplifiers : Clayton
5. Communication Electronics: Deshpande, Deshpande & Rangole.

Paper- IV:EL-104: DIGITAL ELECTRONICS

Unit-I Logic gates, Boolean Algebra, Simplification of logic circuits using Karnaugh map, Number system and codes, Signed Binary Numbers, Representation of fractions, Arithmetic circuits, Adder, Substractor, Code Convertor-decoder, Multiplexers and De- multiplexer, Seven segment and Dot matrix display.

Unit-II Logic families, TTL circuits, Totem-pole output, TTL parameters, TTL NAND gate, Open collector gates, Tri-state TTL Devices, external drive for TTL load, MOS Logic, Enhancement type MOSFET , CMOS characteristics, TTL and C-MOS interfacing.

Unit-III Flip- Flops R-S, D, T, J-K and Master slave J- K . Flip- Flops Registers, Buffer and shifts Registers, Binary Ripple counter of Mod-N. Synchronous counters, Ring counters, semiconductor memories, Memory Addressing logic, ROM, EPROM & RAM memories.

Unit-IV D-A Conversion: Weighted Register and Ladder Method, Sample and hold Circuit, A-D convertor, Simulation methods, Continuous method, Counter method, Successive approximation. A-D Accuracy, Resolution, Digital clock, Digit al Volt meter, Digit al Frequency meter.

Books Recommended:

1. Digit al Principles & Application : Malvino & Leach
2. Compter System Architecture : Moris Mano
3. Digit al Electronic : Schaum Series
4. Digit al Electronics Circuits : Samuel Lee
5. Digit al Electronics : R.J.Tossi (PHI)
6. Digit al electronics : R.P. Jain
7. Measurements & Instrumentation, Abhay Mansingh & M. Sayer.

Paper -V : EL-105: BASIC ELECTRONIC LABORATORY

Experiments based on Semiconductor devices & digital electronics concepts, are to be performed as assigned by the department.

PAPER -VI : EL-106 - MINOR PROJECT WORK

Every student shall be assigned a minor project work involving the design and study of some electronic circuit / devices, etc. so as to provide them experience in designing and understanding the aspects. It is aimed at generating self-confidence and giving practical experience.

SECOND SEMESTER

Paper -I : EL-201:SIGNALS AND SYSTEM

UNIT-1 Signal and System Modeling Concepts: Introduction of signal and system analysis, few examples of system, signals models, classification of signals, energy and power signals, energy and power spectral densities

UNIT –II System modeling and Analysis in Time Domain: Introduction to system modelling concepts, The superposition integral for fixed linear system , Convolution integral, Evaluation of convolution integral , Impulse response of a fixed linear system, superposition integral in terms of step response , stability of linear system modelling and simulation .

UNIT –III State Variable Techniques: Introduction, state variable concepts from the state equation, Time domain solution of state equation, frequency domain solution of state equations, finding the state transition matrices, equations for discrete system .

UNIT –IV Discrete time signal and system: Introduction analog to digital conversion, Z- Transform, difference equations and discrete time system, examples of a discrete system.

Books Recommended:

1) Signal and system: Continuous and discrete Second Edition. Maxwell Macmillan - Internal Edition 1990: Rodger , E- Ziemer .
2) Electronic signal and system (English Lanuage book society, Mac Millan low priced edition, 1990) : Paul A. Lynn .
3) Introduction to signal and systems (Second edition): Edward W. Kamen .
4) Signal and System: Copper.

Paper- II : EL- 202 : ELECTRONIC COMMUNICATION METHODS & RADAR

UNIT –I Amplitude modulation and Demodulation: Amplitude modulation: Current collector modulation, Square law modulation, Suppressed carrier balance modulator. Study of amplitude modulated transmission, square law detector, distortion in linear diode detector

UNIT –II Frequency Modulation and Detection: Reactance tube modulators, frequency modulation varactor diode, Armstrong Method of frequency modulation , frequency stabalization , F.M. receiver receivers , Limiters , F.M. detectors .

