

Shivaji University, Kolhapur

Department of Technology

Vision

To be a leader in engineering and technology education, a research centre of global standards to provide valuable resources for industry and society through development of competent technical human resources.

Mission

1. To develop technocrats of national & international stature committed to the task of nation building.
2. To organize teaching learning programs to facilitate the development of competent and committed professionals for practice, research and academics.
3. To undertake collaborative research projects that offer opportunities for consistent interaction with industries.

Name of Programme: B.Tech. (Electronics and Communication Technology)

Program Outcomes

1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2] 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.

3] 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 the public health and safety, and the cultural, societal, and environmental considerations.

4] 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.

5] 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.

6] 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.

7] 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.

8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10] 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.

11] 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.

12] 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

PSO 1- An Ability to analyze, simulate and design the electronic circuits and communication systems.

PSO 2- An ability to use technical knowledge for successful career and qualifying competitive examinations at national and international levels.

Course Outcomes

Part-I Semester-I

67895	Engineering Mathematics-I	1. Students in this course will apply the Procedure and methods to solve technical problems. 2. Student can understand how to model real world scenario using Mathematics 3. Students will be able to solve computational problems using Scilab/Matlab.
67896/67942	Engineering Physics	1. The student would be able to apply the concepts of physics in various branches of engineering 2 The student would be able to use the techniques,

		<p>skills, and modern tools necessary for physics and engineering careers</p> <p>3. Understands and apply the concepts of light in optical fibers, light wave communication systems, holography.</p> <p>4. Use lasers as light sources for low and high energy applications.</p> <p>5. Understand the nature and characteristics of ultrasonic waves and its various engineering applications.</p>
67897/67943	Engineering Mechanics	<p>1. Differentiate between Scalar and Vector Quantities</p> <p>2. Understand the characteristics of force, system of forces, learn to resolve forces.</p> <p>3. Understand the moment and couple of forces and effect of moment on rigid body</p> <p>4. Compute resultant of coplanar concurrent and non-concurrent force system.</p> <p>5. Distinguish between C.G. and Centroid, Compute moment of inertia of plane figures and composite figures.</p> <p>6. Understand and analyze beam as a structure and compute support reactions using Lami's theorem & equilibrium Conditions for concurrent, parallel and general force system.</p> <p>7. Understand Truss as a structural member and analyze plane trusses by the method of joints And sections</p> <p>8. Understand the concept of dynamic as applied to particle.</p> <p>9. Introduce & define Kinematics of Rigid body, get idea about translation, rotation, general Plane motion</p> <p>10. To Know principle of work.</p>
67899/67945	Electronic Component Devices	<p>1. Understand the basics of Electronics component, different materials and their applications.</p> <p>2. Understand the construction, V-I characteristics and application of semiconductor devices</p> <p>3. Analyze different electronic circuits based on diode, transistor and SCR</p> <p>4. Explain the working principle, construction, applications of relays, display devices and transducer.</p> <p>5. Test and verify results of diode and BJT circuits</p>
67898/67944	Fundamentals of	<p>1. Recall the terms, basic concepts and laws of</p>

