COURSE OUTCOMES

NEW SYLLABUS

Maulana Abul Kalam Azad University of Technology

West Bengal (Formerly West Bengal University of Technology)
Syllabus for B. Tech in Biomedical Engineering
(Applicable from the academic session 2018-2019)
Program Name: B.Tech. in Biomedical Engineering

Blooms Taxonomy level

- **Level 1: Knowledge** -"involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting."
- **Level 2: Comprehension-** "refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications."
- **Level 3: Application-** refers to the "use of abstractions in particular and concrete situations."
- **Level 4: Analysis** -represents the "breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between ideas expressed are made explicit."
- **Level 5: Synthesis-** involves the "putting together of elements and parts so as to form a whole."
- **Level 6: Evaluation-** engenders "judgments about the value of material and methods for given purposes."

FIRST YEAR : 1ST SEMESTER				
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Mathematics –IB **(BS-M102)**	CO1	Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.	Knowledge	1
	CO2	Understand the domain of applications of mean value theorems to engineering problems.	Comprehension	2
	CO3	Learn the tools of power series and Fourier series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.	Synthesis	5
	CO4	Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extreme points of different surfaces of higher dimensions.	Application	3
	CO5	Understand different types of matrices, their eigen values, eigen vectors, rank and also their orthogonal transformations which are essential for understanding physical and engineering problems.	Knowledge	1
2				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Chemistry-I **(BS-CH101)**	CO1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.	Analysis	4
	CO2	Rationalise bulk properties and processes using thermodynamic considerations.	Knowledge	1
	CO3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.	Application	3
	CO4	Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.	Knowledge	1
	CO5	List major chemical reactions that are used in the synthesis of molecules.	Analysis	4
3				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Basic Electrical Engineering (ES-EE101)	CO1	To understand and analyze basic electric and magnetic circuits.	Knowledge	1
	CO2	To study the working principles of electrical machines and power converters.	Application	3
	CO3	To introduce the components of low voltage electrical installations.	Evaluation	6
	CO4	To understand and analyze the working of transformers.	Analysis	4

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Chemistry-I Laboratory (BS-CH191)	CO1	Determining hardness of water helps students to learn the basics of experiments to apply in day to day life as well as in industry.	Evaluation	6
	CO2	Evaluate redox potential and apply in day to day life as well as in industry.	Evaluation	6
	CO3	Calculate the alkalinity of water helps students to learn the basics of experiments to apply in day to day life as well as in industry.	Application	3
	CO4	Measure the viscosity of liquid helps students to learn the basics of experiments to apply in day to day life as well as in industry.	Knowledge	1
	CO5	Measure the pH and conductance with the help of instruments of given samples e.g. tea, fruit juices, soil etc.	Application	3
	CO6	Differentiate two heterogeneous liquid solutions and determine the distribution of solvent among them.	Knowledge	1
5				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Basic Electrical Engineering Laboratory (ES-EE191)	CO1	Get an exposure to common electrical components and their series & parallel connection.	Knowledge	1
	CO2	Get familiarized with the steady state and transient state behavior of electrical circuit	Application	3
	CO3	Understand the usage of common electrical measuring instruments for measurements of current, voltage, power etc.	Analysis	4
	CO4	Understand the basic characteristics of transformers and different electrical machines.	Evaluation	6
6				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Engineering Graphics & Design (ES-ME191)	CO1	Introduction to engineering design and its place in society.	Comprehension	2
	CO2	Exposure to the visual aspects of engineering design.	Knowledge	1
	CO3	Exposure to engineering graphics standards.	Application	3
	CO4	Exposure to solid modelling.	Analysis	4

