## I Year- 2015 SCHEME

Course Code	Course Name	Course Outcomes-On completion of this
		course the students will be
		CO1: Solve the problems on nth derivatives of the
		functions, angle between radius
		CO2: Find Taylor's and Maclaurin's series of the
		functions, and to apply L'Hospital rule to evaluate
		the limits and to solve the problems on Partial
		differentiation.
	Engineering	CO3: Find the velocity, acceleration, gradient, curl,
15MAT11	Mathematics-I	divergence and able to prove the vector identities.
	With the state of	CO4: Evaluate the integrals involving <i>Sin</i> <sup>n</sup> x, <i>Cos</i> <sup>n</sup> x,
		$Sin^n x Cos^n x$ between the limits 0 to $\pi/2$ .
		CO5: Solve the ordinary differential equations of
		first order and first degree.
		CO6: Solve the system of equations, to find the Eigen
		value and Eigen vector of a matrix and reducing
		quadratic form to canonical form.
		CO1: Gain the knowledge about fundamentals of
		Modern Physics and Quantum
		CO2: Discriminate the conductivity of conductors,
		semiconductors and super conductors based on
		Quantum theory.
		CO3: Impart the knowledge about the basic principles
		and classification of Laser and Optical
		fibres, their uses in various fields.
	<b>Engineering</b>	CO4: Differentiate the crystal systems, properties and
15PHY12/22	Physics	crystal structure using XRD
		CO5: Discuss the formation of Shock waves and
		change in flow properties across it and its uses.
		CO6: Know the processing and characterization of
		Nano materials, their properties and applications.
		CO1: Mention the applications of various fields of
		Civil Engineering.
		CO2: Compute the resultant of given force system
	Elamord f -! 'l	subjected to various loads.
15011112122	Elements of civil	CO3: Comprehend the action of Forces, Moments and
15CIV13/23	engineering and	other loads on systems of rigid bodies and compute the
	mechanics	reactive forces that develop as a result of the external
		loads.
		CO4: Locate the Centroid and compute the
		Moment of Inertia of regular and built-up sections.

		CO5: Express the relationship between the motions of
		bodies and analyze the bodies in motion.
		I
		CO6: Apply the concepts of kinetics and kinematics,
		to understand about curvilinear and rectilinear
		motion and to analyze the various problems based on
		these.
		CO1. Explain different sources of energy and its
		conversion
		CO2. Explain the conversion of energy by prime
		movers.
	Elements Of	CO3. Explain the different machine tool
	Mechanical	operations and basics of Robotics and
15EME14/24		Automation.
	Engineering	CO4. Explain basic engineering materials
		and identify its application.
		CO5. Explain the working principle of refrigeration
		and air conditioning.
		CO1: To predict the behavior of electrical and
		magnetic circuits.
		CO2: Select the type of generator / motor required for
	Basic Electrical Engineering	a particular application.
1 FDT D1 F /0 F		CO3: Realize the requirement of transformers in
15ELE15/25		transmission and distribution of electric power and
		other applications.
		CO4: Practice Electrical Safety Rules & standards.
		CO1: Demonstrate the use of fitting tools to make
		models.
	Work Shop Practice	CO2: Demonstrate the use of sheet metals tools to
15WSL16/26		make models.
	Tractice	CO3: Demonstrate the use of Welding tools to make
		models.
		CO1: Formulate, Conduct and inference of the
		Engineering physics experiments.
		CO2: Characterize the semiconducting materials.
		CO3: Determine the physical parameters in optical
	Engineering	experiments.
15PHYL17/27	Physics Lab	1
		CO4: Find mechanical properties of materials.
		CO5: Identify and verify the passive electronic
		components CO1: Solve linear and nonlinear ordinary
	Engineering	j
15MAT21	<b>Mathematics-</b>	differential equations.
	II	CO2: Form/solve the Partial differential equations.
		CO3: Evaluate the double and triple integrals.