UNIT – III Introduction to digital communication, Sampling and Quantization, Time division multiplexing. Pulse Code Modulation, PCM encoding, delta modulation, Differential PCM , Adaptive delta modulation.

UNIT-IV Radar Communication: Contineous and pulse Radar system , General study of pulse Radar using a type indicator, Radar performance factors, Radar Transmitting systems, Rotatory spark gap modulators , Hard value pluser, Radar waveform range determination, Radar Antenna Duplexer , Radar receiver , Automatic tracking Radar, Doppler effect in Radar.

Books Recommended:

1) Modern Electric Communication : Miller .
2) Electronics Communication : Raddv . G. and Collen . J.
3) Electronic Fundamental & Application : Kennedy
4) Principle of Communication System : Taub & Schilling .
5) Electronic Fundamental & Application : Ryder I.D.

Paper- III : EL-203 SEMICONDUTOR DEVICES & FABRICATION

UNIT–I Junction & Contacts: P-N homo junctions, Thermal equilibrium, Depletion region, I-V Characteristics, Heterojunction model, current transport, Heterojunction parameter and criterion for material selection, Application of Heterojunctions, Ohmic contacts, Metal Semiconductor contacts.

UNIT–II Devices and application: SET, MOSFET, MOS–Diode, Microwave devices, Tunnel diode, IMPATT, Light emitting diode, Photovoltaic so lar cell, Characteristics, efficiencies, Fill factor, voltage factor, effect of series and shunt resistance, Material selection

UNIT–III Materials For Integrated Circuits and Fabrication Technology: Classification of IC's, Electronic grade silicon, Silicon shaping lapping polishing and wafer preparation, Vapour phase epitaxy, Molecular beam epitaxy, Optical lithography, Photomask, Photoresist and process, Limitation of optical Lithography, Idea of electron and X-ray Lithography, Wet chemical etching, reactive plasma etching.

UNIT-IV Microelectronic Fabrication: Fabrication of mono lithic diodes, Fabrication of integrated transistors, idea of burried layer fabrication, Monolithic circuit layout and design rule, Isolation methods, Monolithic FET, MOSFET, Processing idea of HEMT (High Electron Mobility transistor), CCD, MOS integrated circuit, Large and medium scale integrated, Hybrid Integrated circuit.

Books Recommended:

1) Integrated Electronics : Milliman and Taub
2) Microelectronics : Milliman and Gros
3) Thin film Phenomenon : K.L. Chopra
4) Hand Books Of Thin Film : Marshe l and Gland
5) Physics of Semiconductor devices : Michel Shur
6) IC Fabrication : J. A. Ellcott
7) Physics of Semiconductor Devices : S.M. Sze
8) Solid State Devices : Streetman
9) Physics of Semiconductor Devices : Dilip K. Roy

Paper- IV : EL-204 COMPUTER APPLICATION IN ELECTRONICS

UNIT-I Architecture of 8085: Organization of microprocessor(8085), General purpose resistors and register pairs, Concept of slage and their uses, General processing unit of microprocessors, Timing and control unit , Fetch and execute cycle, General discussions about input/output of microprocessors, I/O Sect ion, Useful I/O facilities and their control Concept of interfacing ,Types of interfacing devices, Interrupt facility advantage and disadvantage of interrupts, Simple interrupts system ,Direct Memory Access(DMA).

UNIT-II Assembly Language Programming: Concept of assembly language and assembler, The instruction of 8085,Op-codes, Mnemonics, Machine language and instruct ion cycle, Addressing techniques , Direct immediate, Relative indirect and indexed addressing, single address computer Organization, The memory reference instruct ions, Loop jump, Instruct ions Addressing Modes Stack, Call, Return instruct ion and their routines.

