2.6.1   **OUTCOMES OF MATHEMATICS**

Class	Course	Outcomes
F.Y.BSc	1)MTH101- Matrix Algebra	On successful completion of this course student will be able to
		· Understand concepts on matrix operations and rank of the matrix.
		· Understand use of matrix for solving the system of linear equations.
		· Understand basic knowledge of the Eigen values and Eigen vectors.
		· Apply Caley-Hamilton theorem to find the inverse of the matrix.
		· Know the matrix transformation and its applications in rotation, reflection, translation.
	2)MTH 102- Calculus	On successful completion of this course student will be able to
		· Understand basic concept on limit and continuity.
		· Understand use of differentiations in various theorems.
		· Know the Mean value theorems and its applications.
		· Make the applications of Taylors, Maclaurin's theorems.
		· Know the applications of calculus.

	3)MTH103(B)Graph Theory	On successful completion of this course student will be able to	
		. Understand the basic concept in Graph Theory.	
		. To learn about connected graph,planer graphs.	
		. To learn about diagraph and various types of diagraphs.	
		. To understand trees and spanning trees.	
		. It's use in Computer Engineering and in Networks.	
	4)MTH-201 Ordinary differential Equations	On successful completion of this course student will be able to	
		· Understand basic concepts in differential equations.	
		· Understand methods of solving differential equations.	
		· Understand use of differential equations in various fields.	
	5)MTH202- Theory of Equation	On successful completion of this course student will be able to	
		· Students can find roots of any equation of degree less than or equal to five.	
		· Useful in various subjects like algebra, linear algebra, calculus, ordinary and partial differential equations.	

	6)MTH 203(B) Numerical Analysis	On successful completion of this course student will be able to
		· Understand basic concepts of methods of solution of equation viz. bisection, iteration, Newton-Rapson methods and method of false position.
		· Understand method of curve fitting.
		· Use of curve fitting such as least square, polynomial and exponential fitting for set of given data.
		· Use Taylor's series, Euler's method, Modified Euler's methods, Runge Kutta methods for solving ordinary differential equations.
S.Y.BSc	1)MTH-211 Calculus of several variables	On successful completion of this course student will be able to
		· Find double and triple integration
		· To study of Taylor's series, Maclaurian's series.
		· To understand Mean Value Theorems.
		· To find area by double integration and volume by triple integration
		· It use in all branches of engineering
	2)MTH-212 (B)Theory of Groups	On successful completion of this course student will be able to
		· To learn computing using algebra.
		· To understand the concept of groups.

		· To learn homomorphism and isomorphism.
		· To learn group codes and encode.
		· It's use in computer science.
	3)MTH-221 Complex Analysis	On successful completion of this course student will be able to
		· To learn properties of complex numbers.
		· To learn construction of analytic function
		· To study poles, singularities and residues.
		· To apply the knowledge of residues in solving contour integration.
		· It's use in Fluid Mechanics and Electrical engineering.
	4)MTH-222(B)Differential and Difference equation	On successful completion of this course student will be able to
		· To solve system of linear and non-linear algebraic equations.
		· To study definition and properties of difference equation
		· To study simultaneous Differential equation.
		· To study Pffafian Differential equation

T.Y.BSc	1)MTH-251 Topics in Metric Space	On successful completion of this course student will be able to
		· To study continuous function on metric spaces.
		· To learn connected metric spaces.
		· To learn complete metric spaces.
		· To study compact metric spaces.
		· Learn the basic abstract ideas of analysis.
	2)MTH-252 Integral Calculus	On successful completion of this course student will be able to
		· To learn Mean Value Theorems on integral calculus.
		· To learn how to solve improper integrals.
		· To understand the importance of Legendre polynomials.
		· Finding areas and volumes.
		· Know its use in all branches of engineering.
	3)MTH-253 Modern Algebra	On successful completion of this course student will be able to
		· To learn normal subgroups.

		· To study permutations.
		· To know about quotient and polynomial rings.
		· Know algebraic operations.
		· Know its use in computer science and Information Technology.
	4)MTH-254 Lattice Theory	On successful completion of this course student will be able to
		· To understand poset and chains.
		· To understand lattices.
		· To understand various types of lattices.
		· To learn about ideals and homomorphism.
		· It's use in Discrete Mathematics, Computer Science.
	5)MTH-355(B)Number Theory	On successful completion of this course student will be able to
		· Solve various problems on properties of integers and use the basic concept of divisibility.
		· To study prime number, perfect numbers and Fermat's theorem.
		· To understand Fibonacci number.