		CO4: Derive Beta and Gamma functions and its properties. CO5: Find the Laplace Transforms and inverse Lapla transforms of the functions and to solve initial a boundary value problems.
15CHE12/22	Engineering Chemistry	CO1: Electrochemical and concentration cells. Classical & modern batteries and fuel cells. CO2: Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. by electroplating and electro less plating. CO3: Production & consumption of energy for industrialization of country and living standards of people. Utilization of solar energy for different useful forms of energy. CO4: Replacement of conventional materials by polymers for various applications. CO5: Boiler troubles and applies sewage treatment and desalination of sea water, and over viewing of synthesis, properties and applications of nanomaterials.
15PCD13/23	Programming in C and Data structures	CO1: Understand the concepts of C programming CO2: Understand basic programming skills using looping and branching techniques CO3: Understanding and to illustrate the usage of functions and arrays in programming CO4: Get familiarized with the concepts of files and structures CO5: Illustrate the usage of pointers and data structures
15CED14/24	Computer Aided Engineering Drawing	CO1.Demonstrate the usage of CAD software CO2.Draw orthographic projections of points, lines, planes and solids. CO3.Generate the development of lateral surfaces of solids and isometric projections of solids
15ELN15/25	Basic Electronics	CO1: Appreciate the significance of electronics in different applications CO2:Understand the applications of diode in rectifiers, filter circuits and wave shaping, apply the concept of diode in rectifiers, filters circuits CO3:Design simple circuits like amplifiers (inverting

	and non-inventing) someonatons addons
	and non inverting), comparators, adders,
	integrator and differentiator using OPAMPS
	CO4: Compile the different building
	blocksin digital electronics using logic gates and
	implement simple logic function using basic
	universal gates.
	CO5: Understand the functioning of a
	communication system, and different
	CO6: Understand the basic principles of different
	types of Transducers.
	CO1: Draw flowcharts and write Algorithms
	CO2: Design and develop C problem solving skills
Computer	CO3: Trace and debug a program
Programmin	CO4: Write C programs using functions and arrays
g Laboratory	CO5: Use concepts of pointers, structures and files to
	write C programs
	CO1: Analyze m hardness of water and quality o
	cement.
	CO2: Analyze copper and iron metal from its alloy and
	ore.
<b>Engineering</b>	CO3: Analyze waste water and alkalinity of the water.
<b>Chemistry Lab</b>	CO4: Estimate the strength and concentration of
Ţ	acids.
	CO5: Measure the viscosity coefficient of organic
	liquids.
	g Laboratory  Engineering

## II Year- 2015 SCHEME

Course Code	Course Name	Course Outcomes-On completion of this course the students will be	
15BT31	CO1: Use of periodic signals and Fourier series analyze circuits. CO2: Explain the general linear system the continuous- time signals and systems using the Transform. CO3: Analyze discrete-time systems using convolute the z- transform. CO4: Use appropriate numerical methods to solve a and transcendental equations and also to calculate a integral CO5: Use curl and divergence of a vector furthree dimensions, as well as apply the Green's T Divergence Theorem and Stokes' theorem in applications CO6: Solve the simple problem of the calculus of variations		
15BT32	Unit Operations	CO1: Explain the Rheological behavior of fluids. CO2: Explain the principle of flow measuring instrument and analyze the application of Bernoulli equation. CO3: Describe the principles of various unit operations lik size reduction, sedimentation, filteration and mixing. CO4: Comprehend the heat governing laws and explain th working heat transfer equipments. CO5: Analyse the various mass transfer operations.	
15BT33	Biochemistry	CO1: Understand the basic types of chemical reactions and biomolecules CO2: Understand and analyze high energy molecules and Photosynthesis CO3: Understand about transport mechanism across the cell membrane and analyse its regulation CO4: Understand the basic metabolic pathways of CHO, Lipids, amino acid and nucleic acids and analyse their regulations	
15BT34	Microbiology	CO 01:Know about biomolecules CO 02:Understanding basic metabolic pathways CO 03: Understand metabolic regulations	
15BT35	Cell biology & Genetics	CO1: To gather a contemporary knowledge of cytoskeletons. CO2: To be able to understand cell structure and function. CO3:students will be able to understand genetics and population genetics. CO4: Gather knowledge on basis of inherited disorders.	

