छत्रपति शाहू जी महाराज विश्वविद्यालय, कानपुर

CHHATRAPATI SHAHU JI MAHRAJ UNIVERSITY, KANPUR

(पूर्ववर्ती कानपुर विश्वविद्यालय कानपुर)

Formerly Kanpur University, Kanpur – 208024

A Documentary Support

For

Metric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the

Criteria - I

(Curriculum Design and Development)

Key Indicator - 1.1

In

Metric No. – 1.1.1

Integrated M.Sc. (Electronics)

Co-ordinator
Internal Quality Assurance Cell
CSJM University, Kanpur

(Registrar)
C.S.J.M.University
Kanpur

REGISTRAR
C.S.J.M. UNIVERSITY
KANPUR

CHHATRAPATI SHAHU JI MAHARAJ UNIVERSITY

KANPUR

SYLLABUS

(Integrated MSc Electronics)

ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY

SCHOOL OF ENGINEERING & TECHNOLOGY

UNIVERSITY INSTITUTE OF ENGINEERING & TECHNOLOGY

SCHOOL OF ENGINEERING & TECHNOLOGY

Vision

To achieve excellence in engineering education, empower students to be technically competent professionals and entrepreneurs with strong ethical values so as to significantly contribute as agents for universal development and societal transformation

Mission

To provide affordable quality education at par with global standards of academia and serve society with harmonious social diversity

To encourage new ideas and inculcate an entrepreneurial attitude amongst the students, and provide a robust research ecosystem

To practice and encourage high standards of professional ethics and accountability among students

Bachelor of Technology in Electronics & Communication Engineering

Program Outcomes (POs)

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for engineering problems & design system components or processes that meet the specified needs with appropriate consideration for the public health, safety, and cultural, societal, and environmental considerations.
PO4	**Conduct investigation of complex problems:** Use research -based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create , select , and apply appropriate techniques , resources , and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO-1	To be able to understand problem, think of best suitable approach to solve the problem, develop and evaluate effective solutions as per the local/ regional/ national/ global requirements and availability of resources/ technologies.
PSO-2	To be able excel in contemporary technologies being adopted by the industry and academia for providing sustainable solutions
PSO-3	To be able to excel in various signal processing concepts/ project competitions and technological challenges laid by professional bodies

Program Educational Outcomes (PEOs)

PEO-1	**Circuit Design Concepts:** Apply basic and advanced electronics for implementing and evaluating various circuit configurations.
PEO-2	**VLSI and Signal Processing Domain:** Demonstrate technical competency in the design and analysis of components in VLSI and Signal Processing domains globally.
PEO-3	**Communication Theory and Practice:** Possess application-level knowledge in theoretical and practical aspects required for the realization of complex communication systems.

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4 Years Integrated M.Sc.(Electronics)

Year: 1st

Semester-I

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC-101	Physics-I	3	0	30	70	100
EIC-102	Fundamental Chemistry	3	0	30	70	100
EIC-103	Mathematics-I	3	0	30	70	100
EIC-104	Basic Electrical Engg.	3	0	30	70	100
EIC-105	Programming in C^{++}	3	0	30	70	100
EIC-106(L)	Physics Lab - I	0	3	15	35	50
EIC-107(L)	C^{++} Lab	0	3	15	35	50
	Total					**600**

Semester – II

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC-201	Physics-II	3	0	30	70	100
EIC -202	Mathematics-II	3	0	30	70	100
EIC -203	Basic Electronics	3	0	30	70	100
EIC -204	Network Analysis	3	0	30	70	100
EIC -205	Electromagnetic	3	0	30	70	100
EIC -206(L)	Basic Electronics Lab	0	3	15	35	50
EIC -207(L)	Physics lab - II	0	3	15	35	50
	Total					**600**

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4 Years Integrated M.Sc.(Electronics)

Year: 2nd

Semester-III

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -301	Electronics Instrumentation	3	0	30	70	100
EIC -302	Semiconductor Fundamentals and Devices	3	0	30	70	100
EIC -303	Analog integrated circuit	3	0	30	70	100
EIC -304	Signal & System Analysis And Mathematical Methods In Electronics	3	0	30	70	100
EIC -305	Electronics Materials	3	0	30	70	100
EIC -306(L)	Analog integrated circuit Lab	0	3	15	35	50
EIC -307(L)	Electronic Instrumentation Lab	0	3	15	35	50
SST -308	Summer Training	0	3	50	00	50
	Total					**650**

Semester IV

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -401	Digital Electronics	3	0	30	70	100
EIC -402	Analog Communication	3	0	30	70	100
EIC -403	Antenna and wave propagation	3	0	30	70	100
EIC -404	VLSI Technology	3	0	30	70	100
EIC -405	Professional Communication	3	0	15	35	50
EIC -406(L)	Digital Electronics Lab	0	3	15	35	50
EIC 407 (L)	Analog Communication Lab	0	3	15	35	50
	Total					**550**

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4 Years Integrated M.Sc.(Electronics)

Year: 3rd

Semester - V

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -501	Power Electronics	3	0	30	70	100
EIC -502	Microprocessor and applications	3	0	30	70	100
EIC -503	Control System	3	0	30	70	100
EIC -504	Digital Communication	3	0	30	70	100
EIC -505	Industrial management	3	0	30	70	100
EIC -506(L)	Digital Communication Lab	0	3	15	35	50
EIC -507(L)	Microprocessor Lab	0	3	15	35	50
SST -508	Summer Training	0	3	50	00	50
	Total					**650**

Semester VI

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -601	Wireless communication	3	0	30	70	100
EIC -602	Optical Communication	3	0	30	70	100
EIC -603	Advanced Semiconductor devices	3	0	30	70	100
EIC -604	VLSI Design	3	0	30	70	100
SMR 605	SEMINAR	0	3	50	00	50
EIC -606(L)	Wireless communication Lab	0	3	15	35	50
EIC -607(L)	Optical communication Lab	0	3	15	35	50
	Total					**550**

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4 Years Integrated M.Sc.(Electronics)

Year: 4th

Semester VII

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -701	Digital signal Processing	3	0	30	70	100
EIC -702	Satellite Communication	3	0	30	70	100
EIC -703	Elective - I	3	0	30	70	100
EIC -704	Environmental studies	3	0	15	35	50
EIC -705(L)	DSP Lab	0	3	15	35	50
PRT-706	Project- I	0	3	30	70	100
SST -707	Summer Training	0	3	100	00	100
	Total					**600**

Electives – I

1. EIC 703(A) Biomedical Instrumentation
2. EIC 703(B) Renewable Energy Resources
3. EIC 703(C) JAVA Programming
4. EIC 703(D) Optical Networks

Semester VIII

Course code	Courses	Lecture	Practical/ Presentation	Internal	External	Marks
EIC -801	Data Communication	3	0	30	70	100
EIC -802	Elective -II	3	0	30	70	100
EIC -803	Elective -III	3	0	30	70	100
PRT - 804	Project- II	0	3	100	200	300
	Total					**600**

Electives – II

1. EIC -802(A) Artificial Intelligence
2. EIC -802(B) Telecommunication Switching System
3. EIC -802(C) Microwave Electronics
4. EIC -802(D) Advanced Microprocessor

Electives – III

1. EIC-803(A) Information Theory and Coding
2. EIC -803(B) Programming and Application of Aurdino.
3. EIC-803(C) MATLAB Programming
4. EIC-803(D) Digital Image Processing

Dr. Ashutosh Singh
(Member of BOS)

Dr. Vishal Awasthi
(Member of BOS)

Dr. Ajay Tiwari
(Member of BOS)

Er. Ajeet Kr. Srivastava
(Member of BOS)

Er. Anand Kr. Gupta
(Convener)

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EIC 104 (Basic Electrical Engg.)	**Course outcomes :** 1. Recall basic concepts of Electrical Engineering 2. Illustrate basics of AC circuits 3. Explain operative principle of transformer with background of magnetic circuits 4. Classify and compare different types of Electrical machines 5. Classify different electrical measuring equipment's and understanding their principles
EIC-105 (Programming in C++)	**Course outcomes:** 1.To describe the advantages of a high level language like C/C++, the programming process, and the compilation process. 2.To describe and use software tools in the programming process. 3.To apply good programming principles to the design and implementation of C/C++ programs 4.To design, implement, debug and test programs using the fundamental elements of C/C++. 5.To demonstrate an understanding of primitive data types, values, operators and expressions in C/C++,use of numeric arrays, pointers
EIC-203 (Basic Electronics)	**Course outcomes:** CO1: To study basics of semiconductor & devices and their applications in different areas. CO2: To study different biasing techniques to operate transistor, FET, MOSFET and operational amplifier in different modes. CO3: Analyze output in different operating modes of different semiconductor devices. CO4: Compare design issues, advantages, disadvantages and limitations of basic electronics.
EIC-204 (Network Analysis)	**Course outcomes:** 1. The System Function 2. Characterization and Discussion of Responses in Networks 3. Properties of Input Impedance 4. Synthesis or LC or RC input impedances 5. Transfer Function Synthesis 6. Second Order Systems A. Low Pass B. High Pass C. Band Pass D. Band Stop E. All Pass 7. RC Oscillators 8. Magnitude and Phase Functions 9. Approximations A. Butterworth B. Chebyshev C. Linear Phase D. Phase Equalization

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EIC-205 (Electromagnetic)	**Course outcomes:** 1. To differentiate different types of coordinate systems and use them for solving the problems of electromagnetic field theory. 2. To describe static electric and magnetic fields, their behaviour in different media, associated laws, boundary conditions and electromagnetic potentials. 3. To use integral and point form of Maxwell`s equations for solving the problems of electromagnetic field theory. 4. To describe time varying fields, propagation of electromagnetic waves in different media, pyonting theorem, their sources & effects and to apply the theory of electromagnetic waves in practical problems. 5. To apply concepts of Wave reflection and refraction, Smith Chart in practical Field.
EIC-301 (Electronics Instrumentation)	**Course outcomes:** 1.After completing the course, the students should be able: 2.General concepts of measurement 3.Electrical measurement techniques and classical measuring instruments 4.Modern measurement techniques and instruments 5.Brief concepts of sensors and transducers 6.Electronic measurement systems and related components including signal 7.generators,analysers,storage and display devices 8.Applications of the concepts of electrical and electronic measurement systems
EIC-302 (Semiconductor Fundamental & Devices)	**Course outcomes** 1. Describe the Application of semiconductor Devices. 2. Apply the knowledge of semiconductors to illustrate the functioning of basic electronic devices. 3. Classify and describe the semiconductor devices for special Applications 4. Describe the Application of Power Devices. 5. Understand and utilize the basic governing equations to analyze semiconductor devices; design semiconductor devices and power amplifiers.
EIC-303 (Analog Integrated Circuit)	**Course outcomes:** 1. Discuss basic op-amp configuration and explain various parameters of operational amplifier. 2. Understand the linear and nonlinear applications of Op- Amp including comparators, oscillators and waveform generators. 3. Explain various applications of special function IC's such as voltage Regulators, 555 timer applications. 4. Learn about various techniques to develop A/D and D/A convertors. 5. Understanding the VCO, PLL and its application.

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EIC-304 (Signal & system Analysis & mathematical methods in Electronics)	**Course outcomes:** After completion of the course, the student will be able to: 1. Understand the basic elementary signals. 2. Determine the Fourier series for Continuous Time Signals. 3. Analyze the signals using F.T, L.T & Z.T and study the properties of F.T., L.T. & Z.T. 4. Understand the principal of Linear System and Filter Characteristics of a System. 5. Understand the concepts of auto correlation and cross correlation and power Density Spectrum. 6. Apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering. 7. Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations. 8. Familiar with calculation and interpretation of errors in numerical method.
EIC-305 (Electronic Material)	**Course outcomes:** 1. Concepts of energy bands, Direct band gap and indirect band gap semiconductors and alloy semiconductors. 2. Applications and process for formation of semiconductor devices, phenomenon of drift and diffusion. 3. Hall Effect, optical absorption, internal mechanism of semiconductors and Formation of pn junction. 4. Applications and properties of dielectric materials & magnetic materials. 5. Concept of superconductivity, BCS Theory and crystal structure.
EIC-401 (Digital Electronics)	**Course outcomes:** At the end of the course the student should be able to examine the structure of number systems and perform the conversion among different number systems. To understand the Digital Logic Family. Illustrate reduction of logical expressions using boolean algebra, kmap and implement the functions using logic gates. Realize combinational circuits for given application. Design and analyses synchronous and asynchronous sequential circuits using flip-flops. To analyse different types of multivibrators and to study static and dynamic RAMs, ROM, EPROM, and EEPROM. Implement combinational logic circuits using programmable logic devices.

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EIC-402 (Analog electronics)	**Course outcomes:** 1. Develop an understanding of the basic concepts of the analog communication systems. 2. Understanding of fundamentals of signals & linear time invariant systems used in communication system. Knowledge of probability, random variables & random processes. 3. Evaluate analog modulated waveform in time/frequency domain and also find modulation index. 4. Understand and Analyze various analog continuous wave modulation and demodulation techniques including AM, FM and PM. 5. Understand the influence of noise over different modulation schemes. 6. Analyze various analog pulse modulation and demodulation techniques including AM, FM and PM
EIC-403 (Antenna & wave Propagation)	**Course outcomes:** Expected Course Outcomes Upon completion of this course, the students will be able to: CO1: Discuss about the radiation mechanism in wire antennas and Analyze the concept of antennaproperties based on reciprocity theorem CO2:Understanding the significance of loop antennas uniform linear arrays and helical antennas CO3: Describe the various types of Microwave antennas and their pplications. CO4: Analyze the reflector antennas with their applications, measure the different antenna parameters. CO5: Analyze the structure of atmosphere for the wave propagation.
EIC-404 (VLSI Technology)	**Course outcomes:** 1. Identify the various IC fabrication methods. 2. Understanding the silicon growth process 3. Understanding the diffusion and Ion implantation technique 4. Understanding the oxidation method and its significance 5. Understand the need of metallization

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EIC-405 (Professional Communication)	**Course outcomes: PROFESSIONAL COMMUNICATION** 1. Communicate fluently and sustain comprehension of an extended discourse. 2. Demonstrate ability to interpret texts and observe the rules of good writing. 3. Prepare and present effective presentations aided by ICT tools. 4. To communicate contextually in specific personal and professional situations with courtesy. **5.** To inject humour in their regular interactions
EIC-501 (Power Electronics)	**Course outcomes:** 1. Relate basic semiconductor physics to properties of power devices, and combine circuit mathematics and characteristics of linear and non-linear devices. 2. Describe basic operation and compare performance of various power semiconductor devices, passive components and switching circuits 3. Design and Analyze power converter circuits and learn to select suitable power electronic devices by assessing the requirements of application fields. 4. Formulate and analyze a power electronic design at the system level and assess the performance. 5. Identify the critical areas in application levels and derive typical alternative solutions, select suitable power converters to control Inverters and other industry grade apparatus.
EIC-502 (Microprocessor & Applications)	**Course outcomes:** At the end of the course, students will develop ability to define the history of microprocessors, describe the architectures of 8085 and 8086 microprocessors. Draw timing diagram. Write programs using 8085 and 8086. Distinguish between the different modules of operation of microprocessors. Interface peripherals to Microprocessor. Interfacing of memory with Microprocessor.
EIC-503 (Control System)	**Course outcomes:** 1.Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form. 2.Characterize any system in Laplace domain to illustrate different specification of the system using transfer function concept. 3.Interpret different physical and mechanical systems in terms of electrical system to construct equivalent electrical models for analysis. 4.Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions. 5.Formulate different types of analysis in frequency domain to explain the nature

	of stability of the system. 6.Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system.
EIC-504 (Digital Communication)	**Course outcomes:** Expected Course Outcomes Upon completion of this course, the students will be able to: CO1: Apply the knowledge of statistical theory of communication and explain the conventional digital communication system. CO2: Apply the knowledge of signals and system and evaluate the performance of digital communication system in the presence of noise. CO3: Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic code. CO4: Describe and analyze the digital communication system with spread spectrum modulation. CO5: Design optimal detectors in presence of AWGN.
EIC-505 (Industrial Management)	**Course outcomes:** After completing the course, the students should be able: 1Undestanding the concept of administration and organisation. 2.Understanfing the characteristics and principle of Management 3.Understanding the different level of management 4.introduction to industrial psychology 5.Understanding of plant layout
EIC-601 (Wireless Communication**)**	**Course outcomes:** 1. To understand the second-generation cellular networks, third generation wireless networks, wireless in local loop, wireless local area networks, Bluetooth and personal area networks. 2. Able to understand the concepts of spectrum allocation, basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference, improving coverage and capacity, cell splitting. 3. To understand various multiple accesses techniques: FDMA, TDMA, spread spectrum multiple access, SDMA. 4. To understand the difference between wireless and fixed telephone networks, development of wireless networks. 5. Able to understand the communication in the infrastructure, IS-95 CDMA forward channel, IS-95 CDMA risers' channel, packet and frame formats in IS-95, IMT -20000, forward channel in W-CDMA. 6. Able to understand the Historical overviews of the land industry, evolution of the wan industry, wireless home networking IEEE 802.11 the physical layer, MAC layer wireless ATM.