FIRST YEAR : 2ND SEMESTER				
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Physics-I (BS-PH201)	CO1	Basic concepts of mechanics.	Knowledge	1
	CO2	Bragg's Law and introduction to the principles of lasers, types of lasers and applications.	Application	3
	CO3	Various terms related to properties of materials such as,permeability,polarization, etc.	Analysis	4
	CO4	Some of the basic laws related to quantum mechanics as well as magnetic and dielectric properties of materials.	Application	3
	CO5	Simple quantum mechanics calculations.	Evaluation	6
8				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Mathematics –IIB (BS-M202)	CO1	Learn the methods for evaluating multiple integrals and their applications to different physical problems.	Evaluation	6
	CO2	Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.	Knowledge	1
	CO3	Learn different tools of differentiation and integration of functions of a complex variable that are used with various other techniques for solving engineering problems.	Analysis	4
	CO4	Apply different types of transformations between two 2- dimensional planes for analysis of physical or engineering problems.	Application	3
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Programming for problem solving (ES-CS201)	CO1	To formulate simple algorithms for arithmetic and logical problems.	Evaluation	6
	CO2	To translate the algorithms to programs (in C language).	Comprehension	2
	CO3	To test and execute the programs and correct syntax and logical errors.	Application	3
	CO4	To implement conditional branching, iteration, recursion and programming to solve matrix addition and multiplication problems and searching and sorting problems.	Synthesis	5
	CO5	To decompose a problem into functions and synthesize a complete program using divide and conquer approach and can solve simple numerical method problems like rot finding of function, differentiation of function and simple integration.	Application	3
	CO6	To use arrays, pointers and structures to formulate algorithms and programs.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
English (HM-HU201)	CO1	The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.	Knowledge	1
	CO2	The students will be able to build official communication with business houses.	Comprehension	2
	CO3	The students will be able to define, describe and conclude any event.	Application	3
	CO4	The students will be able to comprehend and summarize a topic.	Comprehension	2
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Physics-I Laboratory (BS-PH291)	CO1	To provide idea of dispersion and minimum deviation of light by a prism.	Application	3
	CO2	To provide knowledge of interference and division of amplitude by experimental set up.	Knowledge	1
	CO3	To discuss Wheatstone Bridge Principle and can measure the resistivity of the wire of a meter bridge, can calculate the value of resistance of a unknown sample.	Comprehension	2
	CO4	To measure hot body radiation by different techniques like with Stefan's constant, Plank's constant.	Evaluation	6
	CO5	To measure some mechanical properties of materials like Young modulus, Bending moment, Rigidity modulus.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Programming for Problem Solving (ES-CS291)	CO1	To formulate the algorithms for simple problems and can translate given algorithms to a working and correct program.	Application	3
	CO2	To be able to correct syntax errors as reported by the compilers and correct logical errors encountered at run time.	Evaluation	6
	CO3	To be able to write iterative as well as recursive programs.	Comprehension	2
	CO4	To be able to represent data in arrays, strings and structures and manipulate them through a program.	Analysis	4
	CO5	To be able to declare pointers of different types and use them in defining self-referential structures.	Application	3
	CO6	To be able to create, read and write to and from simple text files.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Workshop/Manufacturing Practices (ES-ME292)	CO1	Able to discuss the function and activities of different shop.	Comprehension	2
	CO2	Students will be able to fabricate components with their own hands.	Synthesis	5
	CO3	Able to explain and show practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Knowledge	1
	CO4	To produce small devices of their interest by assembling different components.	Synthesis	5
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
Language Laboratory (HM-HU291)	CO1	The students will acquire basic proficiency in English.	Knowledge	1
	CO2	The students will have expertise in speaking and listening on English.	Comprehension	2
	CO3	Develop skill on reading, comprehension and pronunciation on English.	Comprehension	2
	CO4	To take part in group discussions can establish own views.	Application	3
SECOND YEAR : 3RD SEMESTER				
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MATHEMATICS – III (PROBABILITY & STATISTICS) –BS-M301	CO1	Demonstrate the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.	Comprehension	2
	CO2	Apply the concept of testing of hypothesis for small and large samples in real life problems.	Application	3
	CO3	Apply statistical methods for studying data samples.	Analysis	4
	CO4	Apply the basic concepts of classifications of design of experiments in the field of engineering and statistical quality control.	Application	3
	CO5	Demonstrate the basic ideas of statistics including measures of central tendency, correlation and regression.	Evaluation	6
	CO6	Apply the notion of sampling distributions and statistical techniques for solving engineering and management problems.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
ANALOG ELECTRONIC CIRCUITS (ES-EC301)	CO1	Demonstrate and apply working principle of different electronic circuit in real life.	Application	3
	CO2	Explain the operation and performance of semiconductor devices.	Analysis	4
	CO3	Choose correct electronic devices to solve problems.	Evaluation	6
	CO4	Analyse the effectiveness of electronic circuit used in day to day life.	Analysis	4
	CO5	Evaluate the feedback circuits and frequency response of amplifier.	Evaluation	6
	CO6	Design and conduct experiments using analog electronic circuits to function as switch,regulator, clippers, clampers, oscillators, power amplifiers.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
SIGNALS AND SYSTEMS IN BIOMEDICAL ENGINEERING (PC-BME301)	CO1	Analyse different types of signals and systems in everyday life.	Analysis	4
	CO2	Represent continuous and discrete systems in time and frequency domain using different transforms.	Evaluation	6
	CO3	Describe and classify physiological signals and develop system for different signals.	Application	3
	CO4	Analyse and characterize physiological signals and systems.	Analysis	4
	CO5	Illustrate and explain the mode of operation of filtering techniques especially for physiological signals.	Comprehension	2
	CO6	Proposed and solve engineering problems using transform techniques.	Knowledge	1

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ENGINEERING PHYSIOLOGY & ANATOMY (PC-BME302)	CO1	Describe the structure and function of various organs of physiological systems.	Knowledge	1
	CO2	Explain interconnection of various systems and mechanism of communication and integration.	Comprehension	2
	CO3	Develop and apply critical reasoning skills in human physiology and anatomy.	Application	3
	CO4	Analyze and interpret the structural and functional aspects of living organisms.	Analysis	4
	CO5	Comprehend the probable causes of anomaly in organs and systems in human body and assess the situation technically.	Comprehension	2
	CO6	Build knowledge to aid diagnosis and to simulate engineering systems.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
BIOPHYSICS & BIOCHEMISTRY (PC-BME303)	CO1	Demonstrate the consequence of different biophysical and biochemical processes.	Application	3
	CO2	Explain the bio-potential and source of bio-signals.	Comprehension	2
	CO3	Make use of stimuli and experiments with biological signals.	Analysis	4
	CO4	Categorize the major biomolecules and infer their structure function relationships.	Knowledge	1
	CO5	Describe the synthesis of macromolecules and their role in metabolic pathways along with their regulation.	Comprehension	2
	CO6	Apply and evaluate the analytical techniques used in molecular biology.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
TECHNICAL ENGLISH (HM-HU301)	CO1	Demonstrate the ability to read and comprehend engineering and technology texts.	Comprehension	2
	CO2	Develop speaking skills to make technical presentation and participate in group discussion.	Application	3
	CO3	Express and exchange ideas effectively through various modes of communication.	Knowledge	1
	CO4	Analyze content to identify main and subordinate ideas, distinguish various modes of argument and outline methods of development.	Analysis	4
	CO5	Evaluate technical reports and judge its authenticity.	Evaluation	6
	CO6	Formulate strategies for persuasive arguments and tools for success.	Application	3

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ANALOG ELECTRONIC CIRCUITS LABORATORY (ES-EC391)	CO1	Choose electronic components to construct circuits for tailor made applications.	Knowledge	1
	CO2	Conduct experiments and verify the results practically.	Application	3
	CO3	Assess and recommend an application device of their interest.	Evaluation	6
	CO4	Design and test fundamental analog electronic circuits.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
SIGNAL ANALYSIS LABORATORY (PC-BME391)	CO1	Identify and select appropriate software tools for analysing various signals.	Application	3
	CO2	Evaluate signal using mathematical transfer function.	Knowledge	1
	CO3	Generate various types of signal and noise waveforms.	Synthesis	5
	CO4	Analyse versatile bio signals and interpret the result clinically.	Analysis	4