15BT36	Basics of computer application	CO1: Understand C- language with updated tool CO2: Apply the basic concepts of MATLAB, Internet. CO3:Use the software with special reference to biotechnological applications	
15BTL37	Unit Operation Laboratory	CO1. Able to apply the basic principles of fluid mechanics and to analyse the flow measurement instruments. CO2. Ability to analyze fluid flow problems with the application of the momentum and energy equations CO3. Able to assess principles of sedimentation, filtration and mass transfer operations through experiments. CO4. Students will learn about the diffusional mass transfer.	
15BTL38	Microbiological Lab	CO1:Able to use different Microbiological Lab equipments like autoclave, incubators, LAF, microscopes, oven etc. CO2: Able to prepare the media and use for the cultivation of the microorganisms CO3: Able to perform laboratory experiments for the isolation ,identification and characterization of microorganisms CO4: Able to carry out experiments for the enumeration and staining.	
15BT41	BioStatistics & Bio modeling	CO1: Fit a suitable curve for the tabulated data by the method of least squares, find correlation coefficients and analyze CO2: Apply different types of tests to test the hypothesis relating to small samples. CO3: Appreciate the concepts of probability, distributions and various stochastic processes. CO4: Perform modeling and simulations experiments for select biological processes using appropriate data. CO5: Study the importance of modeling and simulations for biological problems.	
15BT42	Biochemical Thermodynamic s	Lehemical reactions	
15BT43	Molecular Biology	CO 01: Explain replication, transcription and translation processes with underlying differences in prokaryotic and eukaryotic systems.	

		CO 02: Elaborate importance of genetic recombination with special reference to bacterial system. CO 03: Outline DNA damage and repair mechanisms	
Bioprocess Principles and Calculations		CO1: Discuss the significance of material and energy balance for bioprocess technology. CO2: Solve problems related to material and energy balance to give solutions for bioprocess development. CO3 Develop the flow-sheet for general processes operating in bioprocess industry. CO4: Appreciate the stoichiometry of microbial growth and product formation involved in bioprocess technology	
15BT45	Structural Biology	CO1: Present the foundational principles of macromolecular structure and function. CO2: Apply diverse techniques that enable the elucidation of molecular structure, their organization, stability, associations and functionalities.	
15BT46	Clinical Biochemistry	CO1: Discuss the biochemistry and pathophysiology associated with various disorders of metabolism and inborn errors of metabolism.  CO2: Assess the clinical manifestations of renal, hepatic, pancreatic, gastric and intestinal functions and elevation of enzymes.  CO3:Assess the clinical manifestations associated to hormonal disturbances  CO4:Discuss the medical problems associated with blood and mechanism of detoxification in body	
15BTL47	Cell and Molecular Biology Laboratory	CO 01:To be able to understand the mitotic and meiotic cell divisions CO 02: To be able to carry out somatic cell fusion; CO 03: To separate DNA and run various fragments through electrophoresis	
15BTL48	Clinical Biochemistry lab	CO1: Know about biomolecules with special reference to physiological samples. CO2: Determine the levels of metallic ions, fats and oils and other biomolecules	

## III Year- 2015 SCHEME

Course Code	Course Name	Course Outcomes-On completion of this course the students will be
15BT51	Biokinetics and Bioreaction Engineering	CO1: Discuss about the different models of chemical reactions and various factors affecting to the reaction rate.  CO2: Design of performance equations for the different reactor  CO3: To study the performance and distinguish between the different types of ideal and non ideal reactors  CO4: To determine enzyme activity, To study the fundamentals of Microbial growth kinetics and its stoichiometry  CO5: To describe medium requirements and medium formulation for the optimal bio process
15BT52	Genetic Engineering	CO1:Explain & compare the different vectors & enzymes used in the construction of recombinant DNA in Genetic engineering CO2:Choose & explain specific techniques like PCR, Blotting & construction of libraries CO3:Differentiate between & learn the different gene/DNA transfer techniques CO4:Outline the various methods of producing transgenic organisms CO5:Summarize the applications of genetic engineering for the welfare of mankind & society
15BT53	Immunotechnology	CO1: Outline the molecular and cellular mechanisms involved in the development and regulation of the immune response.  CO2: Describe the cause, challenges and treatment of Immune System Pathologies and Dysfunctions  CO3: Apply the major immunological laboratory techniques and their applications to both clinical analysis and experimental research.
15BT54	Bioinformatics	CO 01: Know the relevant online resources, databases and software tools CO 02: Understand the underlying concepts of Bioinformatics CO 03: Apply alignment and modelling tools CO 04:Analyse biological data using phylogenetic,