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EIC-602 (Optical Communication)	**Course outcomes:** 1. Recognize and classify the structures of Optical fiber and types. 2. Transmission Characteristics of fiber like attenuation and dispersion. Analyze various coupling losses. 3. Manufacturing techniques of fiber/cable. 4. Principle and operation of the optical sources and detectors such as LASER, LED & APD. 5. Optical Amplifier the basic concepts of optical networks, Describe about the SONET/SDH, WDM. 6. Familiar with Design considerations of fiber optic systems, OTDR. Non communicational applications of optical fiber To perform characteristics of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyse the results to provide valid conclusions
EIC-603 (Advanced Semiconductor Devices)	**Course outcomes:** 1. Ability to analyze and describe the PN junctions in semiconductor devices and the behavior of various special purpose diodes. 2. Ability to understand and analyze the, structure, behavior and various models of BJT,FET and MOSFET circuits. 3. Demonstrate the switching and amplification Application of the semiconductor devices.
EIC-604 (VLSI Design)	**Course outcomes:** 1. Express the Layout of simple MOS circuit using Lambda based design rules. 2. Apply the Lambda based design rules for subsystem design 3. Designing digital combinational and sequential circuits. 4. Design an application using Verilog HDL. 5. Concepts of FPGA and its application
EIC-701 (Digital Signal Processing)	**Course outcomes:** Course Outcomes: Upon successful completion of this course the students will have developed following skills/abilities: 1. Interpret, represent and process discrete/digital signals and sytems 2. Thorough understanding of frequency domain analysis of discrete time signals. 3. Ability to design &analyze DSP systems like FIR and IIR Filter etc. 4. Practical implementation issues such as computational complexity, hardware

	resource limitations as well as cost of DSP systems or DSP Processors. 5. Understanding of spectral analysis of the signals.
EIC-702 (Satellite Communication)	**Course outcomes:** 1. History of satellite communication and developments. 2. Ability to calculate the orbital determinations and launching methods , controls and transponders. 3. Able to calculate multiple access techniques like TDMA,CDMA,FDMA, Power systems for satellite. 4. Ability to develop command, monitoring power system and development of antennas. 5. Ability to design satellite real time applications, different types antennas and receivers, calculate uplink and downlink frequencies, impact of GPS.
EIC-703(A) (Biomedical Instrumentation)	**Course outcomes:** After completing the course, the students should be able: 1. Having understanding of different bioelectric potential and electrodes 2. Understanding cardiovascular system and its measurements 3. Understanding respiratory system and it s measurement. 4. Having knowledge of diagnostic techniques, biotelemetry, Patient care and monitoring system.
EIC-703(B) (Renewable Energy Resources)	**Course outcomes:** After completion of the course, students will be able to: 1. Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells. 2. Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation. 3. Explore the concepts involved in wind energy conversion system by studying its components, types and performance. 4. Illustrate ocean energy and explain the operational methods of their utilization. 5. Acquire the knowledge on geothermal energy.

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EIC-703(C) (Java Programming)	**Course outcomes:** The learning objectives of this course are: 1. To learn why Java is useful for the design of desktop and web applications. 2. To learn how to implement object-oriented designs with Java. 3. To identify Java language components and how they work together in applications. 4. To design and program stand-alone Java applications. 5. To learn how to design a graphical user interface (GUI) with Java Swing. 6. To understand how to use Java APIs for program development. 7. To learn how to extend Java classes with inheritance and dynamic binding. 8. To learn how to use exception handling in Java applications. 9. To understand how to design GUI components with the Java Swing API. 10. To learn Java generics and how to use the Java Collections API. 11. To understand how to design applications with threads in Java. 12. To learn how to read and write files in Java.
EIC-703(D) (Optical Networks)	**Course outcomes:** 1. Study the structures of Optical fiber and its classifications. 2. Transmission Characteristics of fiber like attenuation and dispersion. Analyzevarious losses. 3. Describes the behaviour of optical transmitter and receiver for analog and digital mode of operation. 4. Analyze the different network access scheme and packet switching in OFC system **5.** Compute different parameter of optic fiber, losses, power budget and effect of noise associated to optical fiber communication system.
EIC-704 (Enviromental Studies)	**Course outcomes:** 1. Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving. 2. Appreciate key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. 3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. 4. Appreciate that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes. 5. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

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EIC-801 (Data Communication)	**Course outcomes :** 1. To understand network communication using the layered concept, Open System Interconnect (OSI) and the Internet Model. 2. To understand various types of transmission media, network devices; and parameters of evaluation of performance for each media and device 3. To understand the concept of flow control, error control and LAN protocols; to explain the design of, and algorithms used in, the physical, data link layers. 4. To understand the working principles of LAN and the concepts behind physical and logical addressing, subnetting and super netting. 5. To understand the functions performed by a Network Management System and to analyse connection establishment and congestion control with respect to TCP Protocol. 6. To understand the principles and operations behind various application layer protocols like HTTP, SMTP, FTP and cryptography.
EIC-802(A) (Artificial Intelligence)	**Course outcomes:** 1. Course Objective: The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments. Assigned projects promote a 'hands-on' approach for understanding, as well as a challenging avenue for exploration and creativity. Specifically: 2. Gain a historical perspective of AI and its foundations. 3. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning. 4. Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. 5. Experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool. 6. Experiment with a machine learning model for simulation and analysis. Course Outcome: Upon successful completion of this course, the student shall be able to: 7. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations. 8. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. 9. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models. **10.** Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.

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EIC-802(B) (Telecommunication Switching System)	**Course outcomes:** 1. To learn about the various switching systems 2. To learn in detail about time division switching. 3. To know about traffic management. 4. To understand about various signaling in telecommunication systems **5.** To analyze various telecommunication networks CO6: To estimate the performance of telecommunication network
EIC-802(C) (Microwave Electronics)	**Course outcomes:** Expected Course Outcomes Upon completion of this course, the students will be able to: **CO1:** Analyze rectangular and circular waveguides and derive the field equations for electric and magnetic fields in them. **CO2:** Learn about waveguide resonators and calculate its Q factor. **CO3:** Understand ferrites and its applications **CO4:** Explain and analyze microwave tubes like Klystron and its types, magnetrons and travelling wave tubes. **CO5:** Explain the procedures to measure different parameters like VSWR, Impedance, frequency & attenuation, etc., develop the concept of Complex permittivity of material and compare different methods of measurement of permittivity.
EIC-802(D) (Advanced Microprocessor)	**Course outcomes:** At the end of the course, students will develop ability to define the architectures of 8086 microprocessor. Adder Unit, Segmentation of Memory & Addressing Modes. Write programs using 8086. Distinguish between the different modules of operation of microprocessors. Interface peripherals such as 8253,8257,8259,8279 to Microprocessor. Interfacing of memory with Microprocessor. Features of 80286, 80386 Architecture and description of 80286 & 80386, Addressing modes. Architecture of Microcontroller & Basic Assembly language programming concept.
EIC-803(A) (Information Theory & Coding)	**Course outcomes:** Expected Course Outcomes Upon completion of this course, the students will be able to: CO1: Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source CO2: Represent the information using Shannon Encoding, Shannon-Fano, Prefix and Huffman Encoding. CO3:Model the continuous and discrete communication channels using input, output and joint probabilities CO4: Apply linear block codes for error detection and correction CO5: Apply convolution codes for performance analysis & cyclic codes for error detection and correction.
EIC-803(B)	**Course outcomes:** 1. Understanding various RTOS concepts with Free RTOS Programming and Debugging 2. Using STM32 Standard Peripheral Driver APIs to configure peripherals 3. Free RTOS Task Creation , Deletion, Scheduling using with code examples 4. Free RTOS Stack and Heap Management 5. Right ways of Synchronizing between tasks using Semaphores. 6. Synchronization between multiple events and a task

University Institute of Engineering & Technology,
C.S.J.M.University, Kanpur
Department of Electronics and Communication Engineering

EIC-803(C)	**Course outcomes:** Upon successful completion of this course, a student will be able to 1. Apply computational, critical and creative thinking skills in the process of solving problems and expressing their solutions 2. Analyze a wide variety of problems and design solution algorithms with applications to engineering. 3. Document and comment computer programs so that they are readable and well styled. 4. Implement computer programs based on pre-specified requirements and design (structure, algorithms and specific functions) 5. Test and debug computer programs to verify and validate their correctness. 6. Identify the need and use control structures, different data types, strings, various data structures and various inputs/outputs in a computer program. 7. Create and customize various 2D/3D plots and animations based on given input data 8. Work with data from/to input/output files 9. Be able to write/test/execute user-defined functions with multiple and/or variable number of input/output arguments. 10. Be able to work with images, sound, Graphic Objects and basic Matlab GUIs 11. Be able to solve basic symbolic, numeric and linear algebra problems. 12. Reflect on your own thinking and the thinking of others
EIC-803(D)	**Course outcomes:** 1. To study the image fundamentals and mathematical transforms necessary for image processing. 2. To study the image enhancement techniques 3. To study image restoration procedures. 4. To study the image compression procedures. Course Outcome: 5. Review the fundamental concepts of a digital image processing system. 6. Analyze images in the frequency domain using various transforms. 7. Evaluate the techniques for image enhancement and image restoration. 8. Categorize various compression techniques. 9. Interpret Image compression standards. 10. Interpret image segmentation and representation techniques

COURSE CODE: EIC-101

COURSE NAME: PHYSICS-I

UNIT -I

Newton's Law of motion, Frame of reference, Inertial frame of reference, Non Intertial frame of reference, Michelson Morley
Experiment, Lorentz Transformation Einstein's postulates, Mass energy equivalence, Length Contraction, Time Dilation, Addition of velocities,variation of Mass with velocity.Moment of Inertia , Rotaional Energy for rotating bodies.

UNIT- II

Conservative and Non conservative force, Linear Momentum, Angular Momentum, Central force,Two body
Central force problem, reduced mass, relative and centre of mass, Law of gravitation, Kepler's law , Motion of Planets and Satellites.

UNIT- III

Simple Harmonic motion, Differential equation of SHM and its solution , damped and forced vibration , differential equation of wave motion , Plane Progressive Waves in fluid media, reflection of waves, phase change on reflection, superposition, stationary waves,pressure and energy distribution, phase and group velocity.

UNIT -IV

Thermometric , idial gas, kinetic theory gasses, r.m.s speed of molecule, specific heat of mono, di and tri atomic gasses,Adiabatic expansion, real gas, vander waal gas, equation of state , nature of vander waal forces, jule expansion of ideal gas and vander waal gas, Laws of thermodynamics , Zeroth law, first law of thermo dynamics, carnot cycle and its efficiency. Carnot Theorem and second law of thermo dynamics.

UNIT -V

Black body radiation : Pure temperature dependence, Stefan Boltzmann law, Pressure of radiation, Spectral distribution of Black body radiation ,Wein's displacement law Rayleigh – Jean's law , Planck's law , Kirchaff's law : absorption and emission.

References

1. Introduction to Mechanics – R.D. Kleppnar and J. Kalenkow
2. A text book of Mechanics – J. C. Upadhyay
3. Introduction to special theory of relativity – Robert Rasnick
4. Basic and applied Thermodynamics – Nag P.
5. Thermal Physics: with Kinetic theory, thermodynamics – S.C. Garg
6. Fundamentals of thermodynamics 7th edition – Claus Borgnakke

COURSE CODE: EIC-102

COURSE NAME: FUNDAMENTAL CHEMISTRY

UNIT –I Atomic structure and Periodic Properties

Atomic Structure: Idea of de- Broglie matter waves. Heisenberg uncertainty principle, atomic orbitals, Schrodinger wave equation, significance of Ψ and Ψ^2, quantum numbers, radial and angular wave functions and probability distribution curves. Shapes of s, p, d, orbitals, Aufbau and Pauli's exclusion principles, Hund's multiplicity rule, Electronic configurations of the elements, effective nuclear charge.

Periodic Properties: Atomic and ionic radii, ionization energy, electron affinity and electro negativity, Methods of determination or evaluation, trends in periodic table and applications in predicting and explaining the chemical behaviour.

UNIT-II Chemical Bonding

Covalent Bond:

Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions , valence shall electron pair repulsion (VSEPR) theory to NH_3, H_3O+,SF_4,ClF_3,ICl_2 and H_2O, MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, multicenter bonding in electron deficient molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro-negativity difference.

Ionic Solids:

Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, semiconductors, lattice energy and Born- Haber cycle, salvation energy and solubility of ionic solids, polarizing power and polarisability of ions, Fajan's rule Metallic bond – free electron, valence bond and band theories. Weak Interactions – Hydrogen bonding, Vander Waals forces.

UNIT-III Organic reactions

Structure and Bonding: Hybridization, bond lengths and bond angles, bond energy, localized and delocalized chemical bonding, Vander Waals interactions, inclusion compounds, clatherates, charge transfer complexes, resonances, hyper conjugation, aromaticity, inductive and field effects, hydrogen bonding.

Mechanism of Organic Reactions: Curved arrow notation, drawing electron movements with allows, half- headed and double – headed arrows, homolytic and hetrolytic bond fission, Types of reagents – electrophiles and nucleophiles, Types of organic reactions, Energy
Considerations.Reactive intermediates – Carbocations, Carbanions, free radicals, carbenes arynes and nitrenes (with examples). Assigning formal charges on intermediates and other ionic species.Methods of determination of reaction mechanism (product analysis, intermediates, isotope effects, kinetic and stereochemical studies).

Unit IV – Stereochemistry

Stereochemistry of Organic Compounds: Concept of isomerism, Types of isomerism; Optical isomerism- elements of symmetry, molecular chirality, enantiomers, stereogenic center, optical activity, properties of enantiomers, chiral and achiral molecules with two stereogenic centers, disasteromers, threo and erythro diastereomers, meso compounds, resolution of enantionmer, inversion, retention and recemization. Relative and absolute configuration, sequence rules, D & L and R & S systems of nomenclature. Geometric isomerism – determination of configuration of geometric isomers, E & Z system of nomenclature, geometric isomerism in oximes and alicyclic compounds. Conformational isomerism – conformational analysis of ethane and n-butane; conformations of cyclohexane, axial and equatorial bonds, conformation of mono substituted cyclohexane derivatives, Newman projection and Sawhorse formulae, Fischer and flying wedge formulae, Difference between configuration and conformation.

Unit V - Chemical Kinetics and Catalysis

Chemical Kinetics and Catalysis: Chemical kinetics and its scope, rate of a reaction, factors influencing the rate of a reaction – concentration, temperature, pressure, solvent, light catalyst, concentration dependence of rates, mathematical characteristics of simple chemical reactions – zero order, first order, second order, pseudo order, half life and mean life, Determination of the order of reaction – differential method, method of integration, method of half life period and isolation method. Radioactive decay as a first order phenomenon; Experimental methods of chemical kinetics: conductometric, potentiometric, optical methods, polarimetry and spectrophotometer. Theories of chemical kinetics: effect of temperature on rate of reaction, Arrhenius equation, concept of activation energy. Simple collision theory based on hard sphere model, transition state theory (equilibrium hypothesis), Expression for the rate constant based on equilibrium constant and thermodynamic aspects. Catalysis, characteristics of catalysed reactions, classification of catalysis homogeneous and heterogeneous catalysis, enzyme catalysis, miscellaneous examples.