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
PHYSIOLOGY & BIOCHEMISTRY LABORATORY (PC-BME392)	CO1	Identify and select appropriate tools for measurement of physiological and biochemical parameters.	Application	3
	CO2	Conduct experiments and analyse the outputs practically.	Analysis	4
	CO3	Evaluate the compatibility for any clinical measurements.	Evaluation	6
	CO4	Propose analytical methods and plan for quantitative measurement.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
INTERPERSONAL SKILL & REPORT WRITING [SESSIONAL] - HM-HU381	CO1	Develop listening, speaking, reading and writing skills.	Knowledge	1
	CO2	Develop self-confidence and able to reach corporate expectations.	Application	3
	CO3	Answer questions successfully in interviews and take international examination.	Evaluation	6
	CO4	Develop interpersonal skills on current problems and events.	Synthesis	5
	CO5	Make presentations and participate in Group Discussions.	Comprehension	2
	CO6	Produce well versed technical report in recognized format.	Comprehension	2
SECOND YEAR : 4TH SEMESTER				
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
NUMERICAL METHODS (BS-M401)	CO1	Demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.	Comprehension	2
	CO2	Apply appropriate algorithms to solve selected problems, both manually and by writing computer programs.	Application	3
	CO3	Analyze the errors obtained in the numerical solution of problems.	Analysis	4
	CO4	Compare different algorithms with respect to accuracy and efficiency of solution.	Knowledge	1
	CO5	Assess the reliability of the numerical results and find out the effect of round off error.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DIGITAL ELECTRONICS & INTEGRATED CIRCUITS (ES-EC401)	CO1	Understand and explain different kinds of logic families.	Knowledge	1
	CO2	Analyze digital circuits and arrive at suitable conclusions.	Analysis	4
	CO3	Develop digital logic circuits and apply it to solve real life problems.	Synthesis	5
	CO4	Classify and explain the design of different semiconductor memories.	Application	3
	CO5	Design and develop applications of combinational and sequential circuits.	Synthesis	5
	CO6	Engage in self-study to formulate, design, implement, analyze and demonstrate an application of digital electronic circuits.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOSENSORS & TRANSDUCERS (PC-BME401)	CO1	Classify sensors and transducers based on functions.	Knowledge	1
	CO2	Explain the working principles of biosensors and transducers.	Knowledge	1
	CO3	Select appropriate transducers for measurements of physical parameters.	Comprehension	2
	CO4	Analyze various electrical parameters with accuracy and precision.	Analysis	4
	CO5	Measure physiological parameters and interpret the data.	Application	3
	CO6	Design and develop systems for tailor made applications.	Evaluation	6

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMEDICAL INSTRUMENTATION (PC-BME402)	CO1	Measure various electrical parameters with accuracy, precision, resolution.	Application	3
	CO2	Illustrate and explain the mode of operation of various instrument and its medical applications.	Knowledge	1
	CO3	Demonstrate and adjust the technical factors of the instruments.	Application	3
	CO4	Understand electrical safety and the ability to design relevant protection systems.	Synthesis	5
	CO5	Analyze and interpret the static and dynamic characteristics of bioinstrumentation systems.	Analysis	4
	CO6	Identity and solve the problem and servicing the instrument properly.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
ANALYTICAL AND DIAGNOSTIC EQUIPMENTS (PC-BME403)	CO1	Classify and explain different types of clinical instruments for medical diagnosis.	Knowledge	1
	CO2	Demonstrate the basic principle of working, mode of operation and various advancements.	Knowledge	1
	CO3	Choose appropriate instruments for specific application and accurate measurement.	Comprehension	2
	CO4	Integrate knowledge of engineering and biology to repair and calibrate the instruments.	Analysis	4
	CO5	Make measurement, analyse and interpret the results for clinical purposes.	Application	3
	CO6	Exhibit competency in suggesting, designing and offering reliable and optimum solution.	Evaluation	6
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
ELECTRIC CIRCUITS AND NETWORK ANLYSIS (PE-EE401)	CO1	Apply different techniques for analysis of electrical circuit.	Application	3
	CO2	Analyze circuits using mesh current and nodal voltage method.	Analysis	4
	CO3	Analyze and solve transient behaviour of the network.	Evaluate	6
	CO4	Analyze RLC circuits and coupled circuits.	Analysis	4
	CO5	Design resonant circuits for given bandwidth.	Synthesis	5
	CO6	Compute responses of first order and second order networks using time domain analysis.	Evaluation	6

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
ELECTRICAL AND ELECTRONIC MEASUREMENTS (PE-EE402)	CO1	Explain the working principles and operation of measuring instruments.	Knowledge	1
	CO2	Analyze the performance characteristics of measuring instruments.	Analysis	4
	CO3	Measure various electrical parameters with accuracy and precision.	Application	3
	CO4	Select appropriate measuring instruments for measuring the specific physical parameters.	Comprehension	2
	CO5	Test and troubleshoot electronic circuits using various measuring instruments.	Evaluation	6
	CO6	Propose data acquisition system and transfer data for digital signal processing and analysis.	Synthesis	5
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DIGITAL ELECTRONIC CIRCUITS LABORATORY (ES-EC491)	CO1	Understand the basic of the Digital systems to solve real life problems.	Knowledge	1
	CO2	Explain the application of Digital ICs in the designing circuit.	Application	3
	CO3	Describe, design and analyze sequential and combinational circuits.	Analysis	4
	CO4	Design various functional circuits using simple ICs.	Synthesis	5
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOSRNSORS & TRANSDUCERS LABORATORY (PC-BME491)	CO1	Select proper sensors and transducers for measurement of biophysical phenomenon.	Knowledge	1
	CO2	Conduct experiments and analyze the result practically.	Analysis	4
	CO3	Evaluate and compare the measure data for clinical representation.	Evaluation	6
	CO4	Design and test system for detection of physiological signals.	Synthesis	5
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMEDICAL INSTRUMENTATION LABORATORY (PC-BME492)	CO1	Explain the principle of operation and design background of medical instrument for specific application.	Knowledge	1
	CO2	Make measurement on and interpret data from living systems, and ability to communicate properly.	Evaluation	6
	CO3	Design and conduct experiments, as well as to analyze and interpret data.	Synthesis	5
	CO4	Check and calibrate medical instruments at par with standard protocol.	Application	3

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
CIRCUITS AND NETWORK LABORATORY (PE-EE491)	CO1	Generate various signals, represent poles and zeros, determine partial functions and cascade connection using software tools / simulation kits.	Knowledge	1
	CO2	Characterize Series and Parallel Resonant circuits, and validate network theorems.	Application	3
	CO3	Design Transient Response in R-L & R-C Networks and Transient Response in RLC Series & Parallel Circuits & Networks.	Synthesis	5
	CO4	Determine Laplace transform, different time domain functions and inverse Laplace.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ELECTRICAL AND ELECTRONIC MEASUREMENTS LABORATORY (PE-BME492)	CO1	Identify various measuring equipment/meters and to evaluate their performance.	Knowledge	1
	CO2	Measure Resistance, Inductance, Capacitance, Frequency, Voltage, Current, Power and Energy.	Evaluation	6
	CO3	Demonstrate variety of practical electrical circuits and conduct experiments to analyze and interpret data.	Application	3
	CO4	Prepare graphical presentations of laboratory data and computational results, incorporating standard data analysis methods to develop technically sound reports of outcomes.	Analysis	4