UNIT-III Introduction to Computer System & "C" Programming : Basic idea of computers, I/O devices, Programming concepts "C" Programming structure, Data types, Constant , Variable, Assignment declarations & expressions, Statement, Symptoic Constant, Different types of operators, Integers, Floating point in "C" , Data input and output controls, Print f and Scanf function, Putchar, Getchar, Arrays.

UNIT-IV Control statements and Decision making in "C" , If-else statement, Nesting of If in statement, While loop, do-while loop, For loop , Nesting of for loop, Newton-Raphson iteration method as example of "C" program, User defined Function, Function and structured programming, Local and global Variables, Declaration funct-ion, Arrays, Declarat ion , Init ializat ion and processing of Arrays.

Books Recommended:

1) Digital Computer Electronics and Microprocessor : A.P. Malvino
2) Introduction to Microprocessor : A.P. Mathur
3) Digit al System and Microprocessor : T.R. Padmanabhan
4) Introduction to Microprocessor : La Leventhal
5) Microprocessor Assembly Language and Architecture :
6) Microprocessors : B.Ram
7) Fundamental of Computer : B. Ram /Rajaraman

Paper-V : EL-205: DIGITAL & COMMUNICATION ELECTRONIC LABORATORY

Experiments based on communication & digit al electronics concepts are to be performed as assigned by the department.

PAPER-VI : EL-206 - MINOR PROJECT WORK

Every student shall be assigned a minor project work involving the design and study of some electronic circuit / devices, etc. so as to provide them experience in designing and understanding the aspects. It is aimed at generating self-confidence and giving practical experience.

THIRD SEMESTER

PAPER- I : EL-301: COMMUNICATION ELECTRONICS

Unit-I Microwave Electronics. Characteristics. feature of microwave Application of microwave, Generation of microwave by tubes, Limitation of conventional tubes, Klystron ,Reflex Klystron, Magnetron, Travelling wave tube.

Unit -II Definition of microwave, Microwave - power- measurement, Impedance measurement, Frequency measurement, VSWR measurement in wave guide, Isolator, Modulator. Directional Coupler, Magic tree.

Unit -III Transmission Lines: Voltage and Current equation for transmission lines, Reflect ion and transmission coefficient, Standing wave and standing wave ratio, Impedance matching.

Unit -IV Antenna Theory: Radiation Mechanism, Elementary doublet, Current and Voltage antennas, Resonant/ Non Resonant Antennas, Antenna Gain, Beam width , Polarization, Directivity, Radiation Resistance, self and mutual Impedance , Dipole array, Hog Antenna.

Books Recommended:

1. Microwave: K.C. Gupta
2. Microwave circuit s: A. Y. Liyo
3. Electronics communication system; George Kenedy
4. Electronics communication: Sanjeeva Gupta
5. Antenna (MGH): Kraus

PAPER- II :EL-302: FIBRE OPTIC'S & OPTICAL COMMUNICATION.

UNIT-I Optica1 fibre modes and configuration, fibre types, Ray optics, representation, mode of the circular waveguide, Waveguide equation, Wave equation for Step index fibre, Model equation, modes in step index fibre, power flow in step index fibre.

UNIT -II Fibre Material fabrication attenuation, Absorption, Scattering losses. Radiative losses, Core & Cladding Losses, Signal distortion in optical waveguide, Information capacity determination, Group delay, Material Dispersion, Wave Guide Dispersion.

UNIT-III Light Emitting Diode, Light source Material, Internal Quantum Efficiency, Modulation capability, Transient Response, Power band width product, LASER diode, LASER -diode structure and Threshold Conditions, Model properties and radiation pattern modulation.

UNIT -IV Temp. effects, Idea of power launching and coupling idea of integrated optics, Fundamental receiver operation, Digital, signal transmission, Error sources, Receiver configuration Digit al receiver performance calculation, Receiver noise ; Shot noise, Pre-amplifier design, High impedance FET amplifier.