Reference Books

1. Physical Chemistry – R. L. Madan
2. Physical Chemistry – Arun Bahl, B. S. Bahal & G. D. Tuli
3. Physical Chemistry – P. Atkins
4. Organic Chemistry – S. M. Mukherji, S. P. Singh, R. P. Kapoor & R. Dass
5. Inorganic Chemistry – J. D. Lee

COURSE CODE: EIC-103

COURSE NAME: MATHEMATICS-1

UNIT-I

Limit, Continuity And Differentiation of Functions of Two Variable, Homogenous Functions and their Properties ,Chain Rule, Jacobians' ,Taylors theorem for Two Variables ,Extrema of functions of Two or More Variables, Lagrange's Method of Undetermined Coefficients.

UNIT- II

Double and Triple Integrals, Change of Order of Integration Change of Variables, Gamma and Beta Function,

UNIT- III

Gradient, Divergence, Curl and their Physical Meaning, Identities Involving Gradient, Divergence & Curl, Line and Surface Integrals, Greens Theorem, Gauss Divergence Theorem and Stokes Theorem.

UNIT- IV

Rank and Inverse of a Matrix, Solution of System of Linear Equations, Different Types of Matrices and their properties, Diagonalization of Matrix, Eigen value and Eigen Vector, Cayley Hamilton Theorem.

UNIT V

Concept of Probability, Random Variables and Distribution Function, Binomial, Poisson and Normal Distribution and their properties.

References :

(1) Higher engineering mathematics – Jain, jyenger & jain
(2) Higher engineering mathematics – B.S. Grewal
(3) Higher engineering mathematics - H.K.Dass
(4) Higher engineering mathematics – V.Rammana

COURSE CODE: EIC-104

COURSE NAME: BASIC ELECTRICAL ENGG.

UNIT- I

Network Theory & Concept: Network Theory: Circuit theory concept, KVL & KCL, mesh analysis & nodal analysis.
Network Theorems – Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum power transfer Theorem, Miller's Theorem, star delta transformation,.

UNIT- II

AC Circuit Analysis : Sinusoidal steady state circuit analysis, voltage, current, sinusoidal & phaser presentation single phase AC circuit – behavior of resistance, inductance & capacitance & their combination, Active power & Reactive power, power factor. Series & parallel resonance, band width & quality factor.

UNIT -III

Three phase circuits: Phase voltage & current, line & phase quantities, phasor diagram, balanced & unbalanced loads, Measurement of R, L, and C. Three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT- IV

Magnetic circuit & Transformer: Magnetic circuit concepts: self inductance & mutual inductance.Transformer : Introduction to transformer, Principle & Construction of the Transformer,Types of the Transformer, EMF equation, Power loss, Efficiency and Regulation of the transformer , Transformer Tests- Open circuit test and Short circuit test, Auto Transformer, Three Phase Transformer

UNIT –V

DC machines : DC Motor , Principle of operation of the Motor, Types of the Motor, EMF equation and torque equation of motor, Losses and Efficiency , DC Generator : Principle & Construction of the Generator, Types of the Generator, EMF equation of the Generator, Losses and Efficiency

Text Books:
1. I.J. Nagarath, " Basic Electrical Engineering" Tata McGraw Hill
2. D.E. Fitzgerald & A. Grabel Higginbotham, " Basic Electrical Engineering Mc- Graw Hill

Reference Books:
1. Edward Hughes, " Electrical Technology" Longman
2. T.K. Nagsarkar & M.S. Sukhija, " Basic Electrical Engineering" Oxford University Press.
3. H. Cotton, " Advanced Electrical Technology" Wheeler Publishing
4. W.H. Hayt & J.E. Kennely, " Engineering Circuit Analysis" Mc Graw Hill.

COURSE CODE: EIC-105

COURSE NAME: PROGRAMMING IN C++

UNIT-I

Introduction: Object oriented programming, characteristics of an object-oriented language. C++ programming language: Tokens, keywords, identifier and constants, basic data types, user defined data types, derived data types, arithmetic operators, relational operators, logical operators, assignment operators, increment and decrement operators, conditional operators, bit wise operators, special operators, expressions and evaluation of expressions, scope resolution operator, member dereferencing operators, manipulators, type cast operator, implicit conversions, precedence of operators, new and delete operators.

UNIT-II

Decision making, Branching and Looping: if, if-else, else-if, switch statement, break, continue and go to statement, for loop, while loop and do loop.Functions: Function definition, function arguments and passing, returning values from functions, referencing arguments, function overloading, virtual functions,

UNIT-III

Classes and Objects: Classes and objects, member functions, class constructors and destructors, array of objects, operator overloading.Class inheritance: Derived class and base class, multiple inheritance, polymorphism.

UNIT-IV

Streams in C++ - Stream Classes – Formatted and Unformatted data – Manipulators – User Defined Manipulators . library functions, local, static and global variables. Arrays, pointers and structures

UNIT-V

File Streams – Opening and Closing a File – File Pointers Manipulation – Template Classes and Functions– Exception Handling: Try, Catch. Exception Handling – Multithreading – Applets – Graphics Programming.

RECOMMENDED BOOKS:

1. "Object- Oriented Programming with C++" by Balagurusamy E,TMH Pub.
2. "PROGRAMMING IN C++" by P.B.MAHAPATRA,S Chand Pub.
3. "Programming with C++" by Ravichandran,TMH Pub.
4. "Data structures using C and C++" by Yedidyah,Moshe, and Aaron, PHI Pub.
5. "Data structure, Algorithms & application in C++" by SartajSahni ,McGrawHillPub.

COURSE CODE: ELC-106(L)

COURSE NAME: PHYSICS LAB –I

LIST OF EXPERIMENTS

1. Study of a compound Pendulum.
2. Study of a damping of a bar Pendulum.
3. Study of oscillations under a bifiliar suspension.
4. Study of Brownion motion.
5. Plancks Constant by radiation law.
6. To determine the value of acceleration due to gravity at a place by means of kater's reversible Pendulum.
7. To determine moment of Inertia of a fly wheel about its own axis of Rotation.

COURSE CODE: EIC-107(L)

COURSE NAME: PROGRAMMING IN C++ LAB

LIST OF EXPERIMENTS

1. Write a program for operation 1. Addition 2. Subtraction 3.multiplication 4. Division.
2. Write a program to find the factorial of given number and Fibonacci series using switch command.
3. Write a program to find greatest and smallest elements in an array.
4. Write a program to short array elements in descending order.
5. Write a program for sorting name in alphabetical order.
6. Write a program to print the diagonal matrix.
7. Write a program to find matrix addition.
8. Write a program to find multiplication.
9. Write a Program to find a row sum and column sum of a given matrix.
10. Write a program to read and print two dimensional matrix find sum of diagonal.

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE : EIC -201

COURSE NAME : PHYSICS - II

UNIT I

Interference of light, the Principle of superposition, two shift Interference coherence requirement for sources, optical path retardation, lateral shift of fringes, localised frings,thin film,fringes of equal Inclination , Michelson Interferometer its application for determination of wavelength, difference and width of spectral line , Tolansky fringes, Diffraction ,Fresnel and Fraunhaffer diffraction, diffraction grating, Polarization , double refraction in uniaxial Crystals,Nicol Prism, Polariods and retardation Plates, half shade and Bi-quartz Polrimeters.

UNIT -II

Coherence length, coherence time , spatial coherence of source,Einsteins coefficient " A " and " B" Spontaneous and Induced emissions, Population Inversion, He and Ne laser, Application of laser.

UNIT -III

Inadequacies of classical mechanics, Photoelectric phenomenon, Compton effect, wave particle duality, de Broglie, matter-waves, Hisenberg's Uncertainty Principles phase and group velocity.

UNIT- IV

Schrodinger's wave equation,Time dependent and time independed, wave function , Interpretation and wave function , expectation value of dynamical variable , orthonormal properties of wave function, one dimensional Potential box, normalization , simple harmonic Oscillator.

UNIT–V

Spectra of hydrogen , deutron and alkali atoms, spectral terms, doublet fine structure, screening constant for alkali spectra for s,p,d and f states , selection rule , singlet and Triplet fine structure in alkaline earth spectra, L-S and J-J Coupling and weak spectra.

References

1. Principle of Quantum Mechanics – I. S. Tyagi
2. Quantum Mechanics – Eisbery and Resnick
3. Optics – Ajoy Ghatak
4. A text book of Optics – Subrahmanyam, Brijlal
5. Concept of Modern Physics – Aurther Beiser
6. Introduction to Quantum mechanics – J. Griffiths David
7. Quantum Mechanics: Concepts and Application – Nouredine Zettli
8. Atomic and molecular Spectra - Raj kumar

COURSE CODE: EIC-202

COURSE NAME: MATHEMATICS-II

UNIT- I

Solution of 2nd Order Differential Equation with Constant Coefficient, Euler Cauchy Equation, Method of Variation of Parameters, Matrix Method for Higher Order Differential Equations with Constant Coefficients.

UNIT -II

Functions of Complex Variables, Analytic Function, Cauchy-Riemann Equation, Harmonic Functions, Harmonic Conjugate and Methods of finding it.

UNIT -III

Cauchy's Integral theorem, Cauchy's Integral formula, Derivation of Analytic Function, Power Series Representation of Analytic Function, Radius Of Convergence.
Taylor,s and Laurent,s Series, Singularities, Residue theorem, Evaluvation of real integrals.

UNIT -IV

Fourier Series and its Convergance, Fourier Series of Even & Odd functions, Half Range Sine and Cosine Series, Parsevals Identity, Complex Form of Fourier Series.

UNIT -V

Fourier Integral, Fourier Sine & Cosine Integrals, Fourier Transform and their Elementary Properties, Convolution Theorem, Application To Boundary Value Problem.

Reference:

(1)Higher engineering mathematics – Jain, jyenger & jain
(2) Higher engineering mathematics – B.S. Grewal
(3) Higher engineering mathematics - H.K.Dass
(4) Higher engineering mathematics – V.Rammana

COURSE CODE: EIC-203

COURSE NAME: BASIC ELECTRONICS

UNIT- I

Semiconductor Basics : Energy band in solids (metal, semiconductor and insulators), concept of effective mass, density of states, carrier concentration at normal equilibrium in intrinsic semiconductors, derivation of Fermi level for intrinsic semiconductors, donors, acceptor, majority carriers (electrons and holes), dependence of Fermi level on temperature and doping concentration.

UNIT- II

Diode : p-n junction diode, formation of depletion layer, space charge at a junction. derivation of electrostatic potential difference at thermal equilibrium, depletion width and depletion capacitance of abrupt p-n junction, diode equations and the I-V characteristic, Zener and avalanche mechanism, Zener diode, Ohmic & Rectifying Contacts, Thyristor Devices.

UNIT -III

Bipolar Junction Transistor (BJT) : PNP and NPN transistor, basic transistor action, energy band diagram of transistor in thermal equilibrium, early effect, input and output characteristics of CB, CE and CC configurations. Uni-junction Transistor (UJT) -Construction, working and I-V characteristics of UJT.

UNIT- IV

Field Effect Transistor (FET): Construction of JFEET, idea of channel formation, pinch- off voltage, Transfer and output characteristics.

MOSFET: MOS Diode, Basic construction of MOSFET and working, I-V characteristics, enhancement and depletion modes, Complimentary MOS (CMOS).

UNIT- V

Optoelectronic Devices

Photovoltaic effect, the p-n junction solar cell, I-V characteristics, photodetectors: photoconductor, photodiode, avalanche photodiode;LEDs: radiative and non-radiative transitions; semiconductor LASERS, population inversion

SUGGESTED BOOKS

1. S.M.Sze, Semiconductor Devices : Physics and Technology, John wiley & Sons (2002)
2. Ben Streetman and S.Banerjee, Solid State Electronic Devices, Pearson Education (2006)
3. Jasprit Singh, Semiconductor Devices : Basic Principles, John Wiley and Sons (2001)
4. Kanaan Kano, Semiconductor Devices, Pearson Education (2004)
5. Robert F. Pierret, Semiconductor Devices Fundamental, Pearson Education (2006)
6. Dennis Le Croissette, Transistors, Pearson Education (1989

COURSE CODE: EIC-204

COURSE NAME: NETWORK ANALYSIS

UNIT-I

Network Fundamentals and Graph Theory- circuit theory concept, mesh & nodal analysis, star,delta conections and their transformation, Network theorems – Thevenin's, Norton, maximum power transfer theorem, twigs and links, trees, co-trees, formation of incidence matrix ,cut-set matrix, tie-set matrix and loop currents, analysis of networks ,network equilibrium equation ,duality, network transformation.

UNIT-II

Networks and Laplace Transform- Network equation, formulation of network equations, initial conditions in networks and network solution with Laplace transformation, step, ramp and impulse functions, initial and final value theorem and convolution integral. Transform impedance and transform circuits, duality, Fourier transform, discrete and continuous spectrum, relation and Laplace transforms.

UNIT-III

Network Function- Network function for one-port and two-port, calculation of network function for ladder and general networks, poles and zeros with restrictions for driving point functions and transform functions, two-port parameters, stability by Routh-Harwitz criterion.

UNIT-IV

Two Port Network Analysis-Two port networks, Two port parameters, Inter-conversion of 2 port parameter,network function- Driving point and transfer function, Inter-connections of 2 port networks, reciprocity ladder networks, Image impedance, Characteristic impedance, T-□ transformation and analysis.

UNIT-V

Network Synthesis- Identification of network synthesis, Brune's positive and real function (PRF), properties of PRF, testing of driving point functions, even and odd function, one terminal pair network driving point synthesis with LC elements, RC elements, Foster and Cauer form.

RECOMMENDED BOOKS

1. "Introduction to Network Synthesis", Valkenburg, PHI Pbs.
2. Sudhakar, A. Shyammohan, "Circuits and Network", Third Edition, 2006, Tata McGraw Hill.
3. Kelkar, Pandit, "Linear Network Theory", Pratibha Publication.

COURSE CODE: EIC-205

COURSE NAME: ELECTROMAGNETIC

UNIT- I

Electrostatic

Vector analysis: Vector algebra, Coordinate system and Transformation, Vector calculus

Electrostatic Fields: Coulomb's law and field intensity, Electric field due to continuous charge distributions, Electric Flux density, Gauss's Law, Application of Gauss's law, Electric Potential, relationship between E and V, An electric dipole and flux lines, Energy density in Electrostatic Field.

Electric Field in Material Space: Convection and conduction current, Polarization in Dielectric, Continuity Equation and Relaxation time, Boundary Conditions.

Electrostatic boundary value problems: Poisson's and laplace's equations, Uniqueness theorem, Resistance and capacitance, Method of images

UNIT –II

Magnetosatic

Biot-Savart's law, Ampere Circuital Law, Application of Ampere's Circuital law, Magnetic Flux density, Magnetic scalar and vector potentials, Force due to magnetic fields, Magnetic torque and moment, a Magnetic Dipole, Magnetization in Material, Classification of Magnetic material, Magnetic boundary conditions, Inductor and inductances, Magnetic Energy, Magnetic circuits.

UNIT- III

Maxwell's Equation and Electromagnetic Waves

Faraday's Law, Transformer and Motional EMFs, Displacement Current, Maxwell's Equation.
Electromagnetic wave, Wave propagation in lossy dielectric, Plane waves in Lossless Dielectrics, Free Space, Good conductor, Power and the Poynting vector, Reflection of a plane wave at normal incidence, reflection of plane waves at oblique incidence

UNIT IV

Transmission lines

Transmission line parameters, Transmission line equations, Input impedance, SWR and Power, Smith chart, Applications

UNIT V

Waveguides

Parallel Plate Waveguide, TE mode in parallel plate waveguide, TM mode in parallel plate waveguide, TEM mode in parallel waveguide, Rectangular Waveguide, TE mode in rectangular wave guide, TM mode in rectangular waveguide, Power transmission and attenuation.