			· To know certain number theoretic functions.
			· To solve Diophantine equations
			· To calculate with continued fractions.
	6) MTH-356(A) Vector Calculus.	On successful completion of this course student will be able to	
		· To study various operations on vectors.	
		· To study differentiation and integrations of vectors.	
		· To study the concept of gradient, divergence and curl.	
		· To know Stroke's theorem and Gauss divergence theorem.	
		· It's use in Physics and Mechanics.	
	7)MTH-361 Measure and Integration Theory	On successful completion of this course student will be able to	
		· To learn measurable sets.	
		· To learn measurable function.	
		· To understand Lebesgue integral.	
		· To learn Fatou's lemma.	

		· It's use in Statistics, Probability and Analysis.
	8) MTH-362 Method of Real Analysis.	. On successful completion of this course student will be able to
		· To study sequences
		· To study series of real functions.
		· To know the Fourier series.
		· To study half range series.
	9) MTH-363 Linear Algebra.	On successful completion of this course student will be able to
		· To study algebra, vector spaces, Eigen values and Eigen vectors.
		· To solve system of linear equations
		· Use the concept of basis and dimension of vector spaces, linear dependence and independence.
		· Apply the properties of linear transformations to linearity of transformation ,kernel and rank of linear transformations, inverse transformation to solve the problems of matrix transformations,
	10) MTH-364 Ordinary and partial differential equations.	On successful completion of this course student will be able to
		· To learn about exact differential equations and various types.
		· To study linear partial differential equations.

		· To know to solve problems of engineering and physics.
	11)MTH-365(A)Optimization Technique	On successful completion of this course student will be able to
		· Deal with minimization of cost or maximization of profit.
		· To study linear programming problems
		· To study about transportation problems.
		· To know the fundamentals of game theory.
	12) MTH-366(A) Applied Numerical Methods.	On successful completion of this course student will be able to
		· To know concept of numerical analysis.
		· To solve system of linear equations.
		· To learn numerical differential and integration.
		· To learn about interpolation, curve fitting of polynomials.
		· To apply numerical methods for solving differential equations.

Class	Subject	Outcomes
F.Y.B.Sc	ELE-101:Network Analysis And Semiconductor Diode	Learner will be able to ….
		· Apply knowledge to develop circuits using electronic devices.
		· Apply the concept and knowledge of electronics devices to real life problems.
	ELE-102: Digital Integrated Circuit	Learner will be able to ….
		· Simulate complex circuits and understand the behaviour of the systems.
		· Understand and analyse, linear and digital electronic circuits.
		· Review, prepare and present technological developments.
	ELE-201: Analog Circuit	Learner will be able to ….
		· Apply the concept and knowledge of integrated circuit chips to develop new systems.
		· Apply practical knowledge to solve real life problems of the society.
	ELE-202: Linear Integrated Circuit	Learner will be able to ….
		· Understand of the course and create scientific temperament and give exposure to the students for independent use of integrated circuit chips for innovative applications.

		· Model complex circuits and simulate them.
		· Handle simulation software to analyse electronics circuits.
S.Y.B.Sc	ELE-231: Analog Circuits And Applications	On completion of the course, students are able to:
		· To understand Basic Analog Circuits and their applications using Active Devices
		· To learn basic function of single stage amplifier, multistage amplifier and power
		· Amplifier and their working principle:- To understand basic construction of feedback circuits and their application in
		· Oscillators understand basic amplifier and oscillator circuits and their application in analog circuits.
	ELE-232: Instrumentation	On completion of the course, students are able to:
		· To understand Basic Analog and digital meters for measurement of various electrical parameter.
		· To learn basic test instruments such as power supply ,function generator, DFM and CRO and their construction and working principle.
		· To understand basic principle of transducers and their construction, Working principle, classification and application in various fields.

