



The Javery Engineering College

(Approved by AICTE, New Delhi & Affiliated to Anna University)
Mecheri, Mettur Tk. Salem Dt - 636 453.

DEPARTMENT OF BIOMEDICAL ENGINEERING

PROGRAMME: B.E. BIOMEDICAL ENGINEERING

VISION

- ❖ To be recognized as a leader in offering Biomedical Engineering education, research and application of knowledge to the society.

MISSION

- ❖ To equip the students with adequate knowledge in the field of Biomedical Engineering with exemplary values.
- ❖ To encourage entrepreneurship and mould the students to learn new technologies in healthcare Industry.
- ❖ To foster research and development in Biomedical Engineering.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- ❖ To enable the graduates to demonstrate their skills in design and develop medical devices for health care system through the core foundation and knowledge acquired in engineering and biology.
- ❖ To enable the graduates to exhibit leadership in health care team to solve health care problems and make decisions with societal and ethical responsibilities.
- ❖ To Carryout multidisciplinary research, addressing human healthcare problems and sustain technical competence with ethics, safety and standards.
- ❖ To ensure that graduates will recognize the need for sustaining and expanding their technical competence and engage in learning opportunities throughout their careers.

PROGRAM OUTCOMES (POs)

- ❖ Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ❖ Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences



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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.

- ❖ **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.
- ❖ **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ❖ **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.
- ❖ **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.
- ❖ **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ❖ **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ **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.
- ❖ **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.
- ❖ **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)

- ❖ To design and develop diagnostic and therapeutic devices that reduces physician burnout



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Engineering.

- ❖ To apply software skills in developing algorithms for solving healthcare related problems in various fields of Medical sector.
- ❖ To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions for current societal and scientific issues thereby developing indigenous medical instruments that are on par with the existing technology.

COURSE OUTCOMES (COs)

Regulation	2021
Sem	01
Subject Code	HS3151
Subject Name	PROFESSIONAL ENGLISH - I
Course Outcome	<ul style="list-style-type: none">• To listen and comprehend complex academic texts• To read and infer the denotative and connotative meanings of technical texts• To write definitions, descriptions, narrations and essays on various topics• To speak fluently and accurately in formal and informal communicative contexts• To express their opinions effectively in both oral and written medium of communication

Regulation	2021
Sem	01
Subject Code	MA3151
Subject Name	MATRICES AND CALCULUS
Course Outcome	<ul style="list-style-type: none">• Use the matrix algebra methods for solving practical problems.• Apply differential calculus tools in solving various application problems.



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	<ul style="list-style-type: none">• Apply different methods of integration in solving practical problems.• Apply multiple integral ideas in solving areas, volumes and other practical problems.
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Regulation	2021
Sem	01
Subject Code	PH3151
Subject Name	ENGINEERING PHYSICS
Course Outcome	<ul style="list-style-type: none">• Understand the importance of mechanics.• Express their knowledge in electromagnetic waves.• Demonstrate a strong foundational knowledge in oscillations, optics and lasers.• Understand the importance of quantum physics.• Comprehend and apply quantum mechanical principles towards the formation of energy bands.

Regulation	2021
Sem	01
Subject Code	CY3151
Subject Name	ENGINEERING CHEMISTRY
Course Outcome	<ul style="list-style-type: none">• To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.• To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.• To apply the knowledge of phase rule and composites for material selection requirements.• To recommend suitable fuels for engineering processes and applications.• To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

Regulation	2021
Sem	01
Subject Code	GE3151
Subject Name	PROBLEM SOLVING AND PYTHON PROGRAMMING



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	<ul style="list-style-type: none">• CO2: Develop and execute simple Python programs.• CO3: Write simple Python programs using conditionals and loops for solving problems.• CO4: Decompose a Python program into functions.• CO5: Represent compound data using Python lists, tuples, dictionaries etc.• CO6: Read and write data from/to files in Python programs
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Regulation	2021
Sem	01
Subject Code	GE3171
Subject Name	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY
Course Outcome	<ul style="list-style-type: none">• CO1: Develop algorithmic solutions to simple computational problems• CO2: Develop and execute simple Python programs.• CO3: Implement programs in Python using conditionals and loops for solving problems..• CO4: Deploy functions to decompose a Python program.• CO5: Process compound data using Python data structures.• CO6: Utilize Python packages in developing software applications