	Mechanical Engineering	<p>thermodynamics.</p> <ol style="list-style-type: none"> 2. Explain the working of various mechanical systems like I.C.Engines, Refrigeration and air conditioning systems, power plants, energy conversion devices and power transmission devices. 3. Explain various types of manufacturing processes. 4. Explain heat and mass transfer and its modes of transfer. 5. Analyze power transmission devices with their functions.
67900/67946	Lab-I Engineering Physics	<ol style="list-style-type: none"> 1. The student would be able to use spectrometer, polar meter, LASER, photodiode for various measurements. 2. Test optical components using principles of interference and diffraction of light 3. Determine the width of narrow slits, spacing between close rulings using lasers and appreciate the accuracy in measurements. 4. Use ultrasonic interferometer for measuring velocity of ultrasound in various liquids.
67901/67947	Lab.-II Engineering Mechanics	<p>After successful completion of this course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Verify and correlate law of polygon of forces. 2. Verify Lami's theorem. 3. Verify Equilibrium conditions. 4. Determine coefficient of friction for two sliding surfaces. 5. Verify Law of Moments. 6. Find value of local gravitational acceleration.
67902/67948	Lab.-III Fundamentals of Mechanical Engineering	<ol style="list-style-type: none"> 1. Explain and demonstrate the working of various mechanical systems like I.C.Engines, Refrigeration and air conditioning systems, power plants and steam generators. 2. Explain and demonstrate the construction and working of mechanical power transmission devices. 3. Explain and demonstrate the construction and working of energy conversion devices. 4. Explain and demonstrate the manufacturing processes.
67903/67949	Lab.-IV Electronic Components of Devices	<ol style="list-style-type: none"> 1. Understand the diode and transistor characteristics. 2. Verify the rectifier circuits using diodes and filter

		<p>circuits.</p> <ol style="list-style-type: none"> Design various amplifiers like CE, CC, common source amplifiers Study experimentally the characteristics of SCR and JFET
67904/67950	Lab-V Professional Communication	<ol style="list-style-type: none"> Students will be able to communicate language effectively. Students learn to use grammar rules in spoken and written English. Students will be able to learn personality traits and soft skills. Students acquire required skills for technical writings. Students learn fluency and pronunciation. Students acquire techniques for presentation skills.
67905/67951	Lab- VI Matlab & Scilab	<ol style="list-style-type: none"> To familiarize the student in introducing and exploring MATLAB & SCILAB software's. Understand the main features of the MATLAB and SCILAB To enable the student on how to approach for solving Engineering Mathematics problems using MATLAB and SCILAB. To solve complicated numerical problems by writing MATLAB and SCILAB programs Interpret and visualize simple mathematical functions and operations using MATLAB and SCILAB.
Part-I Semester-II		
67931	Engineering Mathematic-II	<ol style="list-style-type: none"> Students in this course will apply the Procedure and methods to solve technical problems Student can understand how to model real world scenario using Mathematics. Students will be able to solve computational problems using Scilab/Matlab.
67932/67906	Engineering Chemistry	<p>After successful completion of this course, the student will able to:</p> <ol style="list-style-type: none"> Have knowledge of water quality parameters and water softening processes, and calculate hardness of water. Classify and describe properties and applications of engineering material. Explain mechanism and properties of lubricants and select lubricants for different service conditions. Understand the mechanism and control methods of corrosion and apply their knowledge for protection of different metals from corrosion.

		5 Use instrumental methods for the analysis of material.
67933/67907	Fundamental Of Civil Engineering	<ol style="list-style-type: none"> 1. Understand how civil engineering is related to other branches. 2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments. 3. Find out vertical distances, reduced levels and angles by using total station. 4. Calculate area of irregular surface by using Mechanical and Digital Planimeter. 5. Identify building materials required for construction with current market rates. 6. Understand use, necessity of submission and working drawing. 7. Prepare site visit report.
67935/67909	Fundamental Of Electrical Engineering	<ol style="list-style-type: none"> 1. Develop fundamental understanding about basics of DC and AC circuit . 2. Differentiate between electrical and magnetic circuit. 3. Explain the working principle, construction, applications of DC machines and AC machines. 4. Understand electrical power system, wiring and Ear thing . 5. Apply different circuit laws to solve electrical circuits and verify results experimentally .
67934/67908	Engineering Graphics	<ol style="list-style-type: none"> 1. Identify basic concepts of BIS conventions and their application. 2. Interpret first angle and third angle projection system. 3. Construct orthographic projections of points, lines and planes. 4. Apply principles of projection and construct orthographic and isometric views of an object. 5. Develop a skill of visualization to understand and read the drawing.
67936/67910	Lab-I Engineering Chemistry	<ol style="list-style-type: none"> 1 Apply basic concepts of chemistry for analysis. 2 Determine the various water quality parameters and preparation of polymers 3 Determine the viscosity of liquid 4 Estimate the amount of copper and zinc from brass solution 5 Understand the use of instrumental methods for analysis of the material
67937/67911	Lab-II Fundamental of Civil Engineering	<p>After successful completion of this course, the student will able to:</p> <ol style="list-style-type: none"> 1. Understand how civil engineering is related to other branches.