Textbooks:

1. Matthew N.O.Sadiku -'Element of electromagnetic'-3e,Oxford University Press
2. W.H.Hayt,J.A.Buck, M Jaleel Akhtar-'Engineering Electromagnetics'-8e,McGraw Hill.

Reference books

1. S Salivahanan, S.Karthie-'Electrmagnetic Field Theory'-2e,McGraw Hill.
2. Joseph A. Edminister –'Schaum's outline series-Theory and problem of Electromagnetics'-2e,Tata McGraw Hill
3. David J.Griffith,-'Introduction to Electrodynamics'-3e,PHI.
4. S.C.Mahapatra and Sudipta Mahapatra,-'Principle of electromagnetics'-2e, McGraw Hill

COURSE CODE: EIC-206(L)

COURSE NAME: BASIC ELECTRONICS LAB

LIST OF EXPERIMENTS

1. To measure DC/AC voltage and frequency using CRO and FG.
2. To study the V-I characteristics of PN Junction diode A). Forward bias (B) Reverse bias
3. To study the Clipping circuits as positive and negative logic.
4. To study the Clamping circuits as positive and negative logic.
5. To study Half wave Rectifier .
6. To study full wave bridge Rectifier .
7. To study full wave bridge Rectifier using Filter.
8. To obtain V-I characteristics of a zener diode and note down its breakdown potential.
9. To study Transistor CB characteristics (Input and Output)
10. To study Transistor CE characteristics (Input and Output)
11. To study Frequency response of CE Amplifier
12. To study UJT characteristics

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC-207(L)

COURSE NAME: PHYSICS LAB – II

LIST OF EXPERIMENTS

1. To determine the refractive Index of the material of the prism for the given Colours (wavelength) of mercury light with the help of a spectrometer
2. To determine the wavelength of sodium light (monochromatic) with the help of Fresnells Bi-Prism.
3. To determine the wavelength of sodium light By Newton's rings.
4. To determine the wavelength of Prominent lines of mercury by plane Diffraction grating.
5. To determine the specific rotation of cane sugar solution with the help of Polarimeter
6. Resolving limit of a telescope system.
7. Use of diffraction grating and its resolving limit.

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC-301

COURSE NAME: ELECTRONIC INSTRUMENTATION

UNIT –I

Introduction of Measurement:

Static and Dynamic Characteristics of Instruments, Measurement of frequency, phase, time – interval, impedance, power measurement, energy measurement and measurement of distortion.

UNIT-II

Primary sensing elements: Cantilever, helical spiral spring, load cells, Bourdon tube, Bellows, Diaphragms

Passive Electrical Transducers:

Resistive: Resistance Thermometers, Resistive displacement Transducers, Resistive strain Transducers, Resistive Pressure Transducers.

Inductive: Inductive thickness transducers, Inductive displacement transducers, Eddy current type Inductive transducer.

Capacitive: Capacitive thickness Transducers, Capacitive displacement Transducers Active Electrical Transduce Thermo electric Transducers

Piezo-electric Transducers: Force transducers, strain transducers, Torque and pressure transducers, and photoelectric transducers.

Digital Transducers: Digital displacement transducers, Digital tachometers.

UNIT-III

Recorders and wave form generators

Recorders: XY recorder, strip chart recorders, UV recorders, Magnetic tape recorders

Wave form generator: Oscillators, Square wave generator, triangular wave generator, sawtooth generator, pulse generator, Function generator.

UNIT-IV

Advanced Measuring Instruments

Data Loggers, Digital Read Out Systems, Digital Input-Output devices, Analog CRO, Digital storage CRO, Spectrum Analyzer, Logic Analyzer.

UNIT-V

Sensors

Semiconductor sensors, Smart sensors, Microsensors, IR radiation sensors, Ultrasonic sensors, Fiber optic sensors, chemical sensors, bio sensors.

Textbook:

1. A.K. Sawhney : Electrical & Electronic Measurement & Instrumentation – DRS . India
2. M.M.S. Anand: Electronic Instruments and instrumentation Technology.

Reference:

3. Helfrick & Copper : Modern Electronic Instrumentation & Measuring Techniques – PHI
4. W.D. Cooper : Electronic Instrumentation And Measuring Techniques – PHI
5. E.O.doebilin: Measurement Systems
6. H.S.Kalsi:Electronic Instrumentation-TMH,2Edition.

COURSE CODE: EIC-302

COURSE NAME: SEMICONDUCTOR FUNDAMENTALS AND DEVICES

UNIT-I

Diode circuits: Ideal diode, piecewise linear equivalent circuit, dc load line analysis, Quiescent (Q) point, Positive, negative and biased clipper circuits, clamping circuits, Half wave rectifier, center tapped and bridge full wave rectifiers, calculation of efficiency and ripple factor.

UNIT-II

DC power supply: Block diagram of a power supply, qualitative description of shunt capacitor filter, Zener diode as voltage regulator, temperature coefficient of Zener diode Basic construction and Characteristics of Thyristor, Semiconductor Controlled Device (SCR), Characteristic and two transistor model of SCR..

UNIT-III

The BJT: Transistor current components and amplification, hybrid parameters, regions of operation, dc load line, Q point.

CE amplifier: Self bias arrangement of CE, dc and ac load line analysis, hybrid equivalent of CE, Quantitative study of the frequency response of CE amplifier, effect on gain and bandwidth for cascaded CE amplifier (RC coupled) RC coupling, direct coupling, transformer coupling and their comparision.

Power Amplifiers: Heat sink, Classification of power amplifiers: A, B, C and AB, analysis of Class B ingle tuned amplifiers.

UNIT-IV

Feedback Amplifiers: Concept of feedback, negative and positive feedback, Negative feedback: advantages and disadvantages of negative feedback, voltage (series and shunt), current (series and shunt), feedback amplifiers, derivation of gain, input and output impedances for feedback amplifiers, Positive feedback: Barkhausen criteria for oscillations, tudy of phase shift oscillator and Colpitts oscillator. Colpitts Crystal oscillator.

UNIT-V

The MOSFET: The three configurations: Common Gate (CG), Common Source (CS) and Common Drain (CD), I-V characteristics, regions of operation, small signal equivalent circuit, dc load line, Q point.

CS amplifier: CS amplifier circuit analysis, Qualitative study of frequency response of CS amplifier.

SUGGESTED BOOKS

1. R. L. Boylestad, L. Nashelsky, K. L. Kishore, Electronic Devices and Circuit Theory, Pearson Education (2006).
2. D.L.Schillling and C. Belove, Electronic Circuits: Discrete and Integrated, Tata McGraw Hill (2002).
3. J.R.C. Jaegar and T.N. Blalock, Microelectronic Circuit Design, Tata McGraw Hill (2010).
4. Donald A. Neamen, Electronic Circuit Analysis and Design, Tata McGraw Hill (2002).
5. J. Millman and C.C. Halkias, Integrated Electronics, Tata McGraw Hill (2001).
6. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991).
7. R. A. Gayakwad, op-Amps and Linear IC'S, Pearson Education (2003).
8. S. Franco, Design with operational amplifiers and analog integrated circuits. Tata McGraw Hill (2002).
9. R. F. Coughlin and F.F. Driscoll, Operational amplifiers and linear integrated circuits.

COURSE CODE: EIC-303

COURSE NAME: ANALOG INTEGRATED CIRCUIT

UNIT- I

Basic IC Op-Amp Fundamentals: Brief review of differential amplifier, current mirror, active load, level shifter, output stage; ac and dc characteristics. Basic building blocks of OP – AMPS.

UNIT –II

Inverting /Non-inverting VCVS, Integrators, Differentiators, CCVS and VCCS, instrumentation Amplifiers, bi-quad filter (LP, HP, BP and Notch), Oscillators. Logarithmic amplifiers, Precision rectifier, peak detector, sample and hold circuits. OP – AMP as comparator, Schmitt trigger, square and triangular wave generator, Monostable Multi-vibrator, IC Analog Multiplexer and De-multiplexer.

UNIT –III

Voltage Regulators: Transistorized series-pass Regulator, Overload short circuit and Thermal shut-down protection, OP – AMP Regulators, IC Regulators, fixed voltage regulators (78/79, XX), 723 IC Regulators (Current limiting, Current fold back); SMPS.

UNIT –IV

Data Converters: Analog to digital & DAC, weighted resistor & binary ladder D/A converters, single & dual slope integration, counter, successive approximation, resistor type A/D converters.

UNIT –V

Signal generators and wave shaping circuits:IC timer (555) applications monostable and astable operation. Ramp Generator: Triangle generator, Saw-tooth generator

PLL : Principle, definition and applications, Linear model of PLL, phase detectors, voltage controlled oscillators, loop filters, FM demodulation, using PLL digital PLL steady state, stability and transient analysis of PLL frequency synthesizer, Direct frequency synthesis analysis of PLL as a frequency synthesizer, direct digital synthesis.

Books:

1. 'Analog Integrated Circuit Design' : David Johns, Kenneth Williams
2. 'Linear Integrated Circuit' : D. Roy. Chaudhary, New Age International.
3. 'OP-amps and Linear Integrated Circuit' :- Ramakant. A. Gayakwad, PHI.

COURSE CODE: EIC-304

COURSE NAME: SIGNAL & SYSTEM ANALYSIS AND MATHEMATICAL METHODS IN ELECTRONICS

UNIT –I

Signal Analysis: Classification of signals and systems, some ideal signals, energy signal, power signals, energy and power spectral densities. Periodic & non periodic, analog& digital, deterministic & random, unit impulse, unit step.System: Classification of systems LTI networks, the concept of frequency in continuous & discrete time domain, linear time invariant system definition. Impulse response of LTI system.

UNIT-II

Fourier Series & Transforms: Fourier Series, Fourier Transforms & properties, Fourier Transform of various functions,Inverse transforms. Convolution Theorem, Laplace transforms,Basic properties of Laplace Transforms, Laplace transform of unit step function, impulse function and periodic function, Solutions of linear differential equations with constant coefficients using Laplace transform applications

UNIT-III

Introduction to Z transform, Region of convergence, properties of the Z transform, Inverse transform using counter integration, complex convolution theorem, Unilateral Z transform and its application to difference equation with non zero initial condition.

UNIT-IV

Probability & Statistics: Introduction: Probability- Mathematical approach and Statistical Approach. Types of Sampling-Simple Random Sampling Stratified Random Sampling. Random Variables, Probability Density function, Probability Mass Function.Mathematical Expectation- Mean, Expectations and Variance of a Distribution.Binomial, Poisson, Exponential, Normal Distributions.

UNIT-V

Computational Methods Numerical Differentiation and Integration: Finite Differences, Derivatives using Forward, Backward and Central Difference Formulae, Newton-Cote's quadrature formula, Trapezoidal rule, Simpson's rules. Numerical methods for Solution of Ordinary Differential Equation-Picards Method ,Taylor Series Method , Eulers and Modified Eulers methods, Runge and RungeKutta Methods .

RECOMMENDED BOOKS:

1. "Advance Engineering Mathematics" by H.K.Dass,PHI Pub.
2. "Advanced Engg. Mathematics" by Erwin Kreyszig,Wiley India Pvt. Ltd..
3. 'Signals and System' by SamarjitGhosh,Pearson Education.
4. "Digital Signal Processing" by S. Salivahanan, A. Vallavara and C. Gnanpriya,TMH Pub..
5. "Higher Engineering Mathematics" by Dr. B. S. Grewal, Khanna Pub.
6. " Signal and System" by Nagrath, Sharan and Ranjan ,McGraw Hill Pub.

COURSE CODE: EIC-305

COURSE NAME: ELECTRONIC MATERIALS

UNIT –I

Fundamentals of Materials Science:
Relative stability of Phase, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods, of crystal growth,Elementary idea of point, line and planar defects, Frankel and Schottky defect, Smart Materials.

UNIT –II

Crystal Structures:
Crystal structures, classification of crystals, lattices, reciprocal lattice, Miller indices, Amorphous materials, Electronic structure and related properties, Bloch theorem, phonons, Nearly Free electron theory, Introduction to tight binding and various band structures, Band structure calculation methods, thermal conductivity due to electrons and phonons.

UNIT –III

Semiconductors:
Metal-semiconductor and, Direct and Indirect semiconductors, Variation of energy bands with alloy composition, charge carriers in semiconductors, effective mass, Intrinsic and Extrinsic materials, Diffusion and drift, diffusion length, diffusion and recombination. The Fermi level & Fermi Dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration Qualitative and Quantitative analysis, Temperature dependency of carrier concentration, conductivity and mobility, effects of temperature and doping on mobility, High field effects, Hall effect.

UNIT- IV

Dielectric and Magnetic Materials:
Dielectric properties, Polariability, Clausius-Mossotti relation, Dielectric constant, Dielectric loss, Kramer-Kronig relation, Damped oscillation, piezoelectric properties, Polymers and their properties. Magnetic and Electro-optical properties, Magnetism & various contributions to Para and diamagnetism, Ferro and Ferri-magnetism and ferrites, Magnons and dispersion relation, antiferromagnetism,Domains and domain walls, Coercive force, Hysterisis.

UNIT –V

Superconductivity and Liquid Crystals:
Different Properties of Superconductor, Meissner effect, London equation, BCS theory, Josephson effect, High temperature Superconductors, Types of liquid crystals and their mesomorphous phases, Elementary theory of order, Transition Metal Alloys.

RECOMMENDED BOOKS

1. "A First Course in Material Science" by Raghvan, McGraw Hill Pub.
2. "Solid State Physics" by S.O.Pillai, New Age Publication.
3. "Electrical Engineering Materials", by A.J. Dekker, PHI Pub.
4. "Electronic Components and Materials" Grover and Jamwal, DhanpatRai and Co.
5. 'The Science and Engineering of materials' by Donald R.Askeland,Chapman & Hall Pub.
6. "Introduction to Liquid Crystal" by Peter J. Collings and Michael Hird, CRC Press.

Course Code: EIC-306(L)

Course Name: ANALOG INTEGRATED CIRCUIT LAB

LIST OF EXPERIMENTS

1. To study the Negative Feedback Amplifier by measuring closed loop gain and gain bandwidth product.
2. To study the RC Phase Shift Oscillator by determining its frequency of oscillation and compare calculated and observed frequency.
3. Construct a Wein Bridge Oscillator and determine its frequency of oscillation and compare calculated and observed frequency.
4. To measure the following parameters of 741 op-amp IC.
   (a) Open-loop gain, (b) Output Offset voltage, (c) CMRR, (d) Slew rate.
5. Using op-amps design the following:
   (a) Differentiator (b) Integrator (c) Zero Crossing Detector (d) Comparator
6. Using op-amps design the following:
   (a) Buffer (b) Scale changer (c) Adder (d) Subtractor.
7. To Verify that in a current mirror, the output current is equal to input current.
8. To design and realize Op-Amp based pulse generator.
9. To design and realize a square wave generator using Op-Amp.
10. To design and realize Log and exponential amplifiers using Op-Amps
11. To design and realize current to voltage converter and also find its conversion factor.
12. Determine the frequency using IC 555 timer of
    (a) Astable Multivibrator (b) Monostable Multivibrator

Note: -20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC-307(L)

COURSE NAME: ELECTRONIC INSTRUMENTATION LAB

LIST OF EXPERIMENTS

1. Wheatstone bridge
    a. To verify balance condition of wheatstone bridge using NI multisim Software
    b. To determine the galvanometer current under unbalance condition of wheatstone bridge using NI multisim Software.
2. AC bidges
    a. To verify the balance condition of Maxwell's Bridge using NI multisim Software.
    b. To verify the balance condition of Hay's Bridge using NI multisim Software.
    c. To verify the balance condition of Scherings's Bridge using NI multisim Software.
    d. To verify the balance condition of Wein's Bridge using NI multisim Software.
    e.
3. Digital to analog convertor
    a. To design 4 bit weighted resistor DAC using NI multisim Software.
    b. To design 4 bit R-2R DAC using NI multisim Software.
    c. To verify 4 bit weighted resistor DAC on hardware kit.
    d. To verify 4 R-2R DAC on hardware kit
4. Waveform generators
    a. To design square wave generator using NI multisim Software.
    b. To design Triangular wave generator using NI multisim Software.
    c. To design sawtooth wave generator using NI multisim Software.
5. Analog to Digital convertor
    a. To verify the characteristics of counter type ADC.
    b. To verify the characteristics of SAR type ADC.
6. To verify the characteristics of Load Cell.
7. To verify the characteristics of Strain Gauge
8. To verify the characteristics of Linear variable Differential Transformer (LVDT).
9. To verify the characteristics of Water Level Transducer.
10. Study of Optical Transducer
    a. To study the characteristics of Filament Lamp.
    b. To study the characteristics of Photovoltaic Cell.
    c. To study the characteristics of Photoconductive cell.
    d. To study the characteristics of PIN Photodiode.
    e. To study the characteristics of phototransistor.
11. Study of Temperature Transducer
    a. To study the characteristics of IC temperature sensors.
    b. To study the characteristics of Platinum RTD.
    c. To study the characteristics of NTC thermistor.
    d. To study the characteristics of NTC Bridge Circuit.
    e. To study the characteristics of K type Thermocouple.