Regulation	2021
Sem	01
Subject Code	BS3171
Subject Name	PHYSICS AND CHEMISTRY LABORATORY
Course Outcome	<ul style="list-style-type: none">• Understand the functioning of various physics laboratory equipment.• Use graphical models to analyze laboratory data.• Use mathematical models as a medium for quantitative reasoning and describing physical reality.• Access, process and analyze scientific information.• Solve problems individually and collaboratively.• To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.• To determine the amount of metal ions through volumetric and spectroscopic techniques• To analyse and determine the composition of alloys.• To learn simple method of synthesis of nano particles• To quantitatively analyse the impurities in solution by electro



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Regulation	2021
Sem	02
Subject Code	HS3251
Subject Name	PROFESSIONAL ENGLISH - II
Course Outcome	<ul style="list-style-type: none">• To compare and contrast products and ideas in technical texts.• To identify cause and effects in events, industrial processes through technical texts• To analyze problems in order to arrive at feasible solutions and communicate them orally and in the written format.• To report events and the processes of technical and industrial nature.• To present their opinions in a planned and logical manner, and draft effective resumes in context of job search.

Regulation	2021
Sem	02
Subject Code	MA3251
Subject Name	STATISTICS AND NUMERICAL METHODS
Course Outcome	<ul style="list-style-type: none">• Apply the concept of testing of hypothesis for small and large samples in real life problems.• Apply the basic concepts of classifications of design of experiments in the field of agriculture.• Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.• Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.• Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications

Regulation	2021
Sem	02
Subject Code	BM3251
Subject Name	BIOSCIENCES FOR MEDICAL ENGINEERING



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	<ul style="list-style-type: none"> Analyze structural and functional aspects of living organisms. Explain the function of microscope Describe methods involved in treating the pathological diseases
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Regulation	2021
Sem	02
Subject Code	BE3251
Subject Name	BE3251 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
Course Outcome	<ul style="list-style-type: none"> CO1: Compute the electric circuit parameters for simple problems CO2: Explain the working principle and applications of electrical machines CO3: Analyze the characteristics of analog electronic devices CO4: Explain the basic concepts of digital electronics CO5: Explain the operating principles of measuring instruments

Regulation	2021
Sem	02
Subject Code	BM3252
Subject Name	MEDICAL PHYSICS
Course Outcome	<ul style="list-style-type: none"> Interpret the properties of electromagnetic radiations and its effect on human. Apply the principles and understand the production of radioactive nuclides. Explain the interaction of radiation with matter. Identify and Analyse the radiation quantities and its effects Demonstrate the knowledge on the properties of sound and its application in medicine.

Regulation	2021
Sem	02
Subject Code	GE3251
Subject Name	ENGINEERING GRAPHICS



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	<ul style="list-style-type: none">• Use BIS conventions and specifications for engineering drawing.• Construct the conic curves, involutes and cycloid.• Solve practical problems involving projection of lines.• Draw the orthographic, isometric and perspective projections of simple solids.• Draw the development of simple solids.
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Regulation	2021
Sem	02
Subject Code	GE3271
Subject Name	ENGINEERING PRACTICES LABORATORY
Course Outcome	<ul style="list-style-type: none">• Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.• Wire various electrical joints in common household electrical wire work.• Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts;• Assemble simple mechanical assembly of common household equipments;• Make a tray out of metal sheet using sheet metal work.• Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

Regulation	2021
Sem	02
Subject Code	BM3271
Subject Name	BIOSCIENCES LABORATORY
Course Outcome	<ul style="list-style-type: none">• Understand the Biochemistry laboratory functional components• Have a sound knowledge of qualitative test of different biomolecules.