		· Students understand the construction of data convertor circuits and their applications in digital circuits.
	ELE-241: Linear Integrated Circuits And Applications	On completion of the course, students are able to:
		· To understand Basic differential amplifier and their applications in linear Integrated circuits
		· To learn basic function of operational amplifier, Ideal and practical characteristics and their mathematical application.
		· To understand basic construction of active filters, comparators and their application in electronics.
		· 4Students understand different types of multivibrator and wave form generator using IC 555.
	ELE-242: 8085 Microprocessor	On completion of the course, students are able to:
		· To understand the basic architecture of 8- bit microprocessors.
		· Able to write programs on 8085 microprocessor based systems.
		· Identify the addressing modes of an instruction.
		· Develop programming skills in assembly language

Class	Course	Outcomes
F.Y.B.Sc	**CS-101 Essential of Computer**	Reflect broad conceptual knowledge and adaptive vocational and generic skills
		• Reflect essential knowledge, skills or attitudes
		• Students will learn to use and configure essential applications
	CS-102 C-Programming Language-I	• Understand the basic terminology used in computer programming
		• Use different data types in a computer program.
		• Design programs involving decision structures, loops and functions
	CS-201Internet Computing	• Students can use current techniques, skills, and tools necessary for computing practice
		• An ability to use and apply current technical concepts and practices in the core information technologies
		• Students can apply knowledge of computing and mathematics appropriate to the discipline
S.Y.B.Sc	**CS-211 Data Structure-I**	• Argue the correctness of algorithms using inductive proofs and invariants.
		• Analyze worst-case running times of algorithms using asymptotic analysis
		• Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it

	CS-222 C++ Introduction	• Demonstrate a thorough understanding of modular programming by designing programs that require the use of programmer-defined functions.
		• Demonstrate a thorough understanding of arrays by designing and implementing programs that search and sort arrays.
T.Y.B.SC	**CS-311 System Programming**	• Utilize the UNIX environment effectively to perform a range of system-level tasks.
		• Analyze, write and apply shell and Perl scripts of medium complexity to solve system-level problems and form an appropriate skill set.
		•Construct and apply regular expressions in shell and Perl to process text, search files and validate format
	CS-312 Database Management System	have a broad understanding of database concepts and database management system software
		have a high-level understanding of major DBMS components and their function
		be able to program a data-intensive application using DBMS APIs
	CS-313 Software Engineering	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
		•Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
	CS-314 Computer Aided Graphics	• Recall drawing and modification functions of CAD software
		• Identify and interpret information provided in technical drawings, schematics, or mask sets
		• Produce two-dimensional drawings using traditional visualization techniques
		• Understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic

CS-315 Programing in VB.NET	• Create applications that use ADO.	
	• NET Working with XML Documents	
	• Using Crystal Reports	
CS-316B) Java Programming-I	Use a version control system to track source code in a project.	
	Validate input in a Java program.	
	• Use a version control system to track source code in a project	
CS-321 Advanced Operating System	• About operating systems, what they are, and what are their major components	
	• Add to and/or modify C code in a large system written by others	
	• Some basic principles about system performance	
CS-322 MS SQL Server	• Demonstrate retrieving data.	
	• Demonstrate deleting data.	
	•Demonstrate sorting and filtering data	
	•Apply the Set theory and Relation Concepts	
	•Apply the Functions and define the recursive functions	

		CS-323 Internet Programming Using PHP	• Apply Inverse Laplace transform to different applications
		CS-324 Theoretical Computer Science	•After the course you know the most important models of computation and you can examine them with mathematical precision.
			• Using finite automata, and characterize simple languages with regular expressions and context-free grammars.
		CS-325 Computer Network	• describe the basis and structure of an abstract layered protocol model
			• describe, analyse and compare a number of datalink, network,
			• identify and apply basic theorems and formulae for the information-theoretic basis of communication and the performance of physical, datalink and network protocols
		CS-326 B)Java Programming-II	•Designs will demonstrate the use of good object-oriented design principles including encapsulation and information hiding
			• Test plans will include test cases demonstrating both black box and glass box testing strategies.
		CS-101Advanced C++ Programming	•Demonstrate a thorough understanding of the concept of pointers and dynamic memory allocation by designing and implementing programs using pointers and dynamic memory allocation.
			• Demonstrate good documentation style in all of the programs written in this course
			• Demonstrate a thorough understanding of stream input/output for both console and files
		CS-102Automata Theory and Computability	• You know the relationship between the expressiveness of the models of computation studied during the course. You have been exposed to some basic concepts of computational
			• A high-level understanding of the structure of operating systems, applications, and the relationship between them.