COURSE CODE: EIC- 401

COURSE NAME: DIGITAL ELECTRONICS

UNIT– I

Number system: Number systems, conversion of number systems,Binary arithmatics- addition, substraction, multiplication and division, 1's compliment and 2' complement,subtraction using 2's compliment method using 2's compliment , 9's compliment and 10's compliment, subtraction using 10's compliment method.

UNIT – II

Boolean algebra and logic circuits- Boolean algebra- Boolean theorems, minimization of Boolean functions, basic logic gates, universal gates, minturm and maxterm, k-map, Boolean functions realization using logic gates, logic gate characteristics, logic families-RTL,DTL,TTL,ECL,CMOS.

UNIT- III

Combinational circuits- Design of Binary adder, Subtractor, Parallel binary adder subtractor Circuit, BCD adder, decoders, multiplexer, de-multiplexers & their applications, Digital Comparators,Parity generator , error detection and corraction code,hamming codes, BCD to Seven segments decoder, Memory- write operation,read operation, types of memory-RAM ROM PROM EPROM and EEPROM.

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UNIT-IV

Sequential circuits: introduction to sequential logic, Flip-Flops-RS Flip-Flop, D Flip-Flop, T Flip-Flop, JK flip-flop, Excitation and characteristics table of Flip-Flops, characteristics equation, Conversion of one form of Flip-Flops to another type, race around condition, Master slaves, flip-flop clocked sequential circuits,Multivibrators- Monostable, Bistable, Astable Multivibrators,Schmitt trigger circuit.

UNIT – V

Counter and shift register: Design of Asynchronous & Synchronous counters - Ripple counter and Up-down Counters, Ring counter,Counter with unused states, shift registers, Serial & parallel data transfer, Shift left/right register.

Textbooks:

1. Morris Mano, "Digital Design" PHI
2. "Digital Electronics", Bignill & Donovan.
3. "Digital Integrated Circuit" A.K.Gautam-Katson Publication.

References:

1. Taub and Schilling "Digital Integrated Electronics",TMH
2. Bartee , Thomas C. / "Fundamentals of Digital Computers"/ Tata McGraw-Hill
3. Gopalan, K. "Gopal" / "Introduction To Digital Microelectronic Circuits" / Tata McGraw-Hill
4. Millman, Jocob & Taub, Herbert / "Pulse, Digital & Switching Waveforms" / Tata McGraw-Hill
5. Malvino, A.P. & Leach, Donald P. / "Digital Principles & Applications" / Tata McGraw-Hill
6. Tokheim, H. Roger L. /"Digital Electronics Principles & Application"/ Tata McGraw-Hill / 6th Ed.

COURSE CODE: EIC-402

COURSE NAME: ANALOG COMMUNICATION

UNIT-I

Communication System
Information, Message and Signal, Elements of communication System and its Fundamental limitations, Need of Modulation.
Random variable & random Processes
Random Process, Discrete random variable, Discrete random vector, Stationary Processes, Ergodic Processes, Transmission through LTI, Power Spectral density, Gaussian process, Expectations.

UNIT-II

Amplitude Modulation (Linear Modulation)
Time domain representation of AM signal, Spectrum of AM signal, Power and current relations in AM, Generation and Demodulation of AM Signal, Generation and Demodulation of DSB-SC, Generation and Demodulation SSB-SC, Generation and Demodulation VSB-SC, Comparison of various AM Systems, Concept of FDM.

UNIT-III

Angle Modulation (Exponential Modulation)
Types of Angle Modulation, Mathematical Representation of Frequency and Phase Modulation, Concepts of Instantaneous frequency, Wideband and Narrowband FM, Generation and Demodulation of FM, Generation and Demodulation of PM.

UNIT-IV

Noise performance of CW Modulation Systems
External and internal sources of noise, Thermal noise, Calculation of thermal noise, Shot noise, Noise figure, Noise temperature, Equivalent noise bandwidth, Noise in DSB-SC, SSB-SC and AM system, Noise in FM and PM, FM threshold and its extension, Pre-emphasis and De-emphasis in FM.

UNIT- V

Sampling theory & pulse modulation
Sampling process, sampling theorem, signal reconstruction, flat top sampling of band pass signals, Analog Pulse Modulation, Types of analog pulse modulation, Method of Generation and Demodulation of PAM, PWM, PPM, Spectra of pulse modulation, concept of time division multiplexing.

Text books:
1. Communication Systems S. Haykin, John Willy & Sons.
2. Communication Systems: A.B. Carlson, Mc-Graw-HW.
3. Modem Analog & Digital Communication Systems : B.P. Lathi; Oxford Univ. Press.
4. Analog Communication Systems : Pchakrabarti Dhanpat Rai.
5. Kennedy, George & Davis, Bernard / "Electronic Communication Systems" / Tata McGraw-Hill / 4thEd.

COURSE CODE: EIC-403

COURSE NAME: ANTENNA AND WAVE PROPAGATION

UNIT –I

ANTENNA BASICS & DIPOLE ANTENNA:
Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Fields from oscillating dipole, Polarization – Linear, Elliptical, & Circular polarizations, Antenna temperature, Antenna impedance, Front–to-back ratio, Antenna theorems, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance.

UNIT- II

ANTENNA ARRAYS:
Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity.

UNIT-III

PRACTICAL ANTENNAS:
The Loop Antenna: Design and its Characteristic Properties, Application of Loop Antennas, Far Field Patterns of Circular Loop Antennas with Uniform Current, Slot Antennas, Horn Antennas, Helical Antennas, The Log-Periodic Antenna, Microstrip Antennas.
Reflector Antennas: Flat Sheet Reflectors, Corner Reflectors, The Parabola-General Properties, A Comparison Between Parabolic and Corner Reflectors, The Paraboloidal Reflector, Patterns of Large Circular Apertures with Uniform Illumination, Reflector Types , Feed Methods for Parabolic Reflectors.

UNIT –IV

ANTENNA MEASUREMENT:
Measurements of antenna efficiency, Measurement of noise figure and noise temperature of an antenna, polarization measurement.

UNIT –V

WAVE PROPAGATION: Ground Wave Propagation:
Plane Earth Reflection, Space Wave and SurfaceWave,**Space Wave Propagation :**Introduction**,** Field Strength Relation, Effects of Imperfect Earth, Effects of Curvature of Earth.
Sky wave Propagation: Introduction structural Details of the ionosphere, Wave Propagation Mechanism, Refraction and Reflection of Sky Waves by ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation Between MUF and the Skip Distance, Multi-Hop Propagation, Wave Characteristics.

SUGGESTED BOOKS:
1. Balanis," Antenna Theory: Analysis & Design" 3rd Edition, 2010, John Wiley (India).
2. Prasad, K.D./"Antenna and Wave Propagation"/ Khanna Publications.
3. Jordan Edwards C. and Balman Keith G./" Electromagnetic Waves and Radiating Systems"/PHI
4. Hayt Jr. William H./" Engineering Electromagnetics"/TMH

COURSE CODE: EIC-404

COURSE NAME: VLSI TECHNOLOGY

UNIT-I

Crystal Growth & Wafer Characterization
Monolithic Integrated Circuits, Bipolar and MOS Integrated Circuits, Electronic Grade Silicon, CZ Crystal Growing Process, Silicon Shaping, Processing Consideration., Growth Mechanism, Silicon Wafer Characterization, Crystal Purification Techniques.

UNIT-II

Diffusion and Ion Implantation
Models of Diffusion in Solids, Fick's One Dimensional Diffusion Equations, Atomic Diffusion Mechanisms. Range Theory, Ion Implantation process, Importance of Ion Implantation process, Annealing. Oxidation, Oxide Properties, Thin and Thick Oxides Thermal oxidation, Properties of oxide Layer, Oxidation Induced Defects.

UNIT-III

Lithography and Metallization
Lithogrphy, Photoresist materials, Photomasking, Photolithography, Optical Lithography, Electron Lithography, X-Ray Lithography, Ion- Beam Lithography, Techniques for Pattern Transfer, Etching Process, Etch Mechanisms, Wet Chemical Etching, Reactive Plasma Etching Techniques and Equipment, Digree of Anisotropy, Metallization, Materials properties for Metallization. Methods of Metallization.

UNIT-IV

Epitaxy and Film Deposition
Epitaxy, Vapour Phase Epitaxy, Molecular Beam Epitaxy, Liquid Phase Epitaxy, Epitaxial Reactors, Physical Vapour Deposition, Evaporation Systems, Sputtering,Chemical vapour deposition (CVD), CVD Reactors.

UNIT- V

Thick and Thin film technology
Thick film hybrid Ic's, Advantages and applications of Thick films, Thick film substrates, Thick film dielectrics and resistors, Thin film hybrid Ic's, Advantages and applications of Thin films, Thin film processing, Thickness measurement, I-V measurement, C-V measurements, Resistance measurement – two probe and four probe, spreading resistance, Dielectric property measurements.

RECOMMENDED BOOKS:

1. "VLSI Technology" by S. M. Sze,Mcgraw Hill Pub.
2. "Solid State Electronic Devices" by Ben G. Streetman, PHI Pub.
3. "Physics and Technology of Semiconductor Devices" by A. S. Grove, John Wiley and Sons Pub.
4. "Large Scale Integration" by M.J. Hower and D.V.Morgan, JohnWiley Pub.
5. "Semiconductor & Integrated Fabrication Techniques" by P.E. Gise and R. Blanchard, Restonn Pub.

COURSE CODE: EIC -405

COURSE NAME: PROFESSIONAL COMMUNICATION

UNIT -1

Basics of Technical Communication:
Technical Communication: Purpose, Features andImportance of Technical communication.
Distinction between General and Technical communication;
Language as a tool of communication; oral, written and nonverbal communication
Process of communication, Barriers of communication

UNIT – II

Presentation skills:
Tips for improving oral skills – public speaking skills, pronunciation,
Level of audience and Locale
Speech delivery, Group Discussions, preparation for Interviews
Presentations strategies – for conferences, seminars and meetings

UNIT – III

Business correspondence:
Business letters, Job applications, Cover letters
Style and tone of writing business messages, layout of business messages
Structure and types of Report writing - annual reports, routine reports
Resume writing - structure and style of writing

UNIT – IV

Non verbal skills Body language, Audio-visual aids
Time management
Voice dynamics, business ethics
Reading and writing skills

UNIT-V

Documentation Primary and secondary documents
Preparing outlines and organizing content of scientific papers
Format and layout of research articles, review writings
Making proposals, thesis

Text Books :

1.Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi

2.Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta Sharma, OxfordUniv. Press 2007, New Delhi.

Reference Books

1.Effective Technical Communication by Barun K. Mitra, Oxford Univ. Press, 2006, New Delhi

2.Business Correspondence and Report Writing by Prof. R.C. Sharma & Krishna Mohan, Tata McGrawHill & Co. Ltd., New Delhi.

3.Developing Communication Skills by Krishna Mohan, Meera Banerji- Macmillan India Ltd. Delhi.

4.Business communication by Malti Agarwal

COURSE CODE: EIC – 406(L)
COURSE NAME: DIGITAL ELECTRONICS LAB

LIST OF EXPERIMENTS

1. To study the operation of transistor
   (a) As a normal open switch (inverter).
   (b) As a normally closed switch.
2. To realize two input AND, OR gate using diodes and transistors and verify truth table.
3. To verify NAND gate operation on IC-7400, NOR gate operation on 7402 and realize basic gates from universal gates.
4) (a) To realize the circuit of half Adder and Full adder and verify the truth table using 7400 NAND gates only.
   (b) Verify the operation of 7483 four bit adder.
5) To verify the truth table of 4 X 1 multiplexer using IC-74153.
6. To realise 2 to 4 line decoder with and without enables and verify their truth tables.
7. To realize a 3 variable Boolean function using multiplexer IC 74153.
8. To study the various types of Flip-Flops
   (a) RS Flip-Flop
   (b) D Flip-Flop
   (c) Verify the operation of JK flip-flop using IC 7476
9. To verify the operation of 7490 decade counter.
10. To realize and verify the operation of 4 bit shift input resister-using IC 7474

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC-407(L)

COURSE NAME: ANALOG COMMUNICATION LAB

LIST OF EXPERIMENTS

1. To study the amplitude modulation single tone and multitone and also study suppressed carrier modulation.
2. To study DSBSC modulation and generate the DSBSC signal also calculate the value of modulation index.
3. To study DSBSC demodulation and receive the DSBSC signal at receiver.
4. To study SSBSC modulation and generate the SSBSC signal.
5. To study SSBSC demodulation and receive the SSBSC signal at receiver.
6. To study the angle modulation (frequency and phase modulation) also calculate the value of modulation index.
7. To study frequency demodulation and receive the FM signal at receiver.
8. To study the modulation and demodulation of PAM signals.
9. To study the modulation and demodulation of PWM signals.
10. To study the modulation and demodulation of PPM signals.
11. To study the pulse code modulation and demodulation.

COURSE CODE:EIC -501

COURSE NAME: POWER ELECTRONICS

UNIT-I

Power semiconductor Devices:

Power semiconductor devices their symbols and static characteristics. Characteristics and specifications of switches, types of power electronic circuits. Operation and steady state characteristics of MOSFET and IGBT. Thyristor – Operation & V- I characteristics, two transistor model, methods of turn-on Operation of GTO, MCT and TRIAC, Protection of devices. Series and parallel operation of thyristors, Commutation techniques of thyristor

UNIT-II

DC-DC Converters:

Principles of step-down chopper, step down chopper with R-L load, Principle of step-up chopper, and operation with RL load, classification of choppers.

UNIT-III

Phase Controlled Converters

Single phase half wave controlled, rectifier with resistive and inductive loads, effect of freewheeling diode.Single phase fully controlled and half controlled bridge converters. Performance Parameters, Three phase half wave converters, Three phase fully controlled and half controlled bridge converters, Effect of source impedance, Single phase and three phase dual converters.

UNIT-IV

AC Voltage Controllers

types of AC voltage controllers, integral cycle control, single phase voltage controllers, with R and RL loads, single-phase transformer tap changers, single-phase sinusoidal voltage controllers, working of threephasecontrollers with star & delta loads.

Cycloconverters: Principle of cycloconverter operation, single-phase to single-phase circuit, step-up andstep-down cycloconverter, three-phase half wave cycloconverter, output voltage equation of a cycloconverter, load commutated cycloconverter.

UNIT-V

Inverters

Single phase series resonant inverter, Single phase bridge inverters, Three phase bridge inverters
Voltage control of inverters, Harmonics reduction techniques, Single phase and three phase current source
inverters.

RECOMMENDED BOOKS:

1. "Power Electronics" by Mohan, Undeland and Robbins, John Wiley Pub..
2. "Power Electronics Circuit Devices and Applications" by Rashid M. H., PHI Pub.
3. "Modern Power Electronics and AC Drives" by Bimal K Bose, Pearson Pub.
4. "Power Electronics" by Bimbhra P S, Khanna Publishers.
5. "Power Electronics" by Vedam Subrahmanyam, New Age International.
6. "Power Electronics: Circuits, Devices and Applications" by H. Rashid, Pearson Pub.