		<ol style="list-style-type: none"> 2. Find out linear and angular measurements required to prepare a plan or map by using traditional as well as modern instruments. 3. Find out vertical distances, reduced levels and angles by using total station. 4. Calculate area of irregular surface by using Mechanical and Digital Planimeter. 5. Identify building materials required for construction with current market rates. 6. Understand use, necessity of submission and working drawing. 7. Prepare site visit report.
67938/67912	Lab. -III Engineering Graphics	<ol style="list-style-type: none"> 1. Identify and implement basic concepts of BIS conventions to sketch Engineering drawing. 2. Create geometric constructions with hand tools. 3. Construct orthographic projection and sectional view of a machine part. 4. Create isometric projection from multiview drawings of an object. 5. Sketch projection of solids and development of lateral surfaces of solids.
67939/67913	Lab.- IV Fundamental Of Electrical Engineering	<p>After completing this course the student will be able</p> <ol style="list-style-type: none"> 1) Perform and measure the basic electric circuit experiment with knowledge of fundamental laws 2) Demonstrate behavior of R,L, C,AC circuit. 3) Understand use of various electrical measuring instruments. 4) Understand application of DC machines and testing of single phase transformer.
67940/67914	Lab.-V Workshop Practice	<ol style="list-style-type: none"> 1. Execute safety measures, while working in a workshop. 2. Identify and use of various hand tools and measuring instruments. 3. Demonstrate and use of different fitting tools and prepare a fitting job as per given drawing. 4. Demonstrate and use of different Carpentry tools and prepare a wooden job as per given drawing. 5. Perform Arc welding operation to prepare a welding joint.
67941/67915	Lab.-VI Computer Programming	<ol style="list-style-type: none"> 1. Illustrate the flowchart and design of an algorithm for a given problem and to develop C programs using operators. 2. Develop conditional and iterative statements to write C programs.

		<ol style="list-style-type: none"> 3. Design C programs with the use of Pointers to access arrays, strings and functions. 4. Exercise user defined data types including structures and unions to solve problems. 5. Design C programs using pointers and to allocate memory using dynamic memory management. 6. Demonstrate files concept to show input and output of files in C.
Part-II Semester-III		
Course code EC211	Engineering Maths 3	<ol style="list-style-type: none"> 1. Solve linear differential equations 2. Apply LDE to electrical circuits 3. Solve circuit and signal related problems using mathematical tools. 4. Apply Fourier series and transform to signals. 5. Learn and apply theory of probability. 6. Learn and apply vector differentiation.
Course code EC212	Electrical Technology	<ol style="list-style-type: none"> 1. Understand the working principle, performance, control and applications of AC, DC Machines and Transformer. 2. Understand the working and performance analysis of Transmission and Distribution of power. 3. Analyze unregulated power supplies. 4. Analyze and Carry out basic experiments on AC, DC machine 5. Analyze and solve AC, DC machine and Transformer related problems. 6. Design and experiment with DC machine and transformer.
Course code EC 213	Electronics Circuit Analysis & Design 1	<ol style="list-style-type: none"> 1. Understand the basic principles of electronics circuit design. 2. Analyze unregulated power supplies. 3. Analyze and design voltage regulator circuits. 4. Study the working principle and characteristics of electronics circuit. 5. Analyze and design voltage amplifiers, tuned amplifiers. 6. Design and experiment with basic electronic circuits.
Course code EC214	Network Analysis	<ol style="list-style-type: none"> 1. Apply appropriate network theorem to find circuit solution. 2. Understand AC resonant circuit. 3. Solve circuit using different network theorems. 4. Calculate parameters of two port network. 5. Simulate different R-L-C circuits for AC/DC inputs.