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	<ul style="list-style-type: none">• Have a sound knowledge of separation technology of proteins and amino acids.• Student can perform practical experiments on staining Processes
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Regulation	2021
Sem	03
Subject Code	MA3351
Subject Name	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS
Course Outcome	<ul style="list-style-type: none">• CO1: Understand how to solve the given standard partial differential equations.• CO2: Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.• CO3: Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.• CO4: Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.• CO5: Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

Regulation	2021
Sem	03
Subject Code	BM3353
Subject Name	FUNDAMENTALS OF ELECTRONIC DEVICES AND CIRCUITS
Course Outcome	<ul style="list-style-type: none">• CO1: Analyze the characteristics of semiconductor diodes.• CO2: Analyze and solve problems of Transistor circuits using model parameters.• CO3: Identify and characterize diodes and various types of transistors.• CO4: Analyze the characteristics of special semiconductor devices.• CO5: Analyze the characteristics of Power and Display devices.



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Regulation	2021
Sem	03
Subject Code	BM3301
Subject Name	SENSORS AND MEASUREMENTS
Course Outcome	<ul style="list-style-type: none">• CO1: Measure various electrical parameters with accuracy, precision, resolution.• CO2: Select appropriate passive or active transducers for measurement of physical phenomenon.• CO3: Select appropriate light sensors for measurement of physical phenomenon• CO4: Use AC and DC bridges for relevant parameter measurement.• CO5: Employ multimeter, CRO and different types of recorders for appropriate measurement.

Regulation	2021
Sem	03
Subject Code	BM3352
Subject Name	ELECTRIC CIRCUIT ANALYSIS
Course Outcome	<ul style="list-style-type: none">• CO1: Comprehend and design ac/dc circuits.• CO2 : Apply circuit theorems in real time.• CO3 : Evaluate ac/dc circuits.• CO4 : Analyse the electrical circuits• CO5 : Develop and understand ac/dc circuits.

Regulation	2021
Sem	03
Subject Code	BM3351
Subject Name	ANATOMY AND HUMAN PHYSIOLOGY
Course Outcome	<ul style="list-style-type: none">• CO1 Identify and explain basic elements of human body• CO2 Explain the functions of skeletal and muscular system• CO3 Describe the structure, function of cardiovascular system and respiratory system• CO4 Discuss the structure of digestive and excretory system.• CO5 Describe the physiological process of Nervous and sensory system



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Sem	03
Subject Code	CS3391
Subject Name	OBJECT ORIENTED PROGRAMMING
Course Outcome	<ul style="list-style-type: none">• CO1:Apply the concepts of classes and objects to solve simple problems• CO2:Develop programs using inheritance, packages and interfaces• CO3:Make use of exception handling mechanisms and multithreaded model to solve real world problems• CO4:Build Java applications with I/O packages, string classes, Collections and generics concepts• CO5:Integrate the concepts of event handling and Java FX components and controls for developing GUI based applications

Regulation	2021
Sem	03
Subject Code	BM3361
Subject Name	FUNDAMENTALS OF ELECTRONIC DEVICES AND CIRCUITS LABORATORY
Course Outcome	<ul style="list-style-type: none">• Experiment and determine the VI characteristics of given PN junction diode, Zener diode, Photo diode and Silicon Controlled Rectifier.• Experiment and determine the Input & output characteristics of BJT• Experiment and test half wave and full wave rectifier circuit using PN Junction diode and obtain the ripple factor, rectifier efficiency and experiment and test voltage regulation characteristics using Zener diode voltage regulator circuit.• Experiment and test the given electric circuit using Kirchhoff's laws and obtain the mesh current & node voltage and obtain the load current for the given circuit using Superposition, Thevenin's, and Norton's and Reciprocity theorems.• Construct and test RLC series and parallel circuits to compute the resonant frequency and bandwidth by plotting the frequency response.