COURSE CODE: EIC- 502

COURSE NAME: MICROPROCESSOR AND APPLICATIONS

UNIT-I

Microprocessor and Microcomputer

Introduction, Digital computer, computer language, Microprocessor architectures and operation, Microcomputer system, memory,Types of memory, Read operation & Write operation, Interfacing of Memory with Microprocessor .

8085 Microprocessor Architecture

Introduction , internal Architecture of 8085, pinout configuration , instruction fetch, execute & decode operation , timing diagram.

UNIT-II

Instruction set of 8085

Introduction, instruction and data formats, addressing modes, status flags, 8085 instructions- Data Transfer Instruction sets, Arithmetic & Logical Instruction sets, Stack related Instruction sets, Subroutine Instruction sets, I/O related Instructions, Machine control Instruction sets.

UNIT-III

Assembly Language programming

Programming techniques, data transfer with 8 bit & 16 bit, Arithmetic operation related to memory, Logical operation programs, Stack related programs, Subroutine programs

Interrupts

Hardware and software interrupts, interrupt call location, Interrupt related programs, Additional I/O concepts and processes.

UNIT-IV

Programmable peripheral interfacing devices

Programmable peripheral interface (8255) - Architecture of Programmable peripheral interface, Operating modes of 8255, Interfacing of 8255 with Microprocessor, Interfacing of seven segment display with Microprocessor via 8255, Interfacing of ADC with Microprocessor via 8255.
Programmable Interrupt Controller (8259) – Architecture of Programmable Interrupt Controller, Initialisation Command Words, Operational Command Words, various internal registers, Interfacing of Programmable Interrupt Controller with Microprocessor in single mode and cascade mode.
Programmable Interval Timer (8253) - Architecture of Programmable Interval Timer, various Operating modes.

UNIT-V :

Advance 16 bit Microprocessor (8086)

Introduction of 8086, Internal organization of 8086, Bus Interface Unit, Execution Unit, Register Organization, Memory Segmentation, Adder Unit, Program Status Word, Addressing modes. Instruction related to Data transfer, Arithmetic and Logical, Conditional and Branching. Programming of Microprocessor 8086.

Reference-

1.R.S. Gaonkar ; Microprocessor Architecture, Programming and Applications –New age International

2. D.V.Hall Microprocessors and interfacing –TMH

3. Brey barry; the Intel Microprocessor –PHI

COURSE CODE: EIC -503

COUSE NAME: CONTROL SYSTEM

UNIT-I

Introduction

Introduction, terminology and Feedback characteristics of control system definitions, closed and open loop systems, Physical examples, Transfer functions, Block diagrams, Reduction Algebra, signal flow graphs.

UNIT-II

Time domain analysis and Root Locus Techniques:

Standard test signals, Time domain performance of control systems, Transient response of the first order system, the second order system, stability, steady state errors, effect of adding zero to the system, Proportional, derivative and integral controllers, combined controllers, Effect of integral and derivative control on system, performance, PID controller, performance indices.

UNIT-III

Stability and Algebraic Criteria:

Concept of stability and necessary conditions, Routh-Hurwitz criteria and limitations, Root Locus Technique: The root locus concepts, construction of root loci.

UNIT-IV

Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots

Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles.

UNIT -V

Introduction to System Design: The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.

State Variable Analysis

Review of state variable, state model, state model for linear continuous time system, diagonalization, solution of state equations, concept of controllability and observability.

TEXT BOOKS:

1. Nagrath & Gopal, "Control System Engineering", New age International.
2. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
3. B.C. Kuo & Farid Golnaraghi, "Automatic Control System" Wiley India Ltd.
4. D.Roy Choudhary, "Modern Control Engineering", Prentice Hall of India.

REFERENCE BOOKS:

5. Norman S. Mise, Control System Engineering , Wiley Publishing Co.
6. Ajit K Mandal, "Introduction to Control Engineering" New Age International.
7. Samarjit Ghosh, " Control Systems theory and Applications", Pearson Education

COURSE CODE: EIC -504

COURSE NAME:DIGITAL COMMUNICATION

UNIT-1

Elements of Digital communication and information theory : Model of a digital communication system, logarithmic measure of information, entropy and information rate, conditional entropy and redundancy, source coding fixed and variable length code words, Source coding theorem, prefix doing and craft in equality, Shannon – fano and Huffman coding for 1st , 2nd and 3rd order extensions, maximum entropy of a continuous source(with Gaussian distribution) entropy of a band limited white Gaussian noise, Mutual information and channel capacity of a discrete memory less channel, of a BSC, Hartley Shannon law.

UNIT-II

Fundamentals of probability theory & random process: Concept of Probability, Random variable, Statistical averages, Correlation, Sum of Random Variables, Central Limit Theorem, Random Process, Classification of Random Processes Power spectral density, multiple random Processes.

UNIT-III

Waveform coding techniques : Discretization in time and amplitude. Linear quantizer, quantization noise power calculation, signal to quantization noise ratio, non – uniform quantizer, A law & μ law companding; encoding and pulse code modulation, bandwidth of PCM, Differential pulse code modulation, Delta modulation, Idling noise and slope overload, Adaptive delta modulation, adaptive DPCM. Comparison ofPCM and DM, MPEG audio coding standard.

UNIT-IV

Principles of digital data transmission: Digital Data transmission, Line coding review, Pulse shaping, Scrambling, Digital receivers, Eye diagram, Digital carrier system. Method of generation and detection of coherent & non-coherent binary ASK, FSK & PSK, Differential phase shift keying, Quadrature modulation techniques. (QPSK and MSK), M-ary Digital carrier Modulation.

UNIT-V

Error Correcting codes: Hamming sphere, hamming distance and Hamming bound, relation between minimum distance and error detecting and correcting capability Linear block codes: encoding and syndrome decoding. Cyclic codes: encoder and decoder for systematic cyclic codes. Convolution codes, code tree and Trellis diagram, Viterbi and sequential decoding, Burst error correction, Turbo codes.

Text Book:

1.B.P. Lathi, "Modern Digital and Analog communication Systems", 4th Edition, Oxford University Press, 2010.
2.H. Taub, D L Schilling, GautamSaha, "Principles of Communication", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd.
3.Simon Haykin, "Communication Systems", 4th Edition, Wiley India.
4.H P HSU & D Mitra, "Analog and Digital Communications", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd.

References Books:

1. Singh, R.P. &Sapre, S.D. / "Communication Systems: Analog& Digital" / Tata McGraw-Hill.
2. A.B. Carlson / "Communication Systems" / Tata McGraw-Hill.
3. Prokis J.J / "Digital Communications" / McGraw Hill /

COURSE CODE-EIC -505

COURSE NAME: INDUSTRIAL MANAGEMENT

UNIT – I

Introduction to industrial management ,Brief history of industries in India. Brief definition of Management, Organisation and administration.

UNIT- II

Characteristics of management, Principles of management, Junction of management like Planning, Organizing, direction, Coordination etc.

UNIT-III

Levels of management,skills of management, inter – relation between skills and levels of Management,scientific management , Introduction to schools of management thoughts.

UNIT-IV

Introduction to Organization, study of basic types of organisation e.g. Line and staff Organisation, project organisation, matrix organisation, Informal organisation etc.

UNIT-V

Introduction to industrial psychology, Motivation theory and study of Maslow's Need Hierarchy Theory, Plant Location, Plant Layout, Study of different forms of layout like line layout, process Layout, product layout, culmination layout, fixed position layout.

Text Book and References:

1. Khanna O.P.: Industrial Engineering
2. T.R. Banga : Industrial Engineering and Management
3. Mahajan : Industrial and Process Management

COURSE CODE: EIC -506(L)

COURSE NAME:DIGITAL COMMUNICATION LAB

LIST OF EXPERIMENTS

1. To construct a Square wave with the help of Fundamental Frequency and its Harmonic component
2. Study of pulse data coding & decoding techniques for NRZ and RZ formats.
3. Study of Manchester coding and Decoding.
4. Study of Amplitude shift keying modulator and demodulator.
5. Study of Frequency shift keying modulator and demodulator.
6. Study of Phase shift keying modulator and demodulator.
7. Study of single bit error detection and correction using Hamming code.
8. Study of Quadrature Phase shift keying modulator and demodulator
9. To simulate Differential Phase shift keying technique using MATLAB software.
10. To simulate M-ary Phase shift keying technique using MATLAB software (example8PSK, 16PSK) and perform BER calculations.
11. To simulate convolutional coding using MATLAB software.
12. Design a front end BPSK modulator and demodulator

COURSE CODE: EIC – 507(L)

COURSE NAME: MICROPROCESSORS LAB

LIST OF EXPERIMENTS

Experiments Based on 8085 :

1. Addition of an 8-bit number without carry and with carry.
2. Addition of a 16-bit number without carry and with carry.
3. Addition of a series of 10 data bytes.
4. Multiplication of two, 8-bit numbers.
5. BCD Addition and subtraction.
6. Find the greatest and smallest number in the given series.
7. Arrange the given series in ascending and descending order.
8. Convert the binary number in to gray code and vice-versa.

Experiments Based on 8086 :

9. Addition of an 8-bit and 16-bit number without carry and with carry.
10. Multiplication of two, 8-bit and 16-bit numbers.
11. Division of two, 8-bit and 16-bit numbers.
12. Find the greatest and smallest number in the given array.

Experiments Based on Interfacing :

13. Interfacing of 8255 with 8085 and read the data for port and store it in memory.
14. Interfacing of 8255 with 8085 and read the data for one port and out it from another port.
15. Interfacing with seven segment display.
16. Mini Project on some interfacing applications.

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC -601

COURSE NAME:WIRELESS COMMUNICATION

UNIT-I

Evolution of mobile radio communication fundamentals. General Model of Wireless Communication Link, Types of Signals, Cellular Infrastructure, Cellular System Components, Operation of Cellular Systems, Channel Assignment, Frequency reuse, Channel Assignm ent strategies, Handoff Strategies, Cellular Interferences, splitting Sectorization, microcell zoning.

UNIT-II

Wireless Channel and Radio Communication, Free Space Propagation Model, Two ray ground reflection model, knife edge diffraction model, Channel Noise and Losses, Multipath Fading, Fading Effects on Signal and Frequency, Shadowing.

UNIT -III

Spread spectrum modulation techniques: Pseudo noise sequence, Direct sequence spread spectrum DS-SS, performance of DS-SS, Frequency hopped spread spectrum FH-SS , performance of FH-SS, Equalization techniques, linear and non linear equalizer, Diversity techniques, RAKE Receiver.

UNIT -IV

Multiplexing and Multiple Access: FDMA, TDMA, CDMA, OFDMA, IDMA Schemes and Hybrid Method of Multiple Access Schemes, Multiple Access for Radio Packet Systems.

UNIT-V

GSM system for mobile Telecommunication, General Packet Radio Service, Edge Technology; CDMA 2000, Wireless Local Loop, IMT 2000 and UMTS, Long Term Evolution (LTE), Introduction to 4G.

Text Book:

1. T.S. Rappaport, "Wireless Communication-Principles and practice", Pearson Publications, Second Edition.
2. Jaganathan, Principles of Modern Wireless Communication System, McGraw Hill Education.
3. T L Singal ,"Wireless Communications ", McGraw Hill Education.

Reference Books:

1.Andrea Goldsmith, "Wireless Communications", Cambridge University Press.
2. S.Haykin & M.Moher, "Modern wireless communication", Pearson, 2005.

COURSE CODE:EIC -602

COURSE NAME: OPTICAL COMMUNICATION

UNIT-I

Introduction:
Historical developments, Optical fiber communication system, Principle of optical communication, Advantages of optical fiber communication, Total internal reflection, Acceptance angle, Numerical aperture, Skew rays, Cylindricalfiber.
Structure and types of optical cable: Structure of optical fibers, Single and multimode fibers, Step index and graded index optical fiber.Optimized fiber structures.

UNIT-II

Transmission Characteristics of Optical Fibers:
Mid-infrared and Far-infrared transmission, Inter-modal and Intra-modal dispersion, Overall fiber dispersion, Polarization. Losses in optical fibers: Attenuation, Material absorption losses, Linear scattering losses, Non-linear scattering losses and Fiber bends loss and Joint loss. Preparation methods of optical fibers: Liquid phase (melting) and Vapour phase deposition techniques.Plasma enhanced chemical vapour deposition method.
Power launching and coupling
Source to fiber power launching, power calculation, lensing schemes, fiber to fiber joints, fiber splicing technique, fiber connectors.

UNIT-III

Optical sources&Optical detectors
Optical sources: Absorption and emission of radiation, Einstein's relation, Population inversion, Optical emission from semiconductors, Semiconductor LASER, LED structures, LED characteristics.
Optical detection: principles, Absorption and emission, characteristics: Quantum efficiency, Responsivity.p-n photodiode, p-i-n photo diode,Avalanche photodiodes, photo transistors.

UNIT-IV

Digital Transmission Systems
Point to point links, system considerations, link power budget, rise time budget, modulation formats for analog communication system, introduction to WDM concepts, Introduction to advanced multiplexing strategies.

RECOMMENDED BOOKS:

1. "Optoelectronics: An introduction" by J.Wilson and J.F.B.Hawkes, PHI Pub.
2. "Optical Fiber Communication" by Gerd Keiser, TMH Pub.
3. "Optical fiber communications, Principles and Practice" by John M. Senior, PHI Pub.
4. "Optical fiber systems, Technology design and applications" by Charles K Kao, Mc- Graw Hill

COURSE CODE : EIC -603

COURSE NAME: ADVANCED SEMICONDUCTOR DEVICES

UNIT-I

Junction Theory

Abrupt and Graded PN junction, Ion implanted junction, Epitaxial junctions. equilibrium conditions, contact potential, current flow at a junction, junction breakdown, capacitance of p-n junctions, charge storage and transient behavior, rectifiers, , zener diode, Metal-Semiconductor contact, Energy band diagrams, Schottky effect, Varactor diodes.

UNIT-II

Bipolar Junction Transistor

BJT-General characteristics, Ebers – moll Model, specification for switching transistors, thermal effects, kirk effects, transit effects, Webster Effect, Heterojunction Bipolar transistors.

UNIT-IIII

Field Effect Transistors

The junction FET, , MESFET, MOSFET basic device Characteristics with analysis, the ideal MOS capacitor, threshold voltage, V-I characteristics of MOS gate oxides, , output characteristics, transfer characteristics, Mobility Model, , power MOSFETS ,CMOS structure

UNIT-IV

Microwave and Opto Electronic Devices

Transferred Electron Model, Principle, structure, construction and working of Gunn diodes, , READ diode, IMPATT, TRAPATT.

Optical absorption, Luminescence, photoluminescence and electroluminescence, Photodiode, solar cell, Phototransistor &, LEDs, Semiconductor lasers, Heterojunction laser operating principles.

UNIT-V

Power Electronic Devices:

The p-n-p-n diode, SCR, GTO, IGBT, MCT, DIAC, TRAIC - operations and characteristics,

RECOMMENDED BOOKS

1. "Solid State Electronic Devices" by Ben G Streetman, PHI Pub.
2. "Semiconductor Devices - Physics and Technology" by S M Sze, John Wiley Pub.
3. "Semiconductor Devices" by Kanaan Kano, Pearson Education.
4. "Microwave Devices and circuits" by Samuel Y.Liao,PHI Pub.
5. "Semiconductor Physics and Devices – Basic Principles" by Donald A Neamen, TMH Pub.
6. "Power Semiconductor drives" by S.B.Dewan, G.R.Sleman and A.Strauphan,John Wiley Sons.
7. "Power Electronics" by P.C. Sen,TMH Education.

COURSE CODE:EIC -604

COURSE NAME:VLSI DESIGN

UNIT-I

Introduction, Historical perspective, VLSI Design methodologies, VLSI Design Flow, Design Hierachy, Design Styles, CAD Technology. Fabrication of MOSFETS, Fabrication processes, NMOS Fabrications, CMOS n-well process, Layout Design rules, Stick Diagrams, Full Custom Mark Layout Design.

UNIT-II

MOS Transistor, Review of structure and operations of MOSFET(n-MOS enhancement type), CMOS,MOSFET v-I Characteristics, MOSFET scaling and small geometry effects, MOSFET capacitance, Modeling of MOS Transistor- Basic concept the SPICE level-1 models, the level-2 and level-3 model equations.MOS Inverters: Basic NMOS inverters, Characteristic, Inverters with resistive load and with n-type MOSFET load. CMOS inverter and characteristics.