		6. Design different filters and attenuators. .
Course code: EC215	Digital Techniques	1. Understand number systems and its arithmetic operations and Illustrate Use of Boolean algebra. 2. Formulate and apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms. 3. Design of combinational circuits like comparators multiplexers, de-multiplexers, encoder, decoder and different code converters. 4. Understand working of flip-flops, its characteristics and conversion using truth table. 5. Design of sequential circuit like counters and shift registers. 6. Understand characteristics and interfacing of logic families and remembering concept of memory technology.
Part-II semester-IV		
Course code EC221	Electronics Circuit Analysis & Design 2	1. Understand the basic principles of electronics circuit design. 2. Design and experiment with wave shaping circuits. 3. Design and experiment with Multivibrators and oscillators. 4. Study the working principle and characteristics of electronics circuit. 5. Design and experiment with two stage RC coupled amplifier. 6. Experiment with electronic components.
Course code EC222	Communication Technology	1. Explain fundamental concepts and identify components of analog communication systems. 2. Analyze various analog modulation & demodulation schemes. 3. Estimate signal to noise ratio, noise figure and noise temperature for single and cascaded stages in a communication system. 4. Compare and contrast the strengths and weaknesses of various communication systems. 5. Explain operation of AM & FM receivers. 6. Compare AM, FM & PM.
Course code EC223	Linear Integrated Circuits	1. Define, describe and analyze the different differential amplifier configurations 2. Define, explain and analyze the different op.amp configurations

		<ol style="list-style-type: none"> 3. Sketch and analyze the op.amp frequency response 4. Design different op.amp circuits for different applications 5. Classify, design and explain active filters and signal generators 6. Describe and design the different PLL and Timer application circuits
Course code EC224	Measurement Techniques	<ol style="list-style-type: none"> 1. Define and describe the generalized measurement system and its elements. 2. Describe and sketch different transducers and explain their operation. 3. Sketch, explain and design dc and ac bridges. 4. Sketch, explain and describe different oscilloscopes and display devices. 5. Sketch and describe signal generators and analyzers. 6. Define, describe data acquisition systems and conversion.
Course code:- EC225	Industrial Organization and Management	<ol style="list-style-type: none"> 1. Demonstrate the concepts of management organizational structure. 2. Understand the values of human and industrial relations. 3. Understand industrial environment. 4. Apply the project management tools in effective. 5. Use ethical and professional practices. 6. Develop leadership quality.
Part-III semester-V		
Course code EC311	Digital Communication Technology	<ol style="list-style-type: none"> 1. Differentiate analog and digital communication system. 2. Compare different source encoding techniques 3. Analyze baseband and passband communication system. 4. Apply channel encoding technique to detect and correct errors in digital communication. 5. Discuss spread spectrum modulation and demodulation techniques. 6. Observe and validate results of different digital communication system blocks/elements.
Course code EC 312	Electromagnetic fields	<ol style="list-style-type: none"> 1. Explain physical interpretation of vectors, integral and differential operators for electromagnetic. 2. Understand the physical interpretation and application of laws and theorems of electric fields. 3. Understand the physical interpretation and application of laws and theorems of magnetic fields. 4. Develop field equations from Maxwell's Equations 5. Analyze fields under time varying situations & effect of materials on electric and magnetic fields.