M.Sc-I	**CS-103Advanced Operating system**	• Some knowledge of the services provided by operating systems.
		• Exposure to some details of major OS concepts.
	CS-104Digital Image Processing	•Students will be able to Explain the basic elements and applications of image processing
		•Students will be able to Analyze image sampling and quantization requirements and implication
		•Students will be able to Explain the image segmentation and image compression problem
	CS-201Advanced DBMS	basic concepts and appreciate the applications of database systems
		basics of SQL and construct queries using SQL
		the relational database theory, and be able to write relational algebra
		expressions for queries.
	CS-202 Machine Intelligence	•Knowledge of theory and methods of inductiv learning
		• Application to problems of regression and classification
		• understanding regarding basic concepts of neural information processing
	CS-203 Compiler Construction	• To understand the principles and techniques used to perform translation
		• To appreciate the concepts of compiler construction. •

		• To acquaint students with software tools and techniques which are applicable both to compilers.
		• Describe the greedy paradigm and explain when an algorithmic design situation calls for it
		• Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
	CS-204Design and Analysis of Algorithm	Recite algorithms that employ this paradigm
	CS-301Software Engineering	How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
		An ability to work in one or more significant application domains
		Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
M.Sc-II	**CS-302 Optimization of Algorithm**	• Compose existing theoretical analysis with new aspects and algorithm variants.
		• Formulate scalable and accurate implementations of the most important optimization algorithms
	CS-303 Advanced Java Programming	Use a version control system to track source code in a project.
		Identify and fix defects and common security issues in code
		Test plans will include test cases demonstrating both black box and glass box testing strategies.
	CS-304Windows ,WCF and WPF Programming	• Students can apply knowledge of computing and mathematics appropriate to the discipline
		• Students can analyze a problem, and identify and define the computing requirements appropriate to its solution

		• Students can use current techniques, skills, and tools necessary for computing practice
	CS-401 Natural Language Processing	• Compose key NLP elements to develop higher level processing chains
		• Choose appropriate solutions for solving typical NLP sub problems
		• Describe the typical problems and processing layers in NLPAnalyze NLP problems to decompose them in adequate independent components Teaching methods
	CS-402 Advanced Network Programming	demonstrate advanced knowledge of networking.
		understand the key protocols which support the Internet
		be familiar with several common programming interfaces for network communication.
		demonstrate advanced knowledge of programming for network communications
	CS-403 Data Warehousing and Data Mining	• Demonstrate advanced knowledge of data mining concepts and techniques
		• Determine whether a real world problem has a data mining solution
		• Apply the techniques of clustering, classification, association finding, feature selection and visualisation on real world data

DEPARTMENT OF PHYSICS

Class	Course	Outcomes
FYBSc	PHY-111: Mechanics and Properties of matter	· Basic theories related with properties of matter and its application to determine values of various physical quantities associated with matter.
		· The dynamics of different types of pendulum and to determine gravitational acceleration
		· The elastic properties of matter and expression of bending beam with its application as a cantilever.
		· Concept of surface tension and its relation with excess pressure and radius of curvature and determination of surface tension by Jaegers method.
		· Concept of fluid flow and pressure energy in fluids and Bernoulli''s Theorem and its applications: venturimeter, pitot tube.
		· Determination of coefficient of viscosity by using Poiseuillie''s equation.
		· Basic skills to perform experiments to understand the concept from existing theories of Basic physics.
	PHY-112: Electricity and Magnetism	· Basic concept of current, current density vector and Kirchhoff''s law by loop analysis.
		· Illustration of Network theorems
		· Time constant of L-R and C-R circuit and its physical significances.
		· Concept of magnetism and and magnetic properties of materials such as Ferromagnetic, Anti ferromagnetic and Ferrimagnetic.

		· Concept of electromagnetic induction, principle of transformer, its types and applications.
		· Working of Inductors in series and parallel
	PHY-121 : Heat and Thermodynamics	· Discussion and conclusions of Andrew''s experiment and Amagat''s experiments.
		· Van der Wall''s equation, Critical constants and concept of Bolye''s temperature.
		· Basic concept of thermodynamics and to distinguish between work done due to Adiabatic and isothermal changes.
		· Laws of thermodynamics and concept of internal energy.
		· Carnot''s ideal heats engine, Carnot cycle and its efficiency, Carnot''s theorem, Otto and Diesel engines with their efficiencies.
		· First and Second latent heat equations.
		· Concept of entropy, Change of entropy in Reversible process and Irreversible process, T-S diagram.
		· Knowledge of basic principles of refrigeration methods: Evaporative refrigeration, refrigeration by throttling of gas, vapour refrigeration.
		· Basic components of simple vapour compression refrigeration understand its working with Flow diagram.
	PHY-122: Theoretical Physics	· Complex number (Addition, Subtraction, Multiplication, Division, Complex conjugate) and Exponential form of complex number.

