2.6: Student Performance and Learning Outcomes

2.6.1: Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution

Science Faculty

Contents

1. Department of Botany

Under Graduates Course

CLASS : F.Y.B.SC -- SEMESTER I		
COURSE TITLE	CO s NO	COURSE OUTCOME
USB(BO 111) Plant Life and Utilization- I	1	Outline cryptogams and phanerogams.
	2	Define general characters of cryptogams and Phanerogams.
	3	Classify the members of plants groups in to cryptogams and Phanerogams.
	4	Describe the Life cycle of plant forms of cryptogams and Phanerogams.
	5	Compare and describe the salient features of Cryptogams.
	6	Summarize type of diversity compare, organize and structure ecological grouping
USB (BO 112) Plant Morphology and Anatomy	1	Define plant morphology and anatomy
	2	Discuss morphology of vegetative and reproductive parts of plants.
	3	Describe anatomy of Monocot and dicot plants.
	4	Explain types of plant tissues.
	5	Understand and describe reproductive parts of the Angiospermic plants
	6	Formulate and compose of floral formula and floral diagram
USB (BO 113) Practical Botany –I	1	Recognize the live forms of Cryptogamic and Phanerogamic plants.
	2	Analyse and describe botanical concepts, including plant anatomy.
	3	Illustrate the floral parts, fruits, leaves and their types.
	4	Categorize the plants into Monocot and Dicot on the basis of anatomical characters.
	5	Field survey for identification of angiospermic plants
	6	Tree plantation

SEMESTER II		
USB (BO 121) Plants life and Utilization II	1	Understand about the diversity, systemic and economic importance of higher plants
	2	Explain identify and classify the higher plants
	3	Know the Economic Importance of higher plants
	4	Compares the features of higher plants.
	5	Aware the status of Phanerogams as a group in plant kingdom.
	6	Apply the economic and ecological importance of flowering plants
USB (BO 122) Principles of plants Science	1	Explain and recognise physiological phenomenon in plants
	2	Describe the mechanism of physiological phenomenon
	3	Distinguish and differentiate cell structures of Types of cells
	4	Understand ultrastructure and functions of cell organelles, different biomolecules in cells
	5	Distinguish, compare cell cycle in plant
USB (BO 123) Practical based on BO121 and Bo 122	1	Describe morphological, reproductive characters, taxonomy of higher plants.
	2	Discuss and compare internal organization of plants
	3	Understand categories and explain utilization of higher plant
	4	Preparation and utilizations of different stains, medium etc.
	5	Estimation of different biomolecules
	6	Aware about conservation and sustainable use of plants

SEMESTER III		
USB (BO 231) Taxonomy of Angiosperm and Plant Ecology	1	Taxonomy of Angiosperm and Plant Ecology
	2	Define different terminology of taxonomy
	3	Discuss and explain about the systematic position of Angiosperm
	4	Understand, summarize about plant nomenclature
	5	Compose, formulate the floral variations in angiosperm families, their phylogeny and evolution.
	6	Define, recognize and describe scope of Ecology
USB (BO 232) Plant Physiology	1	Understand the various physiological life processes in plants
	2	Summarize, describe and distinguish of mechanisms of physiological phenomenon in plants
	3	Demonstration, examine and classify about various mechanisms of growth, development and functioning of plants
	4	Differentiate abiotic and biotics factors affecting on functioning of plants
	5	Discuss, describe and differentiate process of flowering in plants
	6	Demonstrate, examine and describe process of seed germination
USB (BO 233) Practical based on Bo231 and Bo 232	1	Memorize, recognize and explain different plant terminology
	2	Demonstrate and distinguish and Categorize different plant families
	3	Compare and differentiate different Ecological grouping of plants
	4	Sampling, testing and structuring of vegetation different group
	5	Experimenting of growth, development and reproduction in plants as well as understand the physiological changes with the environmental impact.
	6	Demonstrated different experiment of plant physiology and Ecology

