Jaya Sakthi Engineering College
(Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai)
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Department of Biomedical Engineering

Program Curriculum

Jaya Sakthi Engineering College established in 2001, approval of AICTE has been affiliated to ANNA UNIVERSITY. Hence the curriculum/ syllabus as follow:

The Department of Biomedical Engineering follows a systematic process in the design and development of the curriculum as per Choice Based Credit System (CBCS), which involves high level of participation, discussion and critical inquiry involving all the stakeholders contributing to the introduction, innovation, and revision of the syllabus. The curriculum have the balance in the composition of Basic Science Courses, Biomedical Engineering Science Courses, Humanities and Social Science Courses, professional Core, professional Electives, Open Elective, Employability enhancement courses, Basic Life skills and Project Work.

Program Outcomes and Program Specific Outcomes as defined by the program are listed below:-

PROGRAM OUTCOMES (POs):

Engineering Graduates will be able to:

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 OBJECTIVES (PSOs):

1) To design and develop diagnostic and therapeutic devices that reduces physician burnout and enhance the quality of life for the end user by applying fundamentals of Biomedical Engineering.

2) To apply software skills in developing algorithms for solving healthcare related problems in various fields of Medical sector.

3) 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

Provide mapping of 1) POs to PEOs and 2) PSOs to PEOs.
Use the following marking:

Contribution 1: Reasonable 2:Significant 3:Strong

The composition of the curriculum Regulation 2017 & 2021 for the program of B.E (Bachelor of Engineering) in Biomedical Engineering is shown in table .1

Table 1. Credit Contribution of Basic Curricular Components

Curricular Components			Percentage Contribution in (%)			Mapped PO's
SI No	**Course Category**	**Code**	**AICTE Model Curricular**	**Regulation 2017**	**Regulation 2021**	
1	HumanitiesandSocialSciences	HS	6.25	7.40	7.78	PO-7,PO-8,PO-11
2	Basic Sciences	BS	14.58	14.28	14.97	PO-1,PO-2,PO-3, PO-4,PO-6,PO-6, PO-11
3	Engineering Sciences	ES	14.59	17.98	14.37	PO-1, PO-11
4	Professional Core	PC	31.25	40.74	33.53	PO-1, PO-2,

						PO- 3, PO-4, PO-5, PO-6, PO-8, PO-9, PO-10,
5	Professional Electives	PE	12.5	10.05	12.57	PO-1, PO-2, PO- 3, PO-4, PO-5, PO-6, PO-8, PO-9, PO-10, PO-11.
6	Open Electives	OE	6.25	3.17	7.18	PO-1, PO-2, PO-3 PO-8, PO-10, PO11
7	Mandatory Courses	MC	6.25	0	0	PO-1, PO-2, PO-3 PO-8, PO-10, PO11
8	Employability Enhancement Courses	EEC	8.33	7.6	7.78	PO-1, PO-3, PO-4 PO-5, PO-8, PO-9 PO-10, PO-11.

Table 1 depicts that the university recommended curriculum maintains the balance in the composition of various basic curricular components. However, it is necessary that the student's learning outcome should be in consonance, to the extent possible, with the current academic scenario in the relevant field of engineering and with the needs of the relevant industry.

Department of Biomedical Engineering
Program Outcomes (POs) & Program Specific Outcomes (PSOs)

Program Outcomes (POs) Biomedical Engineering graduates will be able to:	
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 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.

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	**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 team work**
	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)	
PSO1	To design and develop diagnostic and therapeutic devices that reduces physician burnout and enhance the quality of life for the end user by applying fundamentals of Biomedical Engineering.
PSO2	To apply software skills in developing algorithms for solving healthcare related problems in various fields of Medical sector.
PSO3	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

Department of Biomedical Engineering

Course Outcomes (COs)

YEAR:I

SEMESTER:I

SUBJECT: Communicative English

CO1	At the end of the course, learners will be able to: Read articles of a general kind in magazines and newspapers.
CO2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
CO3	Comprehend conversations and short talks delivered in English
CO4	Write short essays of a general kind and personal letters and emails in English
CO5	Students should become adept in their use of written word for informational, possessive and creative purposes