		· Solving problems using Euler"s formula, de-Moivere"s theorem and to Trigonometrical functions Application of exponential form for power and roots of complex numbers.
		· Solving partial differentiation and relevant theoretical problems
		· Vector Algebra including Scalar and Vector product Scalar triple product and its geometrical interpretation, Vector triple product and it physical significance.
		· Application of vector analysis such as vector operator, Gradient, Divergence, Curl of a vector to solve the problems of Physics.
	PHY 103: Practical Physics	· Determination of least count of various measuring instruments
		· 'n'torsional oscillation.
		· Determination of Y by using flat spiral spring.
		· M. I. of a disc by torsional pendulum.
		· Determination of Y by vibrational cantilever
		· Use of digital multimeter.
		· Determination of coefficient of viscosity of water by Poiseuille"s method.
		· Verification of Bernoulli"s theorem.

		· SECTION-II
		· Verification of Kirchhoff's laws.
		· Verification of Thevenin's theorem.
		· Verification of Norton's theorem.
		· Maximum power transfer theorem.
		· Determination of time constant of R-C circuit using charging and discharging of condenser through resistor.
		· Study of spectrometer and determination of angle of prism.
		· Electric billing with energy meter.
		· Frequency of a. c. using vibrating wire and magnet.
SYBSc	PHY-231: Waves and Oscillations	· Demonstration Lissajous figures by mechanical, optical and electrical methods.
		· Composition of two S.H.M.s of equal frequencies along same line of vibration, at right angles (analytical method with different cases).
		· Free and damped oscillations and to solve differential equation of damped harmonic oscillator and Energy equation.

		· Demonstration of Resonance and its types- Mechanical resonance (Barton''s pendulum), Acoustic resonance (resonance tube), Electrical resonance (LCR circuit) and Optical
		· resonance (sodium vapour lamp).
		· Solving differential equation of forced oscillations and its solution, and to obtain amplitude, Energy of forced oscillations, Amplitude and Sharpness and Velocity of
		· resonance, Power dissipation, Band width and quality factor.
		· Concept of sound, to classify sound frequencies and to understand Piezoelectric effect, Magnetostriction effect.
		· Doppler effect in sound and light and its application.
	PHY- 232 (A): Electronics- I	· Various aspect of P-N diode, Zener diode, LED and Photodiode.
		· Working of Half wave, full wave and bridge rectifiers and filters: capacitance filter, inductor filter and filters.
		· Demonstration of voltage regulation using Zener diode.
		· Basic construction and operation of bipolar transistors (NPN and PNP),transistor circuit configurations (CB, CE, CC), current gains and their interrelationship.
		· Solving problems of electronics using decimal, binary and hexadecimal number system.
		· Basic concept of logic gates and designing of R-S, clocked R-S, D , JK and T flip flops

		· De Morgan''s theorems and understand symbols, Boolean expression and truth tables for gates.
	PHY- 232 (B) - Instrumentation -I	· Basic concept of standards of measurements and calibration.
		· Measurement of temperature using: Non - electrical, Electrical and Radiation Methods.
		· Measurement of pressure using McLaud Guage (b) Pirani Gauge.
		· Measurement of flow using: Venturi tube, Pitot tube and Rotameter .
		· Characteristics of sound and to know typical sound measuring system.
		· Measurement of magnetic field by using search coil method and Hall gauge meter.
	PHY – 241: Modern Physics	· Problems of energy crisis by means of photo thermal conversion and photovoltaic conversion.
		· Construction and working of photothermal and photovoltaic system and solar modules for power generation.
		· Principle and chartericstics of Laser, its types and applications.
		· Correspondence principle
		· Atomic spectra and distinguish classical planetary model and Bohr''s theory of hydrogen atom and quantum mechanical Bohr''s Sommerfield model.