SEMESTER IV		
USB (BO241) Plants Anatomy and Embryology	1	Define and explain different terminology of plants anatomy and Embryology
	2	Discuss and describe the scope & importance of Anatomy and Embryology
	3	Recognize, compare, describe and classify different tissues systems in internal organization of plants
	4	Compare and classify internal organization of plant organs
	5	Demonstrate, explain, classify and describe the structure and development in plant embroyology
	6	Distinguish, compare and explain process of post fertilization embroygeny
USB (BO 242) Plant Biotechnology	1	Describe, clarify and Summaries Concepts, tools and techniques related to tissue culture
	2	Demonstrate the different methods used for genetic transformation of plants
	3	Explain the basic principles and modern age applications of recombinant DNA technology.
	4	Judge, evaluate and summarize bioinformatics to prepare database
	5	Demonstrate and application phytoremediation techniques
	6	Discuss and distinguish biofuel technology and role of plants as source of biofuels
USB (BO243) Practical based on BO241 and Bo 242	1	Classify, distinguish and categories different tissues systems in plants
	2	Demonstrate of biotechnology techniques and anatomy
	3	Examine and experiment related to biotechnology
	4	Experiment/ demonstrate/ design to different techniques in biotechnology
	5	Discuss, describe and differentiate in embrogeny
	6	Experiment/ demonstrate/ design to different techniques in biotechnology

Semester V		
USB (BO351) Algae and Fungi	1	Define and Describe Lower Cryptogams.
	2	Classify various system of Lower Cryptogams
	3	Demonstrate and explain the Life cycle of Lower Cryptogams
	4	Distinguish And compare Habit and Habitat of Lower Cryptogams
	5	Judge and evaluate General characters of Lower Plants
	6	Summaries the Life cycle of Lower Plants.
USB (BO352) Archegoniate	1	Describe Archegoniate
	2	Compare and classify Archegoniate
	3	Demonstrate and explain the Life cycle of Archegoniate
	4	Compare Habit and Habitat of Archegoniate
	5	Judge and evaluate General characters of Archegoniate
	6	Summaries the Life cycle of Archegoniate.
USB (BO 353) (Spermatophyte and Palaeobotany)	1	Define and Describe Angiosperms
	2	Explain the Pseudanthial theory and Transitional-Combinational theory
	3	Classify Cronquist's system And APG IV System
	4	Compare Habit and Habitat of Angiosperms and Gymnosperms
	5	Evaluate General characters of Angiosperms and Gymnosperms
	6	Summaries the Life cycle of Pinus and Gnetum.

Semester V		
USB (BO 354) Plant Ecology	1	Define Plant Ecology
	2	Discuss Interrelationship between Living world
	3	Classify Ecology
	4	Distinguish between Ecology branches
	5	Evaluate and Summarize Ecological Impact Assessment
	6	Value of Environmental Audit.
USB(BO 355) Cell and Molecular Biology	1	Define and Explain concepts and terminology
	2	Recognise and Discuss cell Organelles
	3	Classify, differentiate and biogenesis of cell organelles
	4	Discussed and examine cell signalling and replication
	5	Summarize Molecular Biology and gene expression
	6	Experiment of Griffith's and Avery
USB (BO 356) Genetics	1	Define and Explain and terminology of Genetics
	2	Describe and summarised gene interaction
	3	Compare and discuss linkage and recombination
	4	Explain and compare the mutation and its types
	5	Discuss and analysis of inheritance
	6	Interrelationship to chromosomal behaviour pattern with different mendelian inheritance

Semester V		
USB (BO 357) Practical based on BO – 351 and BO-352	1	Classify, distinguish and categories different Algae
	2	Classify, distinguish and categories different Fungi
	3	Demonstrate and Classify of Bryophytes
	4	Discuss, describe and differentiate Morphological Character of Bryophytes.
	5	Demonstrate and Classify of Pteridophytes
	6	Discuss, describe and differentiate Morphological Character of Pteridophytes
USB (BO 358) Practical based on BO – 353 and BO-354	1	Classify, distinguish and categories different Family
	2	Distinguish ,compare and describe Vegetative and Reproductive Character.
	3	Experiment and Demonstrate internal and external morphology in Pteridophytes and Gymnosperm
	4	Demonstrate / Design Fossils
	5	Experiment / Test on Polluted water
	6	Discuss of Ecosystem
USB (BO 359) Practical based on BO – 355 and BO-356	1	Demonstrate / Design Cytological Techniques
	2	Distinguish ,compare and describe Mitosis and Meiosis
	3	Experiment/ Demonstrate Mitosis
	4	Discuss/Demonstrate RNA and DNA
	5	Experiment / Demonstrate Onion roots cell
	6	Memorize , recognize and explain of Multiple Alleles(Blood Group in Human)
USB (BO 3510) Medicinal Botany	1	Explain, define terminology the scope of Medicinal plants
	2	Describe and summarize various system of medicine
	3	Discuss and explain different technique of conservation
	4	Differentiate and distinguish of propagation of medicinal plants
	5	Evaluate the application of ethnobotany and folk medicine
	6	Create formula of ethnobotany or folk medicine