SUBJECT: Engineering Mathematics-I

CO1	Use both the limit definition and rules of differentiation to differentiate functions and apply differentiation to solve maxima and minima problems
CO2	Demonstrate the tools for solving Partial differential equations and maxima, minima for functions of several variables
CO3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus and Evaluate integrals using techniques of integration, such as substitution, partial fraction and integration by parts
CO4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables
CO5	Apply various techniques in solving differential equations

SUBJECT: Engineering Physics

CO1	Students will be able to acquire the knowledge of elastic materials and illustrate the applications in various fields
CO2	Describe the basics of oscillatory physics, working of laser and propagation of light in optical fibers
CO3	Describe the knowledge of quantifying the thermal properties of materials and students will be able analyze the materials based on thermal conductivity
CO4	Summarize the importance of free electrons in determining the properties of metals to understand the concept of Fermi energy and apply the knowledge of quantum mechanics
CO5	Students will be able to recognize various planes in a crystal and describe the structure determination

SUBJECT: Engineering Chemistry

CO1	Interpret basics of hardness of water, boiler feed water problems and its treatment process in specific reverse osmosis process
CO2	Interpret basics of hardness of water, boiler feed water problems and its treatment process in specific reverse osmosis process
CO3	Illustrate the concepts of phase rule and the properties of alloys
CO4	Identify the types of fuels and their usage in the life span
CO5	Plan for renewable energy utilization in the twenty first century

SUBJECT: Problem Solving Python Programming

CO1	Develop algorithmic solutions to simple computational problems.
CO2	Read, write, execute by hand simple Python programs
CO3	Structure simple Python programs for solving problems
CO4	Decompose a Python program into functions
CO5	Represent compound data using Python lists, tuple and dictionaries.

SUBJECT: Engineering Graphics

CO1	Students will be able to familiarize with the fundamentals and standards of engineering graphics
CO2	Students will be able to perform freehand sketching of basic geometrical constructions and multiple views of objects
CO3	Students will be able to draw orthographic projections of lines and plane surfaces
CO4	Students will be able to draw projections of solids and development of surfaces
CO5	Students will be able to visualize and project isometric and perspective sections of simple solids

SUBJECT: Problem Solving Python Programming Laboratory

CO1	Write, test, and debug simple Python programs.
CO2	Implement Python programs with conditionals and loops.
CO3	Develop Python programs step-wise by defining functions and calling them.
CO4	Use Python lists, tuples, dictionaries for representing compound data.

CO5	Read and write data from/to files in Python.

SUBJECT: Physics Laboratory

CO1	Apply principles of elasticity, engineering applications.
CO2	Optics engineering applications
CO3	Thermal properties for engineering applications
CO4	Understand the engineering properties of the various materials
CO5	Understand the properties of liquids

SUBJECT: Chemistry Laboratory

CO1	Understand the quantitative chemical analysis of water quality related parameters such as alkalinity and hardness
CO2	DO content in water eco system
CO3	Permissible limit of chloride content in potable water
CO4	Apply redox reaction to analyse iron content through potentiometric titration
CO5	Make use of neutralization reaction by instrumental analysis

SEMESTER:II

SUBJECT: Technical English

CO1	Read technical texts and write area - specific texts effortlessly.
CO2	Listen and comprehend lectures and talks in their area of specialization successfully
CO3	Speak appropriately and effectively in varied formal and informal contexts
CO4	Write reports and winning job applications
CO5	Listening to commentaries of games

SUBJECT: Engineering Mathematics-II

CO1	Matric Algebra: Eigenvalues and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices
CO2	Vector Calculus: Gradient, divergence and curl of a vector point function and related identities. Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification
CO3	Analytic functions and conformal mappings
CO4	Complex integration, Taylor's and Laurent's series and Residue theorems
CO5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients

SUBJECT: Physics for Electronics Engineering

CO1	Gain knowledge on classical and quantum electron theories, and energy band structures,
CO2	Acquire knowledge on basics of semiconductor physics and its applications in various devices
CO3	Get knowledge on magnetic and dielectric properties of materials
CO4	Have the necessary understanding on the functioning of optical materials for optoelectronics
CO5	Understand the basics of quantum structures and their applications in spintronics and carbon electronics.