UNIT-III

MOS inverters: Switching characteristic and interconnect effects; Delay time definitions and calculations , Inverter design with delay constraints, estimations of parasitics switching power dissipations of CMOS inverters. Combinational MOS logic circuits, CMOS logic circuits, State Style, Complex logic circuits, Pass transistor Logic.

UNIT-IV

Sequential Logic Circuit-Introduction, SR latch, Clocked latch & Flip Flop Circuits , CMOS D latch and edge triggered flipflop. Dynamic logic circuits: Dynamic logic, Basic principles, High performance dynamic CMOS circuits, Dynamic RAM, SRAM, Flash Memory.

UNIT-V

System Design method, Design strategies, Concept of FPGA, Standard cell based design, design capture tools, hardware definition languages such as VHDL and packages. Xlinux(Introduction), Introduction to IRSIM and GOSPL (Open source packages), design verification and testing, simulation at various levels including timing verifications, fault models, design strategies for testing chip level and system level test techniques.

TEXTBOOKS:

1. Digital Integrated Circuits- Analysis & Design – Sung Mo-Kang & Yussuf Leblebici, TMH.
2.VHDL Programming by example – Perry TMH.

REFERENCEBOOKS:

1. Digital Integrated Circuits: A Design Perspective- Rabey et.ai.Pearson Education.

2. VLSI design Techniques for analog and digital circuits- Geiger et.AI.McGraw Hill.
3. VLSI – Puckneln & Eshagraine (PHI)

COURSE CODE: EIC -606(L)

COURSE NAME:WIRELESS COMMUNICATION LAB

LIST OF EXPERIMENTS

1. To set up active and passive satellite communication link and study their difference
2. To measure the base band analog signal parameters in a satellite link.
3. To study microwave klystron bench.
4. To find the SWR, Reflection coefficient, frequency.
5. Find the value of unknown load impedance by using smith chart.
6. Radiation pattern of different directional antennas by using microwave bench.
7. Generate DS-SS signal by using different type of sequences (Barker,Gold,PN) with BPSK, QPSK.
8. Demodulation of DS-SS signal.
9. Study of characteristics of Reflex klystron and Gunn diode.
10. Perform the different operations (read, delete, insert, make a call etc.) with commands in GSM module.

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE: EIC-607(L)

COURSE NAME: OPTICAL COMMUNICATION LAB

LIST OF EXPERIMENTS

1. To Study an 950mm Fibre Optic Link and Relationship b/w Input and output.

(a)- Analog link
(b)- Digital link
(c)- Voice link

2. Measurement of bending Losses in Optic Fibre with given Wavelength.

3. Measurement of Numerical Aperture and V number of given Fibre.

4. Study of Frequency Modulation and Demodulation over Fibre Optic Link

5. Study the Characteristic of Fibre Optic LED and Detector.

6. Study of Pulse Position Modulation and Demodulation over Fibre Optic Link.

7. Study of pulse Width Modulation and Demodulation over Fibre Optic Link

Advance Experiment

8. Study the OTDR and its Graph.

9. Measurement of Transmission Characteristic of Optical Fibre link Using OTDR.

Note: 20% experiments other than this list of equal standard relevant to syllabus can also be set.

COURSE CODE:EIC -701

COURSE N AME: DIGITAL SIGNAL PROCESSING

UNIT -I

Introduction
Limitations of analog signal processing, Advantage digital signal processing, discrete time characterization of signals & systems some elementary discrete time sequences and systems, concepts of stability and causality.

UNIT -II

Discrete fourier transform: DFT and its properties ; linear, periodic and circular convolution , linear filtering methods based on DFT, filtering of long data sequences; fast Fourier transform algorithm using using decimation in time and decimation in frequency techniques ; linear filtering approaches to computation of DFT.

Sampling of Continuous Time Signals: Sampling and reconstruction of signals, discrete time processing of continuous time signals and vice – versa; decimation & interpolation, changing the sampling rate by integer and non integer factors using discrete time processing.

UNIT -III

Transform Analysis of LTI Systems
Frequency response of LTI systems, system function for system characterized by linear constant coefficient difference equations. Relationship between magnitude and phase, all pass systems, minimum phase systems.
Structure for discrete time systems Signal flow graph representation, transposed forms, lattice structures.

UNIT -IV

Filter Design Techniques:
Design of D-T IIR filters from continuous – time filters, Linear phase FIR filters , design of FIR filters impulse invariance, bilinear transformation; Matched Z – transformation, by windowing: Kaiser Window method, optimum approximations of FIR filters, FIR equiripple approximation

UNIT -V

Finite Precision Effects
Fixed point and floating point representations, overview of finite precision numerical effects, effects of coefficient quantization, Effects of round-off noise in digital filters, zero-input limit cycles in fixed point realizations of IIR digital filters.
Digital signal processors Architecture and various features of TMS/ADSP, series of digital signal processors; Instruction set and few applications of TMS 320CXX.

TEXT BOOKS:

1. S. Salivahanan, "Digital Signal Processing", McGraw Hill Education (India) Private Limited.
2. Oppenheim A.V., Schafer, Ronald W. & Buck, John R,"Discrete Time Signal processing", Pearson Education . Reference Books:
3. Proakis, J.G. & Manolakis, D.G.," Digital Signal Processing: Principles Algorithms and Applications", Prentice Hall of India.
4. Rabiner, L.R. and Gold B., "Theory and applications of DSP", Prentice Hall of India.
5. Oppenheim, Alan V. & Willsky, Alan S. , "Signals and Systems" , Prentice Hall of India, 2nd Edition

COURSE CODE: EIC-702

COURSE NAME: SATELLITE COMMUNICATION

UNIT-I

Introduction to Satellites and Orbits -History of satellite communications, Satellite frequency bands, Orbital mechanics, Equation of Orbit, Location of Satellite in Orbit, Orbital Elements, Orbital perturbations, Look Angle, Elevation and Azimuthal Determination, Geostationary Orbit, Evolution of Launch Vehicles.

UNIT-II

Introduction to Space craft Subsystems- Satellite Subsystems, Power Supply Subsystem, Attitude and orbit control systems, Tracking, Telemetry and Command Subsystem, Payload, The transponder model, Satellite signal processing, Transponder Limiting, Non linear satellite amplifiers.

UNIT-III

Satellite Link Design Fundamentals- Transmission Equation, Satellite Link Parameters, Noise Figure and Noise Temperature, Antenna Gain-to-Noise Temperature (G/T) Ratio, Link Design- Link Design Procedure, Link Budget, downlink & uplink system.

UNIT- IV

Modulation & Multiple Access Techniques- Digital Modulation and demodulation Techniques- ASK, FSK, PSK, DPSK, QPSK, Multiplexing Techniques, Introduction to Multiple Access Techniques- TDM, FDM/FM/FDMA, TDMA, DAMA and CDMA, Random Access. DBS- Introduction to analog DBS & Digital DBS.

UNIT- V

GPS & Radar Systems- Satellite navigation and global positioning system, GPS position location principle, GPS receiver and codes, Satellite signal acquisition and timing accuracy. Introduction to Radar, Duplexer, Doppler Effect, Types of Radar- Pulse radar, CW radar, MTI radar.

Reference Books

1. Robert M. Gagliardi, Satellite Communications, New Delhi : CBS Publishers and Distributors, 2000

2. Timothy Pratt, Charles W. Bostian, Jeremy E. Allnutt, Satellite Communications, Singapore : John Wiley and Sons Inc. 2003

3. Dennis Roddy, Satellite Communications. New York : McGraw-Hill, 2001

4. Merill I Skolink, Introduction to Radar Systems, New Delhi : TMH Publishing Comp., 1997

COURSE CODE:EIC -703(A)

COURSE NAME: BIOMEDICAL INSTRUMENTATION

UNIT I

Introduction:
Introduction to Man–Instrumentation system, Components, Physiological system of the body, Problem encountered in measuring a living system.
Transducers & Electrodes: The Transducers & Transduction principles, Active transducers, Passive Transducers, Transducer for Biomedical Applications.

UNIT II

Sources of Bioelectric potentials: Resting & Action potentials, propagation of active potential, The Bioelectric potentials.
Electrodes: Electrode theory, Bio-potential Electrodes, Biochemical Transducers

UNIT III

Cardiovascular Measurements: Electrocardiography – ECG amplifiers, Electrodes & leads, ECG recorders - Three channel, Vector Cardiographs, ECG system for stress testing, Continuous ECG recording (Holter recording), measurement of Blood pressure , measurement of Blood flow, measurement of Heart sound measurements.
Patient Care & Monitoring-Elements of Intensive Care monitoring, patient monitoring displays, Diagnosis, Calibration & Repairability of patient monitoring equipment, pacemakers & Defibrillators.

UNIT IV

Measurements in Respiratory system: Physiology of respiratory system Instrumentation for measuring of mechanics of breathing - Spiro meter, Respiratory Therapy equipments: Inhalators ventilators & Respirators, Humidifiers, Nebulizers & Aspirators.
Diagnostic Techniques: Ultrasonic Diagnosis Echocardiography, Echo Encephalography, Ophthalmic scans, X-Ray & Radio-isotope Instrumentation, Computerized Axial Tomography Scanners

UNIT V

Bio Telemetry: The components of Biotelemetry system Implantable units,
Telemetry for ECG measurements during exercise, for Emergency patient monitoring.
Physiological Effects of Electric Current Safety of Medical Electronic Equipments,
Shock hazards from Electrical equipment and prevention against them.

Text Books:
1. Cormwell / "Biomedical Instrumentation and Measurements"/ Prentice Hall (India).
Reference Books:
1. Khandpur R.S./ "Biomedical Instrumentation"/ Tata McGraw-Hill.
2. Tompkins / "Biomedical DSP: C Language Examples andLaboratory Experiments for the IBM PC"/ Prentice Hall (India).

COURSE CODE:EIC 703(B)

COURSE NAME: RENEWABLE ENERGY RESOURCES

UNIT-I

Introduction: Various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits. Solar Cells: Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT-II

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geothermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations. Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations. Fuel Cells: Principle of working of various types of fuel cells

UNIT-IV

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations. Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

UNIT-V

Bio-mass: Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations. Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants.

Text books:

1. Raja etal, "Introduction to Non-Conventional Energy Resources" Scitech Publications.

2. John Twideu and Tony Weir, "Renewal Energy Resources" BSP Publications, .

3. M.V.R. Koteswara Rao, "Energy Resources: Conventional & Non-Conventional" BSP Publications.

4. D.S. Chauhan,"Non-conventional Energy Resources" New Age International.

COURSE CODE : EIC703(C)

COURSE NAME : JAVA PROGRAMMING

UNIT-I

Java Programming: Data types, control structured, arrays, strings, and vector, classes (inheritance, package, exception handling) multithreaded programming.

UNIT-II

Java applets, AWT controls (Button, Labels, Combo box, list and other Listeners, menu bar) layout manager, string handling (only main functions)

UNIT-III

Networking (datagram socket and TCP/IP based server socket) event handling, JDBC: Introduction, Drivers, Establishing Connection, Connection Pooling.

UNIT-IV

HTML: use of commenting, headers, text styling, images, formatting text with , special characters, horizontal rules, line breaks, table, forms, image maps, tags, tags, file formats including image formats.

UNIT-V

Java Servlets: Introduction, HTTP Servlet Basics, The Servlet Lifecycle, Retrieving Information, Sending HTML Information, Session Tracking, Database Connectivity

UNIT-VI

Java Server Pages: Introducing Java Server Pages, JSP Overview, Setting Up the JSP Environment, Generating Dynamic Content, Using Custom Tag Libraries and the JSP Standard Tag Library, Processing Input and Output.

Referential Books:

1. Patrick Naughton and Herbertz Schildt, "Java-2 The Complete Reference" 199, TMH.

2. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998.

3. Ivor Horton, "Beginning Java-2" SPD Publication

4. Jason Hunter, "Java Servlet Programming" O'Reilly

5. Shelley Powers, "Dynamic Web Publishing" 2nd Ed. Techmedia, 1998 rd

6. Hans Bergsten, "Java Server Pages", 3 Ed. O'reilly

COURSE CODE: EIC 703(D)

COURSE NAME:OPTICAL NETWORK

UNIT-I

Introduction, Optical network topology, Optical network principle, optical network challenges, Multiplexing techniques, wavelength routing Networks

UNIT-II

Optical Amplifiers, Tunable Laser, Switches, Wavelength Convertors, Modulation, subcarrier Modulation and Multiplexing, Spectral efficiency, Crosstalk

UNIT-III

SONET frame structure, SONET Physical Layer, elements of SONET, Optical Tansport Network, Generic framing Procedures, Optical Line terminals, Optical line amplifiers, Optical Add/Drop Multiplexers, Optical Crossconnects.

UNIT-IV

Ligthpath Topology Design, Routing and Wavelength Assignment, Network Suvivabilty, Protection of SONET, Optical layer protection Schemes.

UNIT-V

Optical Switching, Optical TDM: Bit interleaving, Packet interleaving, Header processing, Buffering, Burst Switching

Textbook:

1. Optical Networks:A practical perspective –Rajiv Ramaswamy,Kumar Sivarajan-Morgan Kaufmann-Elsevier
2. Optical Networks-P.Raja-Umesh Publication

COURSE CODE: EIC -704

COURSE NAME:ENVIRONMENTAL STUDIES

UNIT -1

THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

What is Environmental Studies? Objectives of Environmental Studies; Scope of Environmental Studies; Importance of Studying Environmental Studies; Need of Public Awareness About Environment; Important Institutions of Environment; Famous Indians who worked Towards Environment.

UNIT-II

ECOSYSTEM

Concept of an ecosystem, components of an ecosystem; Kinds of ecosystem, Structure and function of an ecosystem; Energy flow of ecosystem; Major ecosystems (Pond ecosystem, forest ecosystem, marine and desert ecosystem) Ecological pyramids; Food chain and food Web; Ecological Succession.

UNIT-III

BIODIVERSITY AND ITS CONSERVATION

Types of diversity (Genetic diversity, Species diversity, Ecosystem diversity); Biodiversity at national and global level; Biodiversity Hotspots; Threats to biodiversity; Conservation of biodiversity-in-situ conservation (Protected Areas, National Parks, Wildlife Sanctuaries, Biosphere Reserves), Ex-situ Conservation (Zoological Gardens, Botanical Gardens, Gene Banks); Endemic Species.

UNIT-IV

ENVIRONMENTAL POLLUTION

What is pollution; environmental pollutants; Biodegradable and non-biodegradable pollutants; kinds of pollution (Air pollution, Water pollution, Noise pollution, Soil pollution); Solid Waste Management; Natural Disasters and Management.

UNIT-V

NATURAL RESOURES

Biological and physical components (Atmosphere, Hydrosphere, Lithosphere, Biosphere); Renewable and Non-Renewable Resources; Examples of Renewable Resources (water Resources, Mineral Resources, Food resources) Natural energy resources (Solar energy, wind energy, tidal energy wave energy, geothermal energy) Non-Renewable Energy Resources (Fossil Fules- Coal and Petroleum).

TEXTBOOKS:

1. A textbook of Environmental Studies-Dr.D.K.Asthana
2. A textbook of Environmental Studies-Dr.Sarita Kumar
3. Ecology & Environment-.P.D. Sharma

COURSE CODE: EIC -705(L)

COURSE NAME: DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS

1. 1.1 Introduction of MATLAB.

   1.2 Familiarization with the operation on vector and matrices in MATLAB

   1.3 Verification of sampling theorem.

   1.4 Generation of signals.

2. 2.1 Linear convolution of two given sequences

   2.2 Circular Convolution of two sequences

   2.3 Commutative, distributive and associative property of Convolution

   2.4 Commutative, distributive and associative property of Circular convolution.

3. 3.1 Autocorrelation of a given sequence and verification of its properties.