THIRD YEAR : 5TH SEMESTER

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
THERAPEUTIC EQUIPMENTS & ASSISTIVEE DEVICES (PC-BME501)	CO1	Demonstrate the working of therapeutic equipment and assistive devices.	Knowledge	1
	CO2	Classify and recommend suitable therapeutic devices for specific applications	Application	3
	CO3	Analyze different types of therapeutic devices including pediatric applications and support.	Analysis	4
	CO4	Justify the application of lasers and laser in surgery.	Comprehension	2
	CO5	Outline the potential electrical hazards for therapeutic equipment and evaluate the patient safety.	Comprehension	2
	CO6	Plan and contribute in design, development and effective usage of therapeutic equipment and assistive devices.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MEDICAL IMAGING TECHNIQUES (PC-BME502)	CO1	Classify different imaging techniques and suggest suitable imaging methodology for specific applications.	Knowledge	1
	CO2	Demonstrate the physics and principles of operation of X-ray and ultrasound imaging modality.	Comprehension	2
	CO3	Explain the principles of image formation and implement various techniques to analyze the medical images for clinical purposes.	Analysis	4
	CO4	Identify and interpret the most effective imaging modality for particular examination.	Analysis	4
	CO5	Apply the tools for different problems in medical imaging and respond technically.	Application	3
	CO6	Demonstrate the potential radiation hazards and implement relevant protective systems.	Comprehension	2
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
TELEHEALTH TECHNOLOGY (PE-BME501)	CO1	Demonstrate the types of communication and network systems used in tele health technology.	Knowledge	1
	CO2	Explain the communication standards, ethical and legal issues involved in telehealth system.	Comprehension	2
	CO3	Apply telemedicine and e-health services in professional field.	Application	3
	CO4	Identify the conditions for successful implementation of telemedicine and e-health systems and services.	Evaluation	6
	CO5	Promote and introduce telemedicine and e-health services and programmes.	Comprehension	2
	CO6	Plan and contribute in the design, implementation and use of telemedicine and e health systems.	Synthesis	5
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
COMMUNICATION ENGINEERING & BIOTELEMETRY (PE-BME502)	CO1	Choose and apply different modulation techniques for various applications.	Knowledge	1
	CO2	Analyze the performance of communication system in terms of error rate and spectral efficiency.	Analysis	4
	CO3	Demonstrate the concepts of sampling, pulse modulation techniques and their comparison.	Comprehension	2
	CO4	Inspect recent trend and performance issues for different digital modulation techniques.	Application	3
	CO5	Identify the types of devices and their uses on a digital imaging network.	Knowledge	1
	CO6	Design and evaluate the biotelemetry system.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MICROPROCEESOR & MICROCONTROLLER (OE-EI501)	CO1	Construct and analyse assemble language program in 8085 and 8086 microprocessor to solve various complex engineering problem.	Knowledge	1
	CO2	Evaluate processing time of program and devise technique to reduce execution time to improve microprocessor performance.	Evaluation	6
	CO3	Design interfacing circuits to the microprocessor to communicate with external devices, which can be associated with public safety, health, security and other societal and environmental concerns	Synthesis	5
	CO4	Design memory devices using memory chips and utilize the knowledge in memory based devices used in academics and industry.	Application	3
	CO5	Design and implement 8051 microcontroller based system for using it in real life applications	Synthesis	5
	CO6	Compare memory mapped I/O and peripheral mapped I/O and their interfacing procedure and also compare microprocessor with microcontroller.	Analysis	4
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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
VLSI & EMBEDDED SYSTEM (OE-EI502)	CO1	Describe MOS transistor structure and operation and write current voltage equations for nMOS & pMOS.	Knowledge	1
	CO2	Explain the operation of CMOS combinational and sequential circuits.	Comprehension	2
	CO3	Solve the problem of static and dynamic circuit design with CMOS.	Evaluation	6
	CO4	Generate different subsystems using MOS circuits.	Application	3
	CO5	State the basic programming concepts for embedded systems.	Analysis	4
	CO6	Explain the basic OS fundamentals and the RTOS for embedded systems.	Analysis	4
43				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DATA STRUCTURE & ALGORITHM (OE-CS501)	CO1	Select and apply appropriate data structure and algorithmic methods in solving problem.	Application	3
	CO2	Analyze algorithms to determine the time complexity and justify the correctness.	Analysis	4
	CO3	Write algorithms and compare their performance in term of space and time complexity.	Knowledge	1
	CO4	Implement the computational efficiency of the principal algorithms for sorting, searching, and hashing.	Synthesis	5
	CO5	Design and implement programs for manipulating stacks,queues,linked lists, trees ,and graphs.	Synthesis	5
	CO6	Compare and contrast the benefits of dynamic and static data structures implementations.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
DATA BASE MANAGEMENT SYSTEM (OE-CS502)	CO1	Write relational algebra expressions and optimize the developed expressions for a given query.	Application	3
	CO2	Design the databases using E-R method and normalization for a given specification of the requirement.	Analysis	4
	CO3	Construct the SQL queries for open source and commercial DBMS -MYSQL, ORACLE, and DB2 for a given specification.	Synthesis	5
	CO4	Optimize its execution using query optimization algorithms for a given query	Evaluation	6
	CO5	Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.	Knowledge	1
	CO6	Implement the isolation property, including locking, time stamping based on concurrency control and serializability of scheduling.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ENVIRONMENTAL SCIENCE & SAFETY (MC-ES501)	CO1	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.	Knowledge	1
	CO2	Assess and demonstrate the importance of interdisciplinary nature of environmental and health risk assessment.	Analysis	4
	CO3	Identify environmental problems arising due to engineering and technological activities and the science behind those problems.	Evaluation	6
	CO4	Identify the major pollutants and devices for environmental management and sustainable development.	Evaluation	6
	CO5	Make aware of professional development, life-long learning, and current global and contemporary issues in environmental and safety assessment.	Comprehension	2
	CO6	Make aware of professionalism, ethics, and environmental laws and regulations.	Comprehension	2