Books Recommended:

1. Optics Fibre: G. Keiser
2. Opto e1ectronics : Ghatak

PAPER- III : EL-303 DIGITAL COMUNICATION & NETWORKING

UNIT-I Digital Modulation Techniques: Introduction, BPSK, DPSK, QPSK M-ary FSK minimum shift keying, Duo binary co ding. Coding: Introduction, Parity check bit, coding for error detection and correction, Binary block codes, coding and decoding, Examples of algebraic code, Burst error correction, Convocation coding & decoding.

UNIT-II Noise and Information Theory Regmter Noise: Noise temperature: Noise band width, Noise figure & noise bandwidth cascaded amplifier. Information Entropy, Mutual information, information rate coding to increase- average information per bit, Shannon's theorem, channel capacity, capacity of Gaussain's Channel.

UNIT -III Computer network & communication Transmission media, data transmission circuit, Types of network (Packet and message switching techniques), Network topologies, wide' metropolitan and local area network, layered network, architecture, network protocols, network interfaces and standards modems, RS-232 C, X-25, IEEE 802.

UNIT-IV Advanced Communication System: Evolution of Internet, internet Architecture; goals and key issues related to internetworking technologies; internet connectivity (dial up, dedicated lines, broadband, DSL, radio, VSAT etc.) Domain name-scheme, Techno logy and tools relevant for web access- (FTP, E- mail, search tools etc.). Internet Security. Satellite communication, Mobile Radio, Optical communicat ion, ISPN, View of Telecommunication.

Books Recommended:

1. Communication system: Simon I Laykins.
2. Principle of Communication system: Taub & Shilling
3. Electronic Communication: Kenedy
4. Electronic Communication: D.Roddy &Toolen
5. Computer Network: Tanenbaum

PAPER- IV : EL-304 SENSOR AND TRANSDUCERS

UNIT-I Optical sensors: Spectral response, Photoconductive sensors, Junction type photoconductors (PIN and PIN diode, NPN), Photo diode, photo resister, Application of photodiodes and photo resister in light operated relays, Electro-optics, shaft encoder, Photo-voltaic sensors, Photo emissive-sensors.

UNIT-II Transducers-I. Classification of transducers, Selecting a transducers, strain gauge, Gauge factor, Metallic sensing element, Gauge configuration, Idea of displacement transducers, capacitive and inductive transducers, Variable differential transformer, Oscillation, transducer.

UNIT-III Ttansducers-II: Photoelectric transducers, Piezoelectric transducers, potentiometric transducers, velocity transducers, resistive thermometer, thermocouples, thermister characteristic, Thermister application, photosensitive devices, filled phototube, multiplier phototube.

UNIT-IV Oscilloscopes: Cathode ray tube, Electrostatic. Screen of CRT, Idea of CRT circuits, Vertical deflection system, Horizontal deflection system, Delay line, Oscilloscope probes and transducers, Determination of frequency phase angle: and time delay measurements, Idea of storage oscilloscope, sampling Oscilloscope.

Books Recommended:

1. Electric Instrumentation and Measurment Techniques : W.D. Cooper & A. D Helfric.

2. Understanding Oscillos copes : Sahny, Kulshrestha, Gupta.

PAPER-V

EL-305 MICRO PROCESSOR & COMPUTER SIMULATION LABORATORY

PAPER-VI

EL-306 MINOR PROJECT WORK

FOURTH SEMESTER

PAPER I

EL-401: MAJOR PROJECT WORK WITH DISSERTATION

PAPER II

EL-402: PRACTICAL TRAINING IN ANY OF THE FOLLOWING FIELDS.

- Communication Electronics.
- Fiber Optics.
- Electronic- Devices & Material Development.
- Control Systems& Power Electronics.
- Information Techno logy and Web based Application, any other related field.

PAPER III

EL-403: COMPREHENSIVE VIVA VOCE/TEST