		· Matter wave, concept of wave group, and relations between phase velocity, group velocity, particle velocity.
		· Davission and Germer experiment and verifications of discrete atomic energy levels.
		· Uncertainty principle and its application in Non existence of electron in nucleus, determination of ground state of electron and size of hydrogen atom).
	PHY-242: Optics	· Formation of images using optical instruments and various types of aberration.
		· Concept of interference pattern due to reflected light in parallel sided thin films and in thin wedge shaped film.
		· Demonstration of experimental set up for Newton"s rings, theory and its application to determine wavelength of source and refractive index of liquids.
		· Demonstration of Michelson Interferometer (experimental setup and its application for measurement of wavelength of monochromatic source).
		· Distinguish between Fresnel and Fraunhoffer diffraction.
		· Theory of plane transmission grating and its resolving power.
		· Basic concept of polarization of light, Brewster"s law and Maluss law for polarization by double refraction in crystals.
		· How to construct of Polaroid, Quarter and Half wave plates, Nicol prism.
		· Production and detection of circularly and elliptically polarized light
		· Demonstration of principle and working of Polarimeter or Sacherimeter.

Class	Course	Outcomes
S.Y.B.Sc.	Optional English.	• Students will be introduced with new techniques of technical communication.
		• Students will be equipped with enough English to enable them to enter the usual profession open to them.
		• Students will be equipped to communicate effectively in the changed circumstances and the present business environment.

Class	Course	Outcomes (Students will gain an understanding of)
F.Y. B.Sc.	CH-101: Physical and Inorganic Chemistry	· An ability to use conceptual and mathematical tools to express and predict the various mathematical concepts in chemistry.
		· Atomic structure, chemical bonding or molecular geometry based on accepted models.
		· Scientific equation in straight line to get physical parameter for slope and intercept.
		· The concept of deviation of real gas from ideal behavior.
		· The concept of critical constant and vanderwaal,s constant.
	CH-102: Organic and Inorganic Chemistry	· The general properties of organic compounds, applications of organic compounds.
		· Mono functional compounds - Common and IUPAC nomenclature of various types of organic compound.
		· The preparation, properties and reactions of alkanes.
		· The S- block Elements i.e. Alkali metals and Alkaline earth metals.
		· Concepts of Acid base theories viz. Arrhenius theory, Bronsted- Lowry theory, and Lewis theory.
		· Ionic product of water, Buffer solutions.
	CH-201: Physical and Inorganic Chemistry	· Identifying methods and instruments that can be used to study chemistry
		· Evaluation of data generated by experimental methods for chemical characterization.

		· Specific and equivalent conductance.	
		· Cell constant and use of it to obtain specific and equivalent conductance.	
		· Kolhaurashs law and its applications.	
	CH-202: Organic and Inorganic Chemistry	· The preparations, reactions and properties of monohalogen and dihalogen derivatives of Alkanes.	
		· The preparations, properties and reactions of Alcohol, Ether and Epoxides	
		· The preparations and reactions of carbonyl group and carboxylic acids.	
		· Determination of the Molecular weight, formula weight, equivalent weight of organic compounds	
		· The Electronic structures, size of atoms and ions, ionization energy, metallic and nonmetallic properties of p block elements.	
	CH 231: Physical and inorganic chemistry	· The Electronic structures, size of atoms and ions, ionization energy, metallic and nonmetallic of d block elements.	
		· Concept of Helmholtz and Gibbs free energy.	
		· Solving numericals of Helmholtz and Gibbs free energy, clapeyron equations.Concept of vapor pressure of liquids, Raoults law etc.	
		· The concept of physical and chemical properties of metals.	
	CH 232: Organic and analytical chemistry:	· The concept of isomers and discuss the isomer which results from free rotation of C-C single bond, from a chirallity, from restricted rotation, R, S and E, Z nomenclature.	
		· Study of amines their formation reactivity.	