		predictive and comparative methods CO 05: Design in silico various biomolecules
15BT553	Animal Biotechnology	CO1: Explain the basic principles and techniques in genetic engineering, gene transfer techniques for animals and animal cell lines. CO:2 Gain knowledege about the recent advances in animal breeding. CO3: Explain the contribution 'Functional genomics' is making and is likely to make in animal biotechnology now and in future. CO4: Appraise the role of biotechnology in animal science for sustainable eco-system and human welfare.
15BTL563	Biotechnology for Sustainable Environment	CO 1: Apply reasoning to identify the components of environmental eco systems and effect of pollutant on environment.  CO2: Characterize the various parameters of water, waste water and solid waste from their sources to provide valid conclusions.  CO3: Understand the impact of recovery, recycle of the useful resources from wastes by adopting advanced techniques to demonstrate the need for sustainable development.  CO4: Identify and Demonstrate the knowledege to use suitable equipment for abatement and control of air and noise pollution.
15BTL57	Genetic Engineering and Immunotechnology laboratory	CO1: To experimentally verify various theoretical concepts of Immunodiagnostic techniques like agglutination, precepitation, immunoelectrophoresis, qualitative analysis, ELISA, seperation of lymphocytes and immunoblot. CO2: To plan and interpret the various genetic engineering techniques for the isolation of NA, quantification, purity check, amplification and gene cloning. CO3: To apply and infer these techniques in research.
15BTL58	Bioinformatics Laboratory	CO1:Understand fundamental concepts of bioinformatics CO2: Apply online resource tools solve sequence alignment problems CO3: Design primers and peptide sequences
		CO1 :Identify potential entrepreneurship opportunity in biotechnology CO2:Effectively plan a project with a work plan, budget

15BT61	Bio-business and entrepreneurs hip	and schedule CO3:Assess the government strategies and schemes for startups CO4: Understand the concepts of bioethics, biosafety and Regulatory norms
15BT62	Bioprocess control and automation	CO1: Understand the basics of process dynamics principles and instrumentation CO2: Study various types of input functions and its response for first order systems CO3: Study various types of input functions and its response for second order systems CO4: Perform computational modelling to study different types of controllers CO5: Analyse different control algorithms
15BT63	Enzyme technology & biotransformation	CO1: Discuss the biochemistry and pathophysiology associated with various disorders of metabolism and inborn errors of metabolism.  CO2: Assess the clinical manifestations of renal, hepatic, pancreatic, gastric and intestinal functions and elevation of isoenzymes.  CO3: Assess the clinical manifestations associated to hormonal disturbances  CO 04: Describe the medical problems associated with blood and mechanism of detoxification in body
15BT64	Bioprocess equipment design & CAED	CO1. Know the different components of the heat exchangers and their working. CO2. Do detailed design and drawing of DPHE, STHE and condenser. CO3. Know the function of Fermenter and Packed bed distillation column. CO4.Design and draw the Fermenter, Packed column distillation using software (solid edge).
15BT65	Cell Culture Techniques	CO1: Differentiate between the various sources of cells to be used in cell culture techniques CO2: Correlate between different biological samples and understand the importance of different media in tissue culture CO3: Comprehend the applications of plant, animal and microbial cell culture in industry, healthcare and environment.
15BT662	Nanobiotechnology	CO1:Able to defind nano-biotechnology as an emerging field and its scope CO2: Able to understand the principles and applications

		of the technology in various fields
15BTL67		CO1- Classify automatic process control systems and solve problems related to Laplace Transform. CO2- Deduce transfer function for various systems as well as analyze and interpret the responses.
	Bioprocess control & automation laboratory	CO3- Comprehend the working principle of various controllers, final control elements and solve related problems.
		CO4- Analyze the stability of system using different tools and techniques.
		CO5- Measure and control the various physical parameters using controllers.
15BTL68	Biokinetics and Enzyme technology laboratory	CO1: State and define the nature of the reaction, rate of the reaction, rate constant and enzyme activity. CO2: Compare the rate of reaction for different reactors; know the ethical responsibilities that come with conducting experiments and communicating data. CO 3: Use the design equations for predicting the reactor performance. CO4: Compose the RTD data to identify non idealitites in different reactor configuration