SUBJECT: Engineering Mechanics for Biomedical Engineers

CO1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures
CO2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems

SUBJECT: Fundamentals of Biochemistry

CO1	Explain the fundamentals of biochemistry
CO2	Clinical application of Biochemistry

SUBJECT: Circuit Analysis

CO1	Develop the capacity to analyze electrical circuits, apply the circuit theorems in real time
CO2	Design and understand and evaluate the AC and DC circuits.

SUBJECT: Engineering Practice Laboratory

CO1	Fabricate carpentry components and pipe connections including plumbing works
CO2	Use welding equipments to join the structures
CO3	Carry out the basic machining operations
CO4	Make the models using sheet metal works
CO5	Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings

SUBJECT: Biochemistry Labortary

CO1	Understand the Biochemistry laboratory functional components
CO2	Understand the basics principle of preparation of buffers.
CO3	Have a sound knowledge of qualitative test of different biomolecules.
CO4	Understand the basics knowledge of Biochemical parameter and their interpretation in Blood sample.
CO5	Have a sound knowledge of separation technology of proteins and aminoacids.

YEAR: II

SEMESTER: III

SUBJECT: Linear Algebra And Partial Differntial Equations

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	Demonstrate their mastery by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text.
CO4	Able to solve various types of partial differential equations.
CO5	Able to solve engineering problems using Fourier series.

SUBJECT: Signals and Systems

CO1	To be able to determine if a given system is linear/causal/stable
CO2	Capable of determining the frequency components present in a deterministic signal
CO3	Capable of characterizing LTI systems in the time domain and frequency domain
CO4	To be able to compute the output of an LTI system in the time and frequency domains

SUBJECT: Anatomy and Human Physiology

CO1	Students would be able to explain basic structure and functions of cell
CO2	Students would be learnt about anatomy and physiology of various systems of human body
CO3	Students would be able to explain interconnect of various systems
CO4	Students would be able to explain basic structure and functions of cell

SUBJECT: Sensors and Measurements

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.

SUBJECT: Electronic Devices and Circuits

CO1	Explain the structure and working operation of basic electronic devices.
CO2	Able to identify and differentiate both active and passive elements
CO3	Analyze the characteristics of different electronic devices such as diodes and transistors
CO4	Employ the acquired knowledge in design and analysis of oscillators
CO5	Choose and adapt the required components to construct an amplifier circuit.

SUBJECT: Pathology and Microbiology

CO1	Analyze structural and functional aspects of living organisms.
CO2	Explain the function of microscope
CO3	Discuss the importance of public health.
CO4	Describe methods involved in treating the pathological diseases.

SUBJECT: Pathology and Microbiology Laboratory

CO1	Student can perform practical experiments on tissue processing, cryoprocessing, staining Processes etc.

SUBJECT:Electronic Devices and circuits Laboratory

CO1	Analyze the characteristics of basic electronic devices
CO2	Design RL and RC circuits
CO3	Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems
CO4	Analyze the characteristics of basic electronic devices

SUBJECT:Anatomy and Human Physiology Laboratory

CO1	Identification and enumeration of blood cells
CO2	Enumeration of haematological parameters
CO3	Analysis of special sensory organs test.

SEMESTER: IV

SUBJECT: Probability and Statistics

CO1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
CO2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
CO3	Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
CO5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems.

SUBJECT: Medical Physics

CO1	Explain about non-ionizing radiation, interaction with tissue and its effects.
CO2	Define and compare intensities of sensory stimuli
CO3	Summarizes how ionizing radiation interacts with the human body, how to quantify it and its levels seen in the environment and healthcare
CO4	Explain the fundamentals of radioactivity and radioactive isotopes
CO5	Illustrates the methods of detecting and recording the ionizing radiation and its interaction with matter.