46

Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
MEDICAL EQUIPMENTS AND SIMULATION LABORATORY (PC-BME591)	CO1	Demonstrate the working principle of different analytical and therapeutic devices.	Comprehension	3
	CO2	Make measurement, interpret the data and produce report technically.	Knowledge	1
	CO3	Evaluate the performance and carry out the periodic maintenance.	Evaluation	6
	CO4	Test and calibrate the equipment at par with standard protocol.	Application	3

47				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MEDICAL INSTRUMENTS & SYSTEM LABORATORY (PC-BME592)	CO1	Demonstrate the operation of versatile medical instruments and monitoring of medical parameters.	Knowledge	1
	CO2	Make measurement, interpret the data and produce report for clinical purposes.	Evaluation	6
	CO3	Select suitable monitoring instruments and evaluate the performance.	Analysis	4
	CO4	Plan and carry out maintenance and calibration of medical instruments.	Application	3
48				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MICROPROCEESOR & MICROCONTROLLER LABORATORY (OE-EI591)	CO1	Construct and apply the assembly level programming of microprocessor and microcontroller.	Knowledge	1
	CO2	Develop the programming logic and concept with the help of algorithm or flowchart.	Synthesis	5
	CO3	Troubleshoot assembly language program along with interactions between software and hardware.	Analysis	4
	CO4	Practice the interfacing of microprocessor with peripheral devices for various applications.	Application	3
49				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
VLSI & EMBEDDED SYSTEM LABORATORY (OE-EI592)	CO1	Generate any CMOS based circuit static as well as dynamic and simulate.	Synthesis	5
	CO2	Analyze transient and VTC response of different CMOS logic gates.	Analysis	4
	CO3	Evaluate the DRC and LVS of layout of different CMOS circuits.	Evaluation	6
	CO4	Write embedded code for communication, display data and interfacing.	Application	3
50				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DATA STRUCTURE & ALGORITHM LABORATORY (OE-CS591)	CO1	Implement concepts of linear and non-linear data structures.	Synthesis	5
	CO2	Analyze the concepts of static and dynamic data structure algorithms.	Analysis	4
	CO3	Apply different sorting and searching algorithms.	Application	3
	CO4	Evaluate time complexity of different data structure algorithms.	Evaluation	6
	CO5	Create data structure and algorithm for real world applications.	Knowledge	1
51				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DATA BASE MANAGEMENT SYSTEM LABORATORY (OE-CS592)	CO1	Design and implement a database schema for given problem.	Synthesis	5
	CO2	Populate and query a database using SQL DML/DDL commands.	Comprehension	2
	CO3	Programming PL/SQL including stored procedures, stored functions, cursors, packages.	Application	3
	CO4	Design and build a GUI application using a 4GL.	Synthesis	5

THIRD YEAR : 6TH SEMESTER				
52				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMEDICAL DIGITAL SIGNAL PROCESSING (PC-BME601)	CO1	Apply DFT for the analysis of digital signals and systems.	Knowledge	1
	CO2	Implement algorithms based on discrete time signals.	Application	3
	CO3	Apply appropriate signal processing techniques in analysing various bio-signals.	Application	3
	CO4	Design IIR and FIR filters for bio-signal processing.	Synthesis	5
	CO5	Explain and employ sampling and quantization procedures for digitally recording physiological data.	Comprehension	2
	CO6	Develop measurement systems for bio-signals and its signal conditioning circuits.	Synthesis	5
53				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMATERIALS & TISSUE ENGINEERING (PC-BME602)	CO1	Classify and select biomaterials for hard and soft tissue replacement.	Comprehension	2
	CO2	Characterize the complex host tissue-implant interaction and explain the probable causes of implant failure.	Knowledge	1
	CO3	Analyze the design of various implants and improve the functionality.	Analysis	4
	CO4	Evaluate the biocompatibility and toxicological screening of biomaterials.	Evaluation	6
	CO5	Explain the significance, current status and future potential of tissue engineering.	Knowledge	1
	CO6	Demonstrate the design, fabrication and biomaterials selection criteria for tissue engineering scaffolds.	Application	3
54				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMECHANICS & IMPLANTS (PC-BME603)	CO1	Apply knowledge of biomechanics to analyze the properties of biofluid, hard and soft tissues and identify the appropriate model to demonstrate mechanical behavior.	Application	3
	CO2	Analyze the biomechanics of different human joints and also forces for various static and dynamic human activities.	Analysis	4
	CO3	Demonstrate a detailed understanding of the design requirements of medical implants based on the human anatomy and biological responses to biomaterials.	Comprehension	2
	CO4	Interpret and explain the mode of operation of different artificial implants and its medical applications.	Knowledge	1
	CO5	Interpret technically to the quests of biomechanical team and formulate design specification.	Evaluation	6
	CO6	Perform a systematic qualitative biomechanical analysis of human movement activities or skills in sport, exercise, rehabilitation, work, and daily living.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ADVANCED MEDICAL IMAGING TECHNIQUES (PC-BME604)	CO1	Explain the underlying physics and mode of operation of CT, MRI and SPECT-PET system.	Knowledge	1
	CO2	Demonstrate the advanced imaging instruments and apply mathematical methods for image reconstruction.	Comprehension	2
	CO3	Justify the utility of advanced imaging system and explain the principles of working.	Knowledge	1
	CO4	Analyze and interpret the images for clinical purposes.	Analysis	4
	CO5	Compare and interpret the techniques used for visualizing various sections of the body.	Evaluation	6
	CO6	Plan and minimize the risks and health hazards.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
ARTIFICIAL ORGANS & REHABILITATION ENGINEERING (PE-BME601)	CO1	Explain the structure and role of artificial organs and rehabilitation devices for sustaining functions.	Knowledge	1
	CO2	Describe the expected functionalities of an artificial organ, orthotics and prosthesis.	Comprehension	2
	CO3	Test and apply different types of hearing and mobility aids for the benefit of the society.	Application	3
	CO4	Identify available technology and recognize the user needs and benefits.	Synthesis	5
	CO5	Prioritize in technological innovations for longer, healthier and more productive lives.	Analysis	4
	CO6	Design and develop various aids for physically challenged.	Application	3

