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

Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

Under the

Criteria - I

(Curriculum Design and Development)

Key Indicator - 1.1

In

Matric 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

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

OFFERED PROGRAMMES

Department of Electronics & Communication Engineering offers three programs that are affiliated to C.S.J.M.University, Kanpur and recognized by AICTE:

- **Bachelor of Technology Degree in Electronics & Communication Engineering.**
- **M. Sc. (two years) Programme in Electronics.**
- **Integrated M. Sc. (four years) Programme in Electronics.**

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: Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and the cultural, societal, and environmental considerations
- **PO3: Problem analysis:** Recognize, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- **PO4: Conduct investigations 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: 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
- **PO7: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- **PO8: Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- **PO9: 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
- **PO10: 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)

- **PSO1: Circuit Design Concepts:** Apply basic and advanced electronics for implementing and evaluating various circuit configurations.
- **PSO2: VLSI and Signal Processing Domain:** Demonstrate technical competency in the design and analysis of components in VLSI and Signal Processing domains.
- **PSO3: 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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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

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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