SUBJECT: Basics of Electrical Engineering

CO1	Design simple electrical circuits and understand through nodal, mesh analysis
CO2	constructing series and parallel configuration of circuits with sources and variable loads.
CO3	Get knowledge on electrical machines and on its efficient operating principle.
CO4	Understand metering principles, safety measures while working with electrical circuits.
CO5	Analyse existing power distribution and hence apply technology in electrical applications

SUBJECT: Linear Integrated Circuits

CO1	Design linear and non linear applications of OP – AMPS
CO2	Design applications using analog multiplier and PLL
CO3	Design ADC and DAC using OP – AMPS
CO4	Generate waveforms using OP – AMP Circuits
CO5	Analyze special function ICs

SUBJECT: Fundamentals of Data Structures in C

CO1	Implement linear and non-linear data structure operations using C
CO2	Suggest appropriate linear / non-linear data structure for any given data set.
CO3	Apply hashing concepts for a given problem
CO4	Modify or suggest new data structure for an application
CO5	Appropriately choose the sorting algorithm for an application

SUBJECT: Digital Electronics

CO1	Use digital electronics in the present contemporary world
CO2	Design various combinational digital circuits using logic gates
CO3	Do the analysis and design procedures for synchronous and asynchronous sequential circuits
CO4	Use the semiconductor memories and related technology
CO5	Use electronic circuits involved in the design of logic gates

SUBJECT: Fundamentals of Data Structures in C Laboratory

CO1	Write basic and advanced programs in C
CO2	Implement functions and recursive functions in C
CO3	Implement data structures using C
CO4	Choose appropriate sorting algorithm for an application and implement it in a modularized way
CO5	Write basic and advanced programs in C

SUBJECT: Integrated Circuits Laboratory

CO1	Design oscillators and amplifiers using operational amplifiers.
CO2	Design filters using Opamp and perform experiment on frequency response.
CO3	Analyse the working of PLL and use PLL as frequency multiplier.
CO4	Design DC power supply using ICs.
CO5	Aquire knowledge in using SPICE

YEAR: III

SEMESTER: V

SUBJECT:Analog and digital communication

CO1	Apply analog and digital communication techniques
CO2	Use data and pulse communication techniques
CO3	Analyze Source and Error control coding
CO4	Utilize multi-user radio communication

SUBJECT: Biocontrol systems

CO1	Understand the need for mathematical modeling of various systems, representation of
CO2	systems in block diagrams and signal flow graphs and are introduced to biological controlsystems
CO3	Analyze the time response of various systems and discuss the concept of system stability
CO4	Understand the concept of modeling basic physiological systems
CO5	Comprehend the application aspects of time and frequency response analysis in physiological control systems.

SUBJECT: Biomedical Instrumentation

CO1	Illustrate different electrode placement for various physiological recordings
CO2	Design bio amplifier for various physiological recordings
CO3	Explain Differentiate different bio potentials and its propagations various technique for non-electrical physiogical measurements

SUBJECT: DISCRETE-TIME SIGNAL PROCESSING

CO1	Apply DFT for the analysis of digital signals and systems
CO2	Design IIR and FIR filters
CO3	Characterize the effects of finite precision representation on digital filters
CO4	Design multirate filters
CO5	Apply adaptive filters appropriately in communication systems

SUBJECT: TOTAL QUALITY MANAGEMENT

CO1	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

SUBJECT: DIGITAL SIGNAL PROCESSING LABORATORY

CO1	Carryout basic signal processing operations
CO2	Demonstrate their abilities towards MATLAB based implementation of various DSP
CO3	Analyze the architecture of a DSP Processor
CO4	Design and Implement the FIR and IIR Filters in DSP Processor for performing

SUBJECT: BIO MEDICAL INSTRUMENTATION LABORATORY

CO1	Design preamplifiers and amplifiers for various bio signal recordings.
CO2	Measure various non-electrical parameters using suitable sensors/transducers
CO3	Design PCB layout for any bio amplifier.
CO4	Design preamplifiers and amplifiers for various bio signal recordings.

SEMESTER: VI SUBJECT: - MICROPROCESSORS AND

MICROCONTROLLERS

CO1	Understand and execute programs based on 8086 microprocessor.
CO2	Design Memory Interfacing circuits.
CO3	Design and interface I/O circuits.
CO4	Design and implement 8051 microcontroller based systems.