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
LASER & FIBER OPTICS IN MEDICINE (PE-BME602)	CO1	Explain the principle of laser action and the characteristics of laser.	Knowledge	1
	CO2	Recognize and classify various types of laser and its mode of operation.	Analysis	4
	CO3	Relate various applications of lasers in medical field and apply appropriately.	Application	3
	CO4	Demonstrate the basic concepts of optical fibers and their properties.	Comprehension	2
	CO5	Illustrate the construction, working principle and selection criteria of optical fiber cables.	Analysis	4
	CO6	Propose and integrate lasers and optical fibers for diagnostic, therapeutic and imaging purposes.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
IOT & ARTIFICIAL INTELLIGENCE (PE-BME603)	CO1	Explain the concept of IoT and application areas of IoT.	Comprehension	2
	CO2	Analyze various protocols for IoT.	analysis	4
	CO3	Design a PoC of an IoT system using Rasperry Pi/Arduino.	Synthesis	5
	CO4	Apply IoT in industrial and commercial automation and real world design constraints.	Application	3
	CO5	Demonstrate fundamental understanding of AI and its foundations.	Knowledge	1
	CO6	Apply basic principles of AI for problem solving, inference, perception and knowledge representation.	Application	3

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
OBJECT ORIENTED PROGRAMMING (OE-CS601)	CO1	Differentiate between procedural oriented programming and object oriented programming.	Knowledge	1
	CO2	Specify simple abstract data types and design implementations, using abstraction functions to document them.	Application	3
	CO3	Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.	Evaluation	6
	CO4	Design applications with an event-driven graphical user interface.	Synthesis	5
	CO5	Design, write and apply straightforward programs using the knowledge of object oriented programming.	Synthesis	5
	CO6	Analyze the complex problems and provide awareness of the need for a professional approach to design and the importance of good documentation to the finished programs.	Analysis	4

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
COMPUTER NETWORK (OE-CS602)	CO1	Explain the functions of the different layer of the OSI protocol.	Comprehension	2
	CO2	Draw the functional block diagram for different networks and describe the function of each block.	Application	3
	CO3	Design and implement small scale networks for a given specifications.	Synthesis	5
	CO4	Develop network programing for a given TCP/IP related problems.	Synthesis	5
	CO5	Configure application layer protocols using open source available software and tools.	Analysis	4
	CO6	Describe, analyze and evaluate various technical, administrative and social aspects of specific computer network protocols.	Evaluation	6

61				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
SOFTWARE ENGINEERING (OE-CS603)	CO1	Identify, formulate and solve software engineering problems, including the specification, design, implementation, and testing of software systems.	Knowledge	1
	CO2	Analyze and specify software requirements through a productive working relationship with various stakeholders of a software development project.	Analysis	4
	CO3	Elicit professional, ethical and social responsibility of a software engineer.	Comprehension	2
	CO4	Participate in design, development, deployment and maintenance of a medium scale software development project.	Synthesis	5
	CO5	Use unified modelling language in software specification documents.	Application	3
	CO6	Evaluate the impact of potential solutions to software engineering problems in a global society, using the knowledge of contemporary issues and emerging software engineering trends, models, tools, and techniques.	Evaluation	6
62				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMEDICAL DIGITAL SIGNAL PROCESSING ABORATORY (PC-BME691)	CO1	Perform basic signal processing operations and implement various DSP systems.	Knowledge	1
	CO2	Design and implement digital filters for biosignal processing.	Evaluation	6
	CO3	Program the digital signal processing algorithm using software.	Synthesis	5
	CO4	Analyze biosignals and perform computation depending on the application.	Analysis	4
63				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMATERIALS & BIOMECHANICS LABORATORY (PC-BME692)	CO1	Measure and evaluate the mechanical characteristics and compatibility properties of biomaterials and implants.	Knowledge	1
	CO2	Perform dynamics analysis and interpret force and momentum for a recorded motion.	Application	3
	CO3	Analyze and interpret the forces at a skeletal joint for various static and dynamic human activities.	Analysis	4
	CO4	Evaluate the stresses and strains in biological tissues for a given the loading conditions and material properties.	Evaluation	6
64				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
OBJECT ORIENTED PROGRAMMING LABORATORY (OE-CS691)	CO1	Writes, compile, test and execute straightforward programs using the knowledge of object oriented programming.	Knowledge	1
	CO2	Implement features of object oriented programming to solve real world problems.	Synthesis	5
	CO3	Apply the major object-oriented concepts to implement object oriented programs.	Application	3
	CO4	Design, develop and troubleshoot software based on object oriented programming methodologies.	Analysis	4

65				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
COMPUTER NETWORK LABORATORY (OE-CS692)	CO1	Identify and use various networking components and commands.	Analysis	4
	CO2	Install a network system consists of various computers using NIC, networking cables, connector, hubs and switches.	Knowledge	1
	CO3	Implement networking in software using various socket programming and various networking protocols.	Synthesis	5
	CO4	Anticipate software and hardware technologies used on computer networks and implements device sharing on network.	Evaluation	6
66				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
SOFTWARE ENGINEERING LABORATORY (OE-CS693)	CO1	Apply modern software methodologies to the needs of the dynamic global computing-based society.	Application	3
	CO2	Ensure the quality of software through software development with various protocol based environment.	Synthesis	5
	CO3	Convert the requirements model into the design model and demonstrate use of software and user interface design principles.	Knowledge	1
	CO4	Generate team and organizational leadership in computing project settings and application of computing-based solutions to societal and organizational problems.	Analysis	4
67				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
GROUP DISCUSSION & SEMINAR (HM-HU681)	CO1	Improve oral, written and technical communication skills.	Knowledge	1
	CO2	Communicate with other health professionals in a respectful and responsible manner.	Comprehension	2
	CO3	Participate in any interactive session and succeed in competitive examinations.	Evaluation	6
	CO4	Formulate strategies for audience-centric visual presentations with concrete professional objectives.	Synthesis	5
FOURTH YEAR : 7TH SEMESTER				
68				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
PRINCIPLES OF MANAGEMET & ORGANIZATION BEHAVIOUR (HM-HU701)	CO1	Recognize the fundamentals of management thoughts that are vital for the development of conceptual framework of management as a discipline.	Application	3
	CO2	Demonstrate knowledge of organizational structure, organizational conflict, negotiation, politics and change.	Comprehension	2
	CO3	Apply the principles of decision making through planning, organizing, directing and controlling.	Application	3
	CO4	Implement effective communication skills to handle group behavior and monitor	Synthesis	5