## **IV Year- 2015 SCHEME**

Course Code	Course Name	Course Outcomes-On completion of this course the students will be
15BT71	Fermentation technology	CO1: Describe the factors affecting secondary metabolite production and its industrial importance.  CO2: Describe the importance, basic requirements of downstream processing for biochemical product recovery and summarize the effect of change in unit's operations on the process.  CO3:Illustrate how emerging technologies would benefit the bio chemical product recovery and show the likely benefits it would have over the traditional operations  CO4: Analyzing product recovery techniques for high-purity protein production.
15BT72	Genomics & proteomics	CO1: Students are able to understand genome database & genome project. CO2: To gather knowledge about genomics and genome management. CO3: Able to understand structural genomics and genome analysis. CO4: Able to understand proteomics and proteome analysis.
15BT73	Plant biotechnology	CO-1: State the basic concepts of plant tissue culture and their applications, media preparation, tools of genetic engineering in producing transgenic plants (For eg., disease resistant) CO-2: State the applications of plant genetic engineering in production transgenic plants to with stand abiotic and biotic stress and discuss ethical and social issues regarding genetically-modified crops CO-3: Describe the role, importance & CO-3: Describe the role, importance amp; applications of tissue culture in molecular farming CO-4: Explain the mechanism of signal transduction and nitrogen fixation in plants CO-5: Acquaint with principles, technical requirement, scientific and commercial applications in algal technologies with suitable examples

15BT743	Lab to industrial scaling	CO1: Understand the basic concepts of fermentation, fermentation as a biochemical process, types of fermentation & fermentation products with process parameters & economics of fermentation CO2: Understand the use of medium raw materials, explain the methods of sterilization, optimization, inoculum preparation, CO3: Understand the fermenter design, aeration & agitation CO4: Understand the process parameters & economics of fermentation. CO5: Describe the upstream & downstream processes used in fermentation industry
15BT752	Forensic sciences	CO1: Learn about forensic science as a field of study, discuss about history and development, role and responsibilities of forensic scientist CO2: Analysis of physical evidence, biological evidence, firearm evidence, and evidence examination CO3: Investigation, collection and packing of evidence and legal guidelines CO4: Learn about ethics in forensic science and ethical dilemmas, Application of computers in forensic science CO5: Characterization of the evidence and interpretation of the crime scenes
15BTL77	Fermentation laboratory	CO1: Know about Product enrichment operation using different methods. CO2: Able to Estimate level of secondary metabolites production in fermented broth CO3: Able to identify and characterize protein.
15BTL78	Plant biotechnology laboratory	CO-1: State the basic concepts of plant tissue culture and their applications, media preparation, tools of genetic engineering in producing transgenic plants (For eg., disease resistant) CO-2: State the applications of plant genetic engineering in production transgenic plants to with stand abiotic and biotic stress and discuss ethical and social issues regarding genetically-modified crops CO-3: Describe the role, importance & Eamp; applications

		of tissue culture in molecular farming CO-4: Explain the mechanism of signal transduction and nitrogen fixation in plants CO-5: Acquaint with principles, technical requirement, scientific and commercial applications in algal technologies with suitable examples
15BT81	Clinical & Pharmaceutical Biotechnology	CO 01: Explain the significance of pharmaco-kinetic models, pharmaco-dynamic principles, various dosage forms and formulation CO 02: Understand the specific techniques used in biotherapy & clinical Biotechnology CO 03: Comprehend specific applications of pharmaceutical & clinical Biotechnology
15BT82	Regulatory affairs in Biotech Industry	CO 01: Outline the importance of the quality and compliance in the biotech industry CO 02: Comprehend the various regulatory guidelines and rules as well as the organizations governing the same
15BT833	Environmental Biotechnology	CO1: Students are able learn pollutants and its accumulation and detoxification  CO2: Students are able learn wastewater treatment process and its application in treatment municipal and industries waste water  CO3: Students are able to learn about xenobiotic compounds and their biodegradation and Bioremediation.  CO4: Students are able learn biocatalysts and its application  CO5: Students are able learn about Bioxidation and microbial leaching