S.Y. B.Sc.		· Study of reactivity, preparation and reactions of organo Li, Cu, Zn compounds.
		· The importance of analytical chemistry in analysis of compounds by titrimetric, gravimetric and instrumental methods.
		· The importance of sampling methods and ways of interpretation of results of analysis.
		· The causes of errors and their minimization during analysis
		· The application of types of titrations for quantitative analysis of the samples.
	CH 241 Physical and inorganic chemistry	· Colligative properties and its application calculation of molecular weight of solute
		· Concept of electromotive force and its measurement
		· Properties of Lanthanides and actinides.
		· Concept of s-s, s-p, p-p, and p-d & d-d combination of orbital.
		· Formation of homonuclear and heteronuclear diatomic molecules.
	CH 242: Organic and analytical chemistry	· The synthesis and reaction of 5, 6 member and condensed heterocyclic systems.
		· The synthesis of synthetic reagents and their synthetic utility.
		· The mechanism and stereochemistry of E1, E2 reaction.
		· The concept of quantitative analysis by gravimetric methods.
		· The concept for separation of analytes in samples by thin layer, paper and column chromatographic methods.
	CH 351: Physical chemistry	· Concept of different types of Electrochemical Cell and its Applications, emf measurements, hydrogen electrode, Quinhydrone electrode, glass electrode, potentiometric titration.
		· Laws of Photochemistry, quantum yield, Fluorescence, Phosphorescence, Chemiluminiscence, Study of photochemical reactions.

	· Concept of Phase Rule, Water system, Sulphur system, two components and three component system.	
	· Concept of Radioactivity and its Applications.	
CH-352: Inorganic chemistry	· Basic concepts of coordination	
	· Werner's coordination theory	
	· Modern Theories of M-L Bonds V.B.T.	
CH-353: Organic chemistry	· Structural Effects, Inductive effect, resonance effect, steric effect, hyper conjugation, Application of all these effects.	
	· Nucleophilic Substitution at Saturated Carbon, relation between kinetics and mechanism.SN1, SN2 and SNi mechanisms.	
	· Electrophilic Addition to C=C addition of halogens, addition of HX to C=C with mechanism and its stereochemistry. Hydroxylation.	
	· Nucleophilic Addition to C=O Structure and Reactivity, Addition of water, alcohol, thiol, hydride ion, derivatives of ammonia, semicarbazides.	
	· Aromatic Substitution, Electrophilic Aromatic Substitution, Introduction, general mechanism, Friedal Craft acylation, Diazo coupling reactions.	
	· Rearrangement reactions, classification,Pinacol-pinacolonerearrangement, Beckmann rearrangement, Baeyer Villiger rearrangement.	
CH-354: Analytical Chemistry	· Solvent Extraction, The Distribution Co-efficient, The Distribution Ratio, Percent Extracted, Solvent Extraction of Metals - Ion Association Complex and Metal Chelates.	
	· Ion Exchange Chromatography, Cation Exchange Resins, Anion Exchange Resins, Cross-linkage, Applications of Ion Exchange Chromatography.	
	· Size Exclusion Chromatography, Exclusion Limit, Types of Gels, Applications.	

		· Gas chromatography, Columns, Detectors, Efficiency in Chromatography- Theoretical Plates, Van Deemter Equation, Capacity Factor and Resolution
		· High-performance Liquid Chromatography, Equipment for HPLC, Column Materials for HPLC
		· Electrophoresis, Properties of Charged Molecule, Classification of Electrophoresis Methods, Techniques of electrophoresis, Applications in Inorganic chemistry
T.Y.B.Sc.	CH-355: Industrial chemistry	· General Aspects of Industrial Chemistry ,Basic requirements of industrial chemistry, chemical production, raw materials, unit process quality control, yield, copy right act, patent act and trademarks
		· Sugar Industry, Sugar Industry in Maharashtra and India, Manufacture of cane sugar
		· Fermentation Industry, Alcohol Fermentation, Uses of alcohol, beverages, Manufacture of Beer, Manufacture of Spirit
		· Fertilizers, Plant Nutrients, Nutrient functions, Classification of fertilizers, Natural inorganic fertilizers, Artificial-fertilizers-Nitrogenous fertilizers. Importance of Bio-fertilizers.
		· Small Scale Industries, Aspects of Small Scale Industries, Safety Matches, Agartbatties, Naphthalene balls, Wax Candles, Shoe Polishes, Gum Paste, Writing and fountain Pain ink.
	CH-356 (B) Environment Chemistry	• Understand the concept to awareness about environmental chemistry
		• Understand the concept about atmosphere and different layer and composition
		• Understand the concept. awareness about air pollution and organic inorganic pollutants
		• Understand the concept, water pollution and domestic sewage waste water, industrial pollution agriculture pesticide water pollution.
		• Understand the different methods of water treatment, water effluents and sewage water.
		• Understand the green house gases and global warming.