		human resources through effective leadership.		
	CO5	Relate knowledge of ethics in the context of corporate social responsibility and advertising, brand management and product positioning across cultural diversities.	Evaluation	6
	CO6	Createacongenialandcohesiveambiencewithintheframeworkoforganizationalstructurein achieving the organizational goals.	Analysis	4
69				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MEDICAL IMAGE PROCESSIONG (PC-BME701)	CO1	Demonstrate the concepts and techniques in digital image processing.	Knowledge	1
	CO2	Analyze the performance of various medical image processing techniques.	Analysis	4
	CO3	Perform image compression using lossy and lossless techniques.	Evaluation	6
	CO4	Implement image enhancement techniques in spatial and frequency domain.	Comprehension	2
	CO5	Perform image segmentation and image restoration.	Analysis	4
	CO6	Design and implement algorithm(s) for medical image processing applications.	Evaluation	6
70				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
HOSPITAL ENINGEERING & MANAGEMENT (PE-BME701)	CO1	Classify hospitals, different units and their functions in hospital.	Knowledge	1
	CO2	Demonstrate knowledge of strategic planning and decision making in the healthcare.	Comprehension	2
	CO3	Assess and prioritize various medical and engineering services in hospital.	Evaluation	6
	CO4	Implement information system for effective and improved healthcare delivery.	Application	3
	CO5	Apply skills for improving safety and the quality of care in hospital.	Application	3
	CO6	Practice professional ethics and legal issues in hospital engineering and healthcare system management.	Synthesis	5
71				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
HOSPITAL SAFETY & MANAGEMENT (PE-BME 702)	CO1	Demonstrate the types of hazards, planning, organization and training needed to work safely with hazardous materials.	Application	3
	CO2	Recognize and evaluate safety and health hazards and select appropriate control methodologies based on the hierarchy of controls.	Synthesis	5
	CO3	Utilize regulatory standards as a guide to apply policies, procedures, standards and occupational safety and health principles.	Comprehension	2
	CO4	Design, implement and monitor quality and safety initiatives in the health services.	Application	3
	CO5	Practice due diligence and employ managerial responsibility in creating and maintaining a culture of regulatory compliance in healthcare, including the management of accreditation processes.	Knowledge	1
	CO6	Evaluate and apply quality, safety and management competencies to improve and assure healthcare standards.	Evaluation	6

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
SPORTS MANAGEMENT (PE-BME703)	CO1	Apply concepts, skills and techniques necessary for improving sports activities.	Application	3
	CO2	Demonstrate mechanical, biological and physiological implications involved in sports.	Knowledge	1
	CO3	Correlate physical conditioning for the prevention of injuries and counsel mental health.	Application	3
	CO4	Diagnose and evaluate injuries using suitable methods and techniques.	Evaluation	6
	CO5	Propose appropriate therapeutic modalities for rehabilitation of injuries.	Synthesis	5
	CO6	Integrate other professionals within the allied health profession and medical field.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
BIOLOGICAL CONTROL SYSTEMS & MODELLING (OE-BME701)	CO1	Demonstrate the regulation and control mechanism of various physiological process / biological systems.	Comprehension	2
	CO2	Simulates and analyze physiological systems in time and frequency domain and to understand the concept of system stability.	Evaluation	6
	CO3	Interpret the biological significance of linear and nonlinear control systems.	Analysis	4
	CO4	Apply principles of mathematical modelling in understanding the various biological systems.	Application	3
	CO5	Formulate methods and techniques for analysis and synthesis of dynamic models.	Synthesis	5
	CO6	Create mathematical and computational models in the analysis of physiological process/biological systems as well as implement and evaluate it to meet desired needs in healthcare.	Synthesis	5

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Course Name with Code	On completion of the course, the students will be able to:		Bloom's Taxonomy(BT)	BT LEVEL
BIOMEDICAL MEMS & NANOTECHNOLOGY (OE-BME702)	CO1	Demonstrate the working principles of MEMS and Microsystem and their application in medical field.	Knowledge	1
	CO2	Explain and evaluate various MEMS fabrication techniques.	Evaluation	6
	CO3	Design and develop miniaturized biomedical sensors and BioMEMS for practical applications.	Synthesis	5
	CO4	Demonstrate a detailed understanding of the fundamental principles of nanotechnology and their application to biomedical engineering.	Comprehension	2
	CO5	Analyse nano sensors and nano devices for diagnostics and therapeutic purposes.	Analysis	4
	CO6	Apply knowledge of nano technology to identify how they can be exploited for new applications.	Application	3