SUBJECT:DIAGNOSTIC AND THERAPEUTIC EQUIPMENT- I

CO1	Describe the working and recording setup of all basic cardiac equipment.
CO2	Understand the working and recording of all basic neurological equipment's.
CO3	Discuss the recording of diagnostic and therapeutic equipment's related to EMG.
CO4	Explain about measurements of parameters related to respiratory system.
CO5	Describe the measurement techniques of sensory responses.

SUBJECT: BIOMECHANICS

CO1	Understand the principles of mechanics
CO2	Outline the principles of biofluid dynamics.
CO3	Explain the fundamentals of bio-solid mechanics.
CO4	Apply the knowledge of joint mechanics.
CO5	Give Examples of computational mathematical modelling applied in biomechanics.

SUBJECT: ENVIRONMENTAL SCIENCE AND ENGINEERING

CO1	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
CO2	Public awareness of environmental is at infant stage.
CO3	Ignorance and incomplete knowledge has lead to misconceptions

CO4	Development and improvement in std. of living has lead to serious environmental disasters
CO5	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

SUBJECT: HOSPITAL MANAGEMENT

CO1	Explain the principles of Hospital administration.
CO2	Identify the importance of Human resource management.
CO3	List various marketing research techniques.
CO4	Identify Information management systems and its uses.
CO5	Understand safety procedures followed in hospitals.

SUBJECT: TELEHEALTH TECHNOLOGY

CO1	Learn the key principles for telemedicine and health
CO2	Understand telemedical technology.
CO3	Know telemedical standards, mobile telemedicine and it applications
CO4	Learn the key principles for telemedicine and health
CO5	Understand telemedical technology.

SUBJECT: MICROPROCESSORS AND MICROCONTROLLERS LABORATORY

CO1	Write ALP Programmes for fixed and Floating Point and Arithmetic operations
CO2	Interface different I/Os with processor
CO3	Generate waveforms using Microprocessors
CO4	Execute Programs in 8051
CO5	Explain the difference between simulator and Emulator

YEAR: IV

SEMESTER: VII

SUBJECT: Diagnostic And Therapeutic Equipment - II

CO1	Discuss the various equipment used in ICU and applications of telemetry.
CO2	Explain the types of diathermy and its applications.
CO3	Express the basics of ultrasound and its application in medicine
CO4	Discuss the various extracorporeal and special diagnostic devices used in hospitals
CO5	Outline the importance of patient safety against electrical hazard

SUBJECT: Digital Image Processing

CO1	Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms.
CO3	Operate on images using the techniques of smoothing, sharpening and enhancement.
CO4	Understand the restoration concepts and filtering techniques.
CO5	Learn the basics of segmentation, features extraction, compression and recognition

SUBJECT: Radiological Equipments

CO1	Describe the working principle of X ray machine and its application.
CO2	Illustrate the principle computed tomography.
CO3	Interpret the technique used for visualizing various sections of the body using magnetic resonance imaging
CO4	Demonstrate the applications of radio nuclide imaging.
CO5	Outline the methods of radiation safety.

SUBJECT: Rehabilitation Engineering

CO1	Gain adequate knowledge about the needs of rehabilitations and its future development.
CO2	Have an in depth idea about Engineering Concepts in Sensory & Motor rehabilitation

CO3	Apply the different types of Therapeutic Exercise Technique to benefit the society.
CO4	Design and apply different types Hearing aids, visual aids and their application in biomedical field and hence the benefit of the society.
CO5	Gain in-depth knowledge about different types of models of Hand and arm replacement

SUBJECT: Digital Image Processing Labortary

CO1	Perform enhancing operations on the image using spatial filters and frequency domain filters.
CO2	Use transforms and analyse the characteristics of the image.
CO3	Perform segmentation operations in the images.
CO4	Estimate theefficiency of the compression technique on the images.
CO5	Apply image processing technique to solve real health care problems.

SUBJECT: Hospital Training

CO1	Advocate a patient-centred approach in healthcare
CO2	Communicate with other health professionals in a respectful and responsible manner
CO3	Recognize the importance of inter-professional collaboration in healthcare.
CO4	Propose a patient-centred inter-professional health improvement plan based upon the patient’s perceived needs
CO5	Use the knowledge of one’s own role and those of other professions to address the healthcare needs of populations and patients served.