   3.2 Cross correlation of given sequences and verification of its properties.

4. Solving a given difference equation.

5. Computation of N point DFT of a given sequence and to plot magnitude and phase spectrum.

6. 6.1 Verification of DFT properties

   6.2 DFT computation of square pulse and Sinc function etc

7. 7.1 Introduction of Filter design and analysis (FDA) tool.

   7.2 Design and implementation of FIR filter to meet given specifications

   7.3 Design and implementation of IIR filter to meet given specifications.

   7.4 Design and implementation of FIR filter using window techniques.

8. Finite word length Effect in Digital filter

Note: 20% **experiments other than this list of equal standard relevant to syllabus can also be set.**

COURSE CODE: EIC -801

COURSE NAME:DATA COMMUNICATION

UNIT-I

Introduction to Networks and Data Communications, Goals and Applications of Networks, Network structure and architecture, The Internet, Protocols and Standards, Layered Tasks, The OSI reference model, TCP / IP, Addressing, Design issues for layers .

UNIT-II

Physical Layer, Transmission Media: Guided and unguided, Network Topology Design, Data Link Layer: Error detection and Correction, Framing, Flow and Error Control Protocols, Networking devices , sliding window protocols, LLC , HDLC,PPP.

UNIT-III

Media Access sub layer: Random Access Protocols, CSMA, CSMA/CD, CSMA/CA, Controlled Access, Channelization Wired LANs: IEEE Standards IEEE 802.3,802.4,802.5,802.6, Fast Ethernet, Gigabit Ethernet , Wireless LAN IEEE 802.11, Bluetooth IEEE 802.16.

UNIT-IV

Network Layer: Point to Point Networks routing algorithms shortest path, flooding, link state, hierarchal, distance vector routing, Congestion control, Internetworking-TCP / IP, IP packet, IPV4, IPv6, transport Layer Protocol: UDP and TCP, session Layer-Design issues.

UNIT-V

Application Layer: File Transfer, Electronic mail, Virtual Terminals, Cryptography, Network Security.

Text Books:

1.Stallings, W., (2010), Data and Computer Communications, Pearson.
2.Andrew S. Tanenbaum, "Computer Networks" Pearson.

Reference Books:

1.Ajit Pal, "Data Communication and Computer Networks", PHI
2.Dimitri Bertsekas, Robert G. Gallager, "Data Networks" , Prentice Hall, 1992

COURSE CODE: EIC 802(A)

COURSE NAME: ARTIFICIAL INTELLIGENCE

UNIT I
INTRODUCTION TO AI AND PRODUCTION SYSTEMS
Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized production system- Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II
REPRESENTATION OF KNOWLEDGE
Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

UNIT III
KNOWLEDGE INFERENCE
Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster – Shafer theory.

UNIT IV
PLANNING AND MACHINE LEARNING
Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.

UNIT V
EXPERT SYSTEMS
Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON,

TEXT BOOKS:
1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill- 2008. (Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

REFERENCES:
Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education, 2007.
Stuart Russel and Peter Norvig "AI – A Modern Approach", 2nd Edition, Pearson Education 2007.
Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.

COURSE CODE:EIC -802(B)

COURSE NAME:TELECOMMUNICATION SWITCHING SYSTEM

UNIT-I

Evolution of switching systems: Introduction, Message switching, Circuits switching, Functions of a switching system, Register-transistor-senders, Distribution frames, Crossbar switch, A general trucking, Electronic switching, Reed- electronic system, Digital switching systems.

UNIT-II

Digital Switching: Switching functions, Space Division Switching, Time Division Switching, Two-Dimensional Switching, Digital Cross-Connect Systems , Digital Switching in an Analog Environment

UNIT-III

Telecom Engineering: Network Traffic Load and Parameters, Grade of Service and Blocking Probability, Modeling Switching Systems, Incoming Traffic and Service Time Characterization, Blocking models and Loss Estimates, Delay Systems

UNIT-IV

Control of switching systems: Introduction, Call-processing functions, Common control, Reliability, availability and security; Stored-program control. Signalling: Introduction, Customer line signalling, Audio-frequency junctions and trunk circuits, FDM carrier systems, PCM signalling, Inter-register signalling, Common-channel signalling principles, CCITT signalling system no. 6 and 7, Digital customer line signalling.

UNIT-V

Packet Switching: Packet Switching, Statistical Multiplexing, Routing Control (dynamic routing, virtual circuit routing and fixed-path routing), Flow Control, X.25, Frame Relay, TCP/IP ATM Cells, ATM Service Categories, ATM Switching (ATM Memory Switch, Space-Memory Switch, Memory-Space Switch, Memory-Space-Memory switch, Banyan Network Switch).

TextBooks:

1. Thiagarajan Viswanathan & Manav Bhatnagar, "Telecommunication Switching Systems andNetworks", PHI.
2. J.E. Flood, "Telecommunication Switching, Traffic and Networks", Pearson Education.
3. John C. Bellamy, "Digital Telephony", John Wiley, 3rd Ed.

COURSE CODE:EIC -802(C)

COURSE NAME:MICROWAVE ELECTRONICS

UNIT-I

Wave Guides:
Rectangular Wave Guide: Field Components, TE, TM Modes,Field Distribution, Power, Attenuation. Circular Waveguides: TE, TM modes. Wave Velocities, Microstrip Transmission line (TL), Strip TL, and CoplanarTL, Microwave Cavities,

UNIT-II

Microwave Components:
Waveguide couplings, Bends, Corners, Transitions and twists, Scattering Matrix, Passive microwave devices: Microwave Hybrid Circuits, Terminations, Attenuators, Phase Shifters, Directional Couplers: Two Hole directional couplers, S Matrix of a Directional coupler, Hybrid Couplers, Microwave Propagation in ferrites, Faraday Rotation, Isolators, Circulators.

UNIT-III

Microwave Tubes:
Limitation of Conventional Active Devices at Microwave frequency, Two Cavity Klystron, Reflex Klystron, Magnetron, Travelling Wave Tube, Backward Wave Oscillators: Their Schematic, Principle of Operation, Performance Characteristic and their applications.

UNIT-IV

Solid state Microwave Devices: Microwave Bipolar Transistor, Microwave tunnel diode, Microwave Field-effect Transistor, Transferred electron devices, Avalanche Transit -time devices: IMP ATT Diode, TRAPPAT Diode.

UNIT-V

Microwave Measurements:
General setup of a microwave testbench, Slotted line carriage, VSWR Meter, microwave power measurements techniques, Crystal Detector, frequency measurement, wavelength measurements, Impedance and Refection coefficient, VSWR, Insertion and attenuation loss measurements, measurement of antenna characteristics, microwave link design.

Text Books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", Pearson Education Publication.
2. S.Kulkarni ,''Microwave Engineering", Umesh Publication.

Reference Books:

1. R.E Collin, "Foundation for Microwave Engineering", John Wiley India Publication
2. A. Das and S.K. Das," Microwave Engineering", Tata McGraw Hill Publication.

COURSE CODE :EIC-802(D)
COURSE NAME: ADVANCED MICROPROCESSOR

UNIT-I

Introduction to 16-bit Microprocessor:
Review of Microprocessor 8086 – Architecture, Register structure, Adder Unit, Bus interface unit, Execution unit, Segmentation of Memory, Flag Register. Addressing Modes. Signal Description of pins of 8086 and 8088, Clock generation, Address and data bus Demultiplexing, Read and Write cycle Timings, Interrupt structures, Minimum Mode CPU Module, Maximum Mode Operation

UNIT-II

Assembly Language Programming of 8086:
Program related to Data transfer , Arithmetical and logical operation, Branching operation (Unconditional jump, conditional jump and subroutine calls), Loop and string operation, Assembler Directives, Parameter passing and recursive procedures.

UNIT- III

Basic of Interfacing:
Programmed I/O, Interrupt driven I/O, DMA Controller (8257), Serial I/O(8251/8250, RS-232 standard) 8259 Programmable Interrupt Controller, 8253/8254 Programmable Timer/Counter, Keyboard and display interface (8279), Universal Synchronous And Asynchronous Receiver and Transmitter (USART 8251) ADC and DAC interfacing.

UNIT-IV

Processor from 80286 to 80486
Salient Features of 80286 and 80386DX, Architecture and signal Description of 80386, Register Organization of 80386, Addressing Modes, Data Types of 80386, Real Address Mode of 80386, Protected Mode of 80386, Segmentation, Paging, Virtual 8086 Mode, Enhanced Instruction set of 80386, The co-processor 80387.

UNIT-V

An Introduction to Microcontroller 8051
Intel Family of 8bit Microcontroller, Architecture of 8051, Signal Description of 8051, Register set, Important operational features of 8051, Memory and I/O Addressing, Interrupts, Instruction set.

Textooks:
1. Douglas V.Hall/8086 Microprocessors Architecture
2. R.Gaonker/8085 Microprocessor
3. Kenneth J.Ayala/The 8051 Microcontroller/Penram International Publishing.
References:
4. Liu Gibson/Microprocessor
5. Ray, A.K. & Burchandi, K.M./ "Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing"/ Tata McGraw Hill.
6. Brey, Barry B. / "INTEL microprocessors" / Prentice Hall (India) /4th Ed.

COURSE CODE: EIC 803(A)

COURSE NAME:INFORMATION THEORY AND CODING

UNIT-I

Entropy: Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship Between Entropy and Mutual Information, Chain Rules for Entropy, Relative Entropy, and Mutual Information, Jensen's Inequality and Its Consequences, Log Sum Inequality and Its Applications, Data-Processing Inequality, Sufficient Statistics, Fano's Inequality.

UNIT-II

Asymptotic Equipartition Property: Asymptotic Equipartition Property Theorem, Consequences of the AEP: Data Compression, High Probability Sets and the Typical Set Data Compression: Examples of Codes, Kraft Inequality, Optimal Codes, Bounds on the Optimal Code Length, Kraft Inequality for Uniquely Decodable Codes, Huffman Codes, Some Comments on Huffman Codes, Optimality of Huffman Codes .

UNIT-III

Channel Capacity: Examples of Channel Capacity,Symmetric Channels, Properties of Channel Capacity, Preview of the Channel Coding Theorem, Definitions, Jointly Typical Sequences, Channel Coding Theorem

UNIT-IV

Introduction to block codes, Single -parity-check codes, Product codes, Repetition codes, Hamming codes, Minimum distance of block codes, Soft-decision decoding, Automatic-repeat-request Schemes.Definition of linear codes, Generator matrices, Standard array, Paritycheck matrices

UNIT-V

Convolutional codes, Generator matrices for convolutional codes, Generator polynomials for convolutional codes, Graphical representation of convolutional codes, Viterbi decoder.

Text Books:

1.Bose, Inforrmation Theory, Coding and Cryptography, Mcgrawhill Education
2. Joy A. Thomas, Thomas M. Cover, "Elements of information theory", Wiley -Interscience; 2edition (July 18, 2006)

Reference Books:

1.S. Gravano, "Introduction to Error Control Codes" OUP Oxford .
2.Todd k Moon, "Error Correction Coding: Mathematical Methods and Algorithms.

COURSE CODE:EIC -803(B)

COURSE NAME:PROGRAMMING AND APPLICATION OF AURDINO

UNIT-I

Arduino platform, Prototyping environment, Electronic component overview, Arduino Development Environment, setting up the Arduino board, creating sketches, using Libraries, using example codes, Debugging Using the Serial Monitor.

UNIT -II

Arduino C, Data types, Decision making, Loops, Functions, Pointers, Structures.

UNIT -III

Digital and Analog signals, Temperature sensors, Humidity sensors, Obstacle sensors, Ultrasonic sensor, Accelerometer and gyro.

UNIT -IV

Wired and Wireless Communication, Communication Protocols, Interfacing Communication Modules with Arduino.

UNIT- V

Interfacing display:Alphanumeric LCD Display, Formatting Text, Creating custom characters, Interfacing Graphical LCD Display, Creating Bitmaps for Use with a Graphical Display.

UNIT -VI

InterfacingMotorsTypes of motors - DC, Servo, Stepper, Motor Drivers, Speed and direction control.

BOOKS :

1. Arduino Cookbook by Michael Margolis, O'Reilly Media, Inc., 1st edition.

2. Beginning C for Arduino by Jack Purdum (ebook)

3. Arduino for beginners : Essential Skills Every Maker Needs, John Baichtal, Person Education, Inc., 1st edition.

COURSE CODE:EIC -803(C)

COURSE NAME:MATLAB PROGRAMMING

UNIT-I

Introduction of MATLAB, MATLAB fundamental, Interactive Computation: Logical vectors, logical operations, logical functions, Matrix and Arrays, matrices, matrix operations, MATLAB Graphics: Basics 2-D plots, 3-D plots, handle graphics, Saving and printing graphs, Linear equations, Import and Export of data.

UNIT –II

MATLAB Programming, Automating commands with scripts,writing programs with logic and flow control, Writing functions, Control statement Programming. Conditional Statement Programming, Loops and Conditional Statements, Functions

UNIT-III

Symbolic Math in MATLAB, GUI Design: Introduction Of Graphical User Interface, GUI Function Property, GUI Component Design, GUI Container, Dialog Box Menu Designing, Applications.

UNIT –IV

MATLAB Applications in Communication Systems: Introduction, Generation and detection of AM, FM, and PM signals, Sampling of signals, Pulse modulation techniques (PAM, PWM, PPM), PCM, Digital modulation techniques (ASK, PSK, FSK, M-ary), OFDM, Spread-spectrum techniques. MATLAB Applications in control system. MATLAB Application in Neural Networks.MATLAB Application in Digital Signal Processing.

Text Books:

1. Raj Kumar Bansal, Ashok Kumar Goel and Manoj Kumar Sharma, "MATLAB and its Applications in Engineering ", Pearson 14th impression,2014.
2. Brian H. Hahn and Daniel T. Valentine, "Essential MATLAB for Engineering and Scientists", Academic Press, Elsevier, 5th edition, 2013.
3. RudraPratap, "MATLAB- A quick introduction for Scientists and Engineers", Oxford University Press, 2013.
4. www.mathworks.com

COURSE CODE: EIC-803(D)

COURSE NAME: DIGITAL IMAGE PROCESSING

UNIT-I

Introduction to Image processing: Fundamental steps in image processing; Components of image processing system; Pixels; coordinate conventions; Imaging Geometry; Spatial Domain; Frequency Domain; sampling and quantization; Basic relationship between pixels; Applications of Image Processing. Image transforms and its properties – Unitary transform; Discrete Fourier Transform; Discrete Cosine Transform; Walsh Transform; Hadamard Transform;

UNIT-II

Image Enhancement in spatial domain Basic Gray Level Transformation functions – Image Negatives; Log Transformations; Power-Law Transformations. Piecewise-Linear Transformation Functions: Contrast Stretching; Gray Level Slicing; Bit Plane Slicing; Histogram Processing– Equalization; Specification. Basics of Spatial Filtering – Smoothing: Smoothing Linear Filters; Ordered Statistic Filters; Sharpening: Laplacian; Unsharp Masking and High Boost Filtering.

UNIT-III

Image Enhancement in Frequency Domain Basics of Filtering in Frequency Domain, Filters - Smoothing Frequency Domain Filters : Ideal Low Pass Filter; Gaussian Low Pass Filter; Butterworth Low Pass Filter; Sharpening Frequency Domain Filters: Ideal High Pass Filter; Gaussian High Pass Filter; Butterworth High Pass Filter; Homomorphic Filtering.

UNIT-IV

Image Segmentation: Pixel-Based Approach- Multi-Level Thresholding, Local Thresholding, Threshold Detection Method; Region-Based Approach- Region Growing Based Segmentation, Region Splitting, Region Merging, Split and Merge, Edge Detection - Edge Operators; Line Detection, Corner Detection.

UNIT-V

Morphological Operations Basics of Set Theory; Dilation and Erosion - Dilation, Erosion; Structuring Element; Opening and Closing; Hit or Miss Transformation. Representation and Description Representation - Boundary, Chain codes, Polygonal approximation approaches, Boundary segments.

Books:

1. 'Digital Image Processing': Rafael G. Gonzaleg, Richard E. Wood, Pearson
2. 'Digital Image Processing': Bernd Jahne, Springer.
3. 'Digital Image Processing': S Jayaraman, S. Esakkirajan, T. Veerakumar, TMH