75				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MEDICAL ROBOTICS & AUTOMATION (OE-BME703)	CO1	Demonstrate the state of the art medical robots and their operational workspace characteristics.	Knowledge	1
	CO2	Select and identify suitable automation hardware for given application.	Comprehension	2
	CO3	Analyze and design the motion for articulated systems.	Analysis	4
	CO4	Identify and describe different types of medical robots and their potential applications.	Evaluation	6
	CO5	Simulate the basic concepts in kinematics, dynamics and control relevant to medical robotics.	Synthesis	5
	CO6	Design and implement robotic assistance for both minimally invasive surgery and image-guided interventions.	Synthesis	5
76				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
INDIAN CONSTITUTION (MC-HU701)	CO1	Describe the features of Indian Constitution.	Knowledge	1
	CO2	Describe the power and functioning of union, state and local self-government.	Comprehension	2
	CO3	Workings of the various legislative, executive and judicial bodies in the country.	Application	3
	CO4	Appreciate the democratic workings at the grassroots level.	Evaluation	6
	CO5	Illustrate the jurisdiction and procedures of Indian Courts.	Comprehension	2
	CO6	Identify authority to redress a problem in the profession and in the society.	Analysis	4
77				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
MEDICAL IMAGE PROCESSING LABORATORY (PC-BME791)	CO1	Employ image processing and analysis techniques appropriate to medical imaging.	Analysis	4
	CO2	Perform different operations to improve the quality of medical images.	Synthesis	5
	CO3	Design and implement algorithm(s) for a medical image processing application.	Evaluation	6
	CO4	Apply image processing technique to solve real health care problems.	Application	3
78				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
INDUSTRIAL / HOSPITAL TRAINING EVALUATION (PROJ-BME792)	CO1	Communicate with other health professionals and practice professional ethics and legal issues in workplace.	Comprehension	2
	CO2	Recognize the importance of inter-professional collaboration in healthcare.	Knowledge	1
	CO3	Analyze real-time problems and advocate an appropriate problem solving methodology.	Analysis	4
	CO4	Propose a patient-centre inter-professional health improvement plan based upon the patient's perceived needs.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
PROJECT-I (PROJ-BME793)	CO1	Express the technical ideas, strategies and methodologies.	Knowledge	1
	CO2	Convert ideas of interest into a conceptual model.	Evaluation	6
	CO3	Work in a group in a collaborative and productive manner.	Synthesis	5
	CO4	Prepare technical report and present the oral demonstrations.	Evaluation	6
FOURTH YEAR : 8TH SEMESTER				
80				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
HOME MEDICARE TECHNOLOGY (PE-BME801)	CO1	Demonstrate the understanding about basics of home medicare system.	Knowledge	1
	CO2	Identify the critical elements for providing effective integrated health care at home.	Comprehension	2
	CO3	Evaluate home medicare devices and their clinical applications.	Evaluation	6
	CO4	Illustrate the various aspects that influence safety, quality and effective home medicare.	Synthesis	5
	CO5	Anticipate advances in healthcare technologies and wireless technology related to healthcare system.	Analysis	4
	CO6	Plan and design cost effective quality home care devices with proper patent safety.	Evaluation	6
81				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOMEDICAL HAZARDS & SAFETY (PE-BME802)	CO1	Demonstrate the types of hazards, planning, organization and training needed to work safely with hazardous materials.	Knowledge	1
	CO2	Explain the different types of hazardous exposure and its biological effects, exposure guidelines and basic workplace monitoring.	Knowledge	1
	CO3	Analyze various hazards, infection, accidents and its control.	Analysis	4
	CO4	Categorize biowastes and design efficient waste disposal procedures.	Evaluation	6
	CO5	Design different safety facility and control measures in hospitals.	Synthesis	5
	CO6	Propose and adopt mandatory regulations and safety norms for improving healthcare delivery.	Comprehension	2
82				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
BIOINFORMATICS & EXPERT SYSTEM (PE-BME803)	CO1	Demonstrate the most important bioinformatics databases, perform text and sequence-based searches, and analyze the results.	Knowledge	1
	CO2	Carry out gene and protein expression patterns and modeling cellular interactions and processes.	Comprehension	2
	CO3	Apply bioinformatics and biological databases to solve in real research problems.	Application	3

	CO4	Choose biological data, submission and retrieval it from databases and design databases to store the information.	Analysis	4
	CO5	Illustrate the impact of bioinformatics in a global, economic, environmental, and societal context.	Evaluation	6
	CO6	Design and develop expert system for real world problems.	Synthesis	5
83				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
QUALITY CONTROL & REGULATORY ASPECTS OF MEDICAL DEVICES (OE-BME801)	CO1	Examine the broad scope of the medical device industry and its quality assurance practices.	Analysis	4
	CO2	Explain the basics of medical devices and process of development.	Knowledge	1
	CO3	Demonstrate the regulatory requirements for approval of medical devices.	Evaluation	6
	CO4	Harmonize the initiatives for quality and ethical considerations for medical devices.	Analysis	4
	CO5	Conduct clinical evaluation and investigation for medical devices.	Evaluation	6
	CO6	Propose procedures for approval and marketing of medical devices.	Synthesis	5
84				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DESIGN CONCEPT & MAINTENANCE OF BIOMEDICAL INSTRUMENTS (OE-BME802)	CO1	Perform needs finding and generate design requirements for medical instruments.	Application	3
	CO2	Utilize fundamental design principles, machine elements, manufacturing and assembly techniques.	Evaluation	6
	CO3	Perform risk assessment for prototyping and countermeasure development.	Application	3
	CO4	Appreciate the need for grounding aspects, maintenance and troubleshooting.	Comprehension	2
	CO5	Identify the reasons for equipment failure and formulate solution.	Analysis	4
	CO6	Conduct investigation and analyse the data sheets for performance measurement of biomedical instruments.	Analysis	4
85				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
VIRTUAL INSTRUMENTATION DESIGN FOR MEDICAL SYSTEM (OE-BME803)	CO1	Explain applications of mathematical modelling for designing virtual instrument.	Knowledge	1
	CO2	Relate fundamental physiological properties with virtual biomedical instruments.	Comprehension	2
	CO3	Demonstrate advanced analysis capabilities that explore potential research topics.	Application	3
	CO4	Demonstrate clinical utilization of virtual biomedical instrumentation.	Application	3
	CO5	Categorise functions related to medical device development and tests.	Analysis	4
	CO6	Design and implement data acquisition system with PC interfacing.	Synthesis	5

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Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
DESIGN LAB / INDUSTRIAL PROBLEM RELATED PRACTICAL TRAINING (PROJ-BME891)	CO1	Develop a model or simulation or prototype using industry best practices and tools.	Synthesis	5
	CO2	Design a medical electronic circuits starting with a given specifications.	Synthesis	5
	CO3	Solve a specific problem right from its identification till the successful solution of the same.	Analysis	4
	CO4	Formulate a real world problem, identify the requirement and develop the design solutions.	Analysis	4
87				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
PROJECT-II (PROJ-BME892)	CO1	Prepare a comprehensive technical project report and communicate with engineers and the community at large.	Synthesis	5
	CO2	Utilize the new tools, algorithms, techniques that contribute to obtain the solution of the project.	Synthesis	5
	CO3	Test and validate through conformance of the developed prototype and analysis the cost effectiveness.	Analysis	4
	CO4	Work independently as well as in teams and manage a project from start to finish.	Application	3
88				
Course Name with Code	**On completion of the course, the students will be able to:**		**Bloom's Taxonomy(BT)**	**BT LEVEL**
GRAND VIVA-VOCE (BME881)	CO1	Explore their field of knowledge, which includes a critical awareness of current problems and/or new insights at the forefront of that field.	Knowledge	1
	CO2	Demonstrate confidence and versatility in answering the varieties of questions posed by a group of faculty members in a moderately short duration.	Analysis	4
	CO3	Demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level.	Application	3
	CO4	Demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques professional enquiries are used to create and interpret knowledge in their discipline.	Application	3