		6. Identify transmission line parameters and derive equation for transmission line.
Course code EC313	Microcontrollers	<ol style="list-style-type: none"> 1. Discuss and compare on chip features of microcontrollers. 2. Develop programs in assembly and C language for 8051 and PIC microcontrollers. 3. Interface devices to microcontrollers. 4. Illustrate the difference between CISC and RISC architectures. 5. Select suitable microcontroller for particular application. 6. Utilize Integrated Development Environments for microcontrollers.
Course code EC314	Signals and systems	<ol style="list-style-type: none"> 1. Differentiate different types of signals. 2. Identify type of Systems. 3. Analyze LTI systems in time domain. 4. Apply Fourier techniques to transform the signals in frequency domain. 5. Analyze LTI systems using Laplace transform and Z- transforms. 6. Demonstrate signals and interdependencies of time and frequency domain parameters.
Course code EC315	Computer networks and data communication	<ol style="list-style-type: none"> 1 Explain different network topologies and Compare OSI and TCP/IP reference models 2 Explain guided and unguided transmission media 3 Discuss error detection and correction mechanism for data link layer 4 Explain multiple access protocols and Data link control protocols 5 Define IEEE standards and Compare wired and wireless LANs 6 Describe network layer protocols
Part-III semester-VI		
Course code EC321	Digital signal processing	<ol style="list-style-type: none"> 1. Apply different algorithms to find DFT, IDFT and convolution. 2. Design FIR filters using different methods. 3. Design IIR filters using different methods. 4. Explain adaptive signal processing and adaptive filter models. 5. Apply DCT and wavelet transforms. 6. Illustrate the role of DSP in different areas.
Course code EC 322	Operating systems	<ol style="list-style-type: none"> 1. Explain basic concepts of operating systems. 2. Explain Processes & Threading environment in operating systems. 3. Discuss issues related to the memory & I/O in

		<p>Operating systems.</p> <ol style="list-style-type: none"> 4. Describe various process management concepts like scheduling, synchronization, deadlocks. 5. Explain concepts of memory management. 6. Compare different operating systems.
<p>Course code EC 323</p>	<p>Antenna and wave propagation</p>	<ol style="list-style-type: none"> 1. Explain the radiation mechanism of antenna and calculate antenna parameters 2. Analyze array of antennas and their applications 3. Identify and analyze various wire antennas. 4. Design and analyze antennas for different applications 5. Analyze wave propagation characteristics for ground and space wave 6. Evaluate effect of different ionospheric phenomenon on wave propagation
<p>Course code EC324</p>	<p>VLSI Designs</p>	<ol style="list-style-type: none"> 1. Describe the structure, working principle and characteristics of MOS devices. 2. Explain CMOS IC fabrication technology. 3. Experiment using VHDL language and explain features of HDL. 4. Develop VHDL code for different digital circuits. 5. Describe construction and features of programmable logic devices. 6. Propose testing strategies for testing digital circuits
<p>Course code EC 325</p>	<p>Control systems</p>	<ol style="list-style-type: none"> 1. Understand the basic principles, types of control systems and I/P –O/P relationship by using mathematical model and transfer function. 2. Analyze parameters of a feedback control system and its transient behavior. 3. Evaluate the stability of a system by using different stability criteria 4. Plot the Root locus and Nyquist plot for a given control system for stability analysis 5. Plot Bode plot for a given control system for stability analysis. 6. Understand and analyze performance of control system by using state space.
<p>Part-IV semester-VII</p>		
<p>Course code EC411</p>	<p>Audio and video engineering</p>	<ol style="list-style-type: none"> 1. Discuss audio systems with their elements. 2. Explain components of CD player. 3. Describe fundamental concepts in television engineering. 4. Compare different monochrome and colour transmitters and receivers.