CH 361: Physical chemistry	• Concepts of Investigation of Molecular Structure.	
	· Chemical kinetics, First order, Second order kinetics.	
	· Solid State, Element of symmetry, Unit cell, lattices, structure of NaCl.	
	· Elementary Quantum Mechanics ,Black body radiation Planks radiation law, Photoelectric effect, Compton effect, Debroglies hypothesis, Heisenberg's uncertainty principle, Postulates of Quantum mechanics.	
CH-362: Inorganic chemistry	· The Copper group Coinage Metals , Electronic structure, Extraction and uses of Cu, Ag and Au, Oxidation state	
	· Solvents, Solutions, Acids and Bases, Donor and Acceptor properties, molten salts, solvents for electrochemical reactions, purity of solvents, solvent system concepts.	
	· Corrosion and passivity, types of corrosion - Atmospheric corrosion, Immersed corrosion, microbiological corrosion, Theories of corrosion.	
	· Structure and Reactivity of Molecules, VSEPR theory, Structure of molecules containing lone pair of electrons- Sulphur tetrafluoride , Bromine trifluoride, Dichloroiodate(I)anion.	
	· Some Transition and Inner Transition Elements, Occurrence, Extraction, properties and uses of Transition elements Ti and Cr.	
CH-363: Organic chemistry	· Spectroscopy, Ultraviolet spectroscopy, Infrared Spectroscopy, NMR Spectroscopy, Problems based on UV, IR and NMR Spectroscopy.	
	· Designing Organic Synthesis, different terms used: disconnection, One group disconnection of simple alcohols.	
	· Natural products, Terpenoids, Barbier- Bouvealt synthesis, Alkaloids, Atropine: structure determination, synthesis of atropine, synthesis of atropine.	
CH-364: Analytical Chemistry	· Spectrometry, Interaction of electro-magnetic radiation with matter, Beer's Law, monochromators, Cells, detectors, Slits Width, Spectrometric Errors.	
	· Emission Spectrometry, Flame Emission Spectroscopy, Plasma Emission Spectrometry.	

		· Atomic Absorption Spectrophotometry, Instrumentation, Spectral, Ionization, Refractory Compound Formation, Physical Interferences, Applications of AAS. Nephelometry and Turbidimetry, Instrumentation, Applications.
		· Thermal Methods ,Thermogravimetry, Instruments and applications of thermogravimetry, Differential Techniques.
	CH-365: Industrial chemistry	· Petroleum Industry, Petroleum producer countries in the world, Exploration Methods, Composition of Petroleum, Cracking process- Thermal, Catalytic, Hydro cracking.
		· Industrial Organic Synthesis from Petroleum, Manufacture of methanol from synthesis gas, Isopropanol ,Glycerol, Acetone Hydrocarbon Preparation of toluene.
		· Soaps and Detergents, Manufacture of Soaps, Synthetic Detergents,
		· Drugs and Pharmaceuticals, Importance, Qualities of good drugs, Functional and chemotherapeutic drugs, Meaning of the various terms like Prescriptions, Doses, Analgesic, Antipyretics, manufacture and properties of Paracetamol, Aspirin
		· Dyes, Pigments and paints, Otto Witts theory only, Classification of dyes, Synthesis and Uses of dyes:- Congo red, Methyl orange, Phenolphthalein, Paints ingredients and classification, new technologies, Pigments
	CH 366(C): Polymer chemistry	· Basic concepts of polymers, Brief history, definition, functionality and reactivity, degree of polymerization, Classification of polymers based on origin, native backbone chain, thermalresponse, applications, degradation, types of degradation
		· Chemistry of polymerisation , chain growth polymerisation, Addition polymerization
		· Ionic polymerisation, step growth polymerization, condensation polymerization. Polymerization techniques, Bulk polymerization, solution polymerization, suspension polymerisation, emulsion polymerization.
		· Study of some important, Polyethylene, Polypropylene, Polyvinyl chloride, Polystyrene,Polyacrylonitrile, Polycarbonates, Phenol-formaldehyde resins, Epoxyresins.
		· Glass transition temperature, Glass transition temperature, Glass transition temperature and melting point, determination of glass transition temperature