Regulation	2021
Sem	03



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Subject Name	SENSORS AND MEASUREMENTS LABORATORY
Course Outcome	<ul style="list-style-type: none">• CO1: design and understand characteristics and calibration of various transducers.• CO2: design and develop bridge circuits to find unknown variables.• CO3: select proper transducer for various applications.• CO4: understand various read out and display devices.• CO5: design a measurement system for various applications.

Regulation	2021
Sem	03
Subject Code	CS3381
Subject Name	OBJECT ORIENTED PROGRAMMING LABORATORY
Course Outcome	<ul style="list-style-type: none">• CO1 : Design and develop java programs using object oriented programming concepts• CO2 : Develop simple applications using package, exceptions, multithreading, and generics concepts• CO3 : Create GUIs and event driven programming applications for real world problems

Regulation	2021
Sem	04
Subject Code	MA3355
Subject Name	RANDOM PROCESSES AND LINEAR ALGEBRA
Course Outcome	<ul style="list-style-type: none">• CO1: Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.• CO2: Demonstrate accurate and efficient use of advanced algebraic techniques.• CO3: Apply the concept of random processes in engineering disciplines.• CO4: Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon.• CO5: Understand the basic concepts of one and two dimensional random variables and apply them to model engineering problems.

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Subject Code	BM3491
Subject Name	BIOMEDICAL INSTRUMENTATION
Course Outcome	<ul style="list-style-type: none">• CO1 : Illustrate the origin of various biological signals and their characteristics.• CO2: Gain knowledge on characteristics of bio signals.• CO3: Gain knowledge on various amplifiers involved in monitoring and transmission of biosignals.• CO4: Explain the different measurement techniques for non-electrical bio-parameters• CO5: Explain the biochemical measurement techniques as applicable for diagnosis and further treatment.

Regulation	2021
Sem	04
Subject Code	BM3402
Subject Name	ANALOG AND DIGITAL INTEGRATED CIRCUITS
Course Outcome	<ul style="list-style-type: none">• CO1: design new analog linear circuits and develop linear IC based Systems.• CO2: Apply the concept of ADC and DAC in real time systems and Phase Locked Loop with applications.• CO3: Use Boolean algebra and apply it to digital systems.• CO4: Design various combinational digital circuits using logic gates.• CO5: Bring out the analysis and design procedures for synchronous and asynchronous sequential circuits.

Regulation	2021
Sem	04
Subject Code	BM3451
Subject Name	BIO CONTROL SYSTEMS
Course Outcome	<ul style="list-style-type: none">• CO1: Interpret the need for mathematical modeling of various systems, representation of systems in block diagrams and signal flow graphs and are introduced to biological control systems• CO2: Determine the time response of various systems• CO3: discuss the concept of system stability• CO4: Examine the frequency response characteristics of various systems using different charts• CO5: Appraise the concept of modeling basic physiological



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Regulation	2021
Sem	04
Subject Code	BM3401
Subject Name	SIGNAL PROCESSING
Course Outcome	<ul style="list-style-type: none">• CO1: To classify the continuous time and discrete time signals and systems.• CO2: To analyze the signals in both continuous time and discrete time• CO3: To apply DFT for the analysis of digital signals & systems• CO4: To design IIR filter to process real world signals.• CO5: To design FIR filter to process real world signals.

Regulation	2021
Sem	04
Subject Code	BM3411
Subject Name	BIOMEDICAL INSTRUMENTATION LABORATORY
Course Outcome	<ul style="list-style-type: none">• CO1: Design the amplifier for Bio signal measurements• CO2: Measure heart rate and heart sounds.• CO3: Record and analyze pulse rate and respiration rate• CO4: Measure blood pressure and blood flow• CO5: Design isolation amplifier

Regulation	2021
Sem	04
Subject Code	BM3412
Subject Name	ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY
Course Outcome	<ul style="list-style-type: none">• CO1: Design Combinational Circuits using logic gates• CO2: Design and implement arithmetic circuits for different applications using opamp• CO3: Design Sequential Circuits using logic gates• CO4: Design wave form generators and analyse their characteristics• CO5: Simulate and analyse circuits using ICs