		<p>5. Discuss modern trends in television engineering.</p> <p>6. Identify different faults in TV receivers.</p>
<p>Course code EC412</p>	<p>Industrial and power electronics</p>	<p>1. Explain structure and working of power devices.</p> <p>2. Analyze triggering methods, Commutation methods and protection circuits used for SCR.</p> <p>3. Calculate different parameters of controlled rectifier.</p> <p>4. Calculate different parameters of chopper circuit.</p> <p>5. Demonstrate use of power electronics devices.</p> <p>6. Explain different inverters and industrial application of power devices..</p>
<p>Course code:- EC413</p>	<p>Arm and embedded systems</p>	<p>1. Discuss the architecture of ARM7TDMI microcontroller.</p> <p>2. Explain the instruction set of ARM microcontroller.</p> <p>3. Write programs in assembly and C language for ARM microcontroller family.</p> <p>4. Discuss the memory management scheme of ARM microcontroller.</p> <p>5. Compare the features of 8 bit, 16 bit and 32 bit microcontrollers.</p> <p>6. Illustrate the features and applications of embedded systems.</p>
<p>Course code ECT 414</p>	<p>Microwave Engineering</p>	<p>1. Explain basic microwave system, its applications and hazards caused</p> <p>2. Analyze different modes of propagation in waveguides.</p> <p>3. Design and select the appropriate waveguide components for various applications</p> <p>4. Illustrate generation and amplification of microwaves using microwave tubes and Semiconductor devices.</p> <p>5. Differentiate between Hybrid and Monolithic Microwave Integrated Circuits</p> <p>6. Articulate process of measurement of microwaves characteristics</p>
<p>Course code EC 415</p>	<p>Internet of Things</p>	<p>1. Explain the Internet of Things and the entities involved therein.</p> <p>2. Explain the wireless protocols involved in IoT</p> <p>3. Illustrate the working principle of RFID technology</p> <p>4. Describe the issues in power line communication</p> <p>5. Explain the protocols involved in networking and automation</p> <p>6. Explain the M2M protocols involved in utility metering</p>
<p>Part-IV semester-VIII</p>		
<p>Course code ECT 421</p>	<p>Broadband communication</p>	<p>1. Discuss different switching networks and evolution of switching techniques.</p> <p>2. Illustrate ISDN architecture, transmission structure and its interworking.</p>

		<ol style="list-style-type: none"> 3. Explain ISDN physical, data link and network layer and its services. 4. Differentiate between broadband and narrowband ISDN with its protocol interface model. 5. Explain ATM architecture, virtual connections and switching types. 6. Describe frame relay architecture and congestion control mechanism.
Course code EC422	Satellite and radar engineering	<ol style="list-style-type: none"> 1. Explain basic satellite system with its subsystems. 2. Define orbital parameters and determine antenna look angles, range for GEO 3. Classify types of losses and formulate power link budget for satellite. 4. Illustrate applications of satellite communication such as DBS, VSAT and GPS. 5. Determine range, power and other performance parameters required for radar. 6. Differentiate between different types of radars with their application.
Course code EC423	Optical fibre communication	<ol style="list-style-type: none"> 1. Determine characteristics of optical fiber 2. Describe fiber materials, properties and fabrication methods. 3. Explain dispersion and its types also evaluate attenuation and scattering losses of optical fiber. 4. Discuss fiber splicing, connectors and calculate losses in fiber 5. Classify and compare different optical sources and detectors. 6. Understand working of different optical networks.
Course code EC 424	Mobile Communication	<ol style="list-style-type: none"> 1. Understand the basic concepts of Cellular System and the design requirements 2. Have in-depth understanding of the architecture & design consideration of GSM 3. Analyze CDMA system functioning with knowledge of forward and reverse channel details 4. Gain insights into various mobile radio propagation phenomena and how the diversity can be exploited to improve performance. 5. Understand 2.5 G & 3G Network technologies 6. Understand emerging technologies for fourth generation mobile systems
Course code EC425	Digital Image processing	<ol style="list-style-type: none"> 1. Compare color and gray image representation techniques 2. Acquire knowledge of various transforms used in image processing. 3. Apply mathematical treatment to digital image using image enhancement algorithms. 4. Apply image compression technique on image.

		<p>5. Apply various morphological image processing algorithms on Digital Image.</p> <p>6. Apply different segmentation, representation and descriptors algorithms on digital Image</p>
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