USB (BO 3511) Plant Diversity and Human Health	1	Describe the different terminology of plant diversity and conservation
	2	Discuss the types and value of Plants diversity
	3	Explain ethical , aesthetic values of biodiversity
	4	Examine and classify management of plant diversity
	5	Distinguish and evaluate conservation of biodiversity
	6	Summarize the role of plant human welfare

Semester VI		
USB (BO 361) Plant Physiology and Metabolism	1	Compare and classify of mineral elements and essential elements
	2	Explain Photosynthetic mechanism and distinguish between light reaction and dark reaction
	3	Discuss and summarize the physiological process
	4	Mechanism of stomata opening and closing at depend upon the light
	5	Examine vascular tissue
	6	Differentiated and compare plant growth hormones Discuss in photomorphogenesis to defend on red and far red light
USB (BO 362) Biochemistry	1	Describe and Define Biochemistry
	2	Discuss and Describe Biomolecules
	3	Classify and Relate Amino acid and Proteins Structure
	4	Write Enzymes Properties
	5	Categorise Vitamins
	6	Compare Carbohydrates and Lipids
USB (BO 363) Plant Pathology	1	Describe and define terminology of Plant Pathology
	2	Discuss and describe the of mechanism Plant Disease
	3	Evaluate and identified the Disease of Plant
	4	Compare of Viral and Non-Parasitic Disease
	5	Distinguish Fungal and Bacterial Plant Disease
	6	Use of Chemical control to plant Disease

USB (BO364) (Evolution and population genetics)	1	Define and describe terminology of Evolution
	2	Discuss mechanism of Organic Evolution
	3	Differentiate Lamark's and Darwinism theory
	4	Summarise Population
	5	Support Speciation types in isolating Mechanism
	6	Evaluate Geological Time Scale based on fossils
USB (BO 365) Advanced plant biotechnology	1	Define and Describe Biotechnological terminology
	2	Discuss Plant Tissue culture techniques
	3	Demonstrate and perform Experiment of Tissue Culture
	4	Differentiate Direct and Indirect gene transfer
	5	Summarise importance, application of biotechnology
	6	Distinguish Microbial technology and Nano Biotechnology
USB (BO 366) Plant breeding and Seed technology	1	Define and Describe Plant breeding terminology
	2	Discuss the Types and techniques of Plant Breeding
	3	Evaluation and Importance, scope of Plant Breeding
	4	Summarise Seed Technology techniques
	5	Application and evaluated seed testing methods
	6	Generation the application of Seed Production
USB (BO367) Practical based on BO – 361 and BO-362	1	Experiment / Demonstrate of osmotic potential of plant cell by plasmolysis method
	2	Describe and Discuss of photosynthesis mechanism
	3	Experiment / Estimate of Amino acid by paper chromatography method
	4	Estimation /Test of Proteins
	5	Demonstration/Examine of enzyme activity
	6	Select Different qualitative test use of biomolecules(Starch, Lipids and Proteins)
USB (BO368) (Practical based on BO – 363 and BO-364)	1	Demonstrate/Recognise Plant Pathogens
	2	Discuss /Describe of various Culture method
	3	Demonstrate and Classify of Fungal Disease
	4	Distinguish / Differentiate Viral and Non-Parasite Disease
	5	Describe/Discuss of Geological time Scale

	6	Demonstrate and Collect Fossil Plant
USB (BO 369) (Practical based on BO – 365 and BO-366)	1	Experiment / Demonstrate Preparation of different techniques
	2	Recognise and Predict of Secondary Metabolites in plant
	3	Demonstration and perform and handling of equipment used in genetic engineering
	4	Demonstration ,estimate and measure to Fermentation technology
	5	Demonstration of Hybridisation Techniques
	6	Estimate test seed moisture ,seed germination, seed diseases etc
USB (BO3610) Nursery and gardening management	1	Describe and define terminology of nursery management and gardening
	2	Discuss and classify structure and types of seeds
	3	Demonstration and explain different methods of propagation and gardening
	4	Distinguish techniques of management
	5	Judge and design of gardening
	6	Develop design of gardening , landscaping
USB (BO 3611) Biofertilizer	1	Define and Describe the terminology of biofertilizer production
	2	Describe techniques of biofertilizer productions
	3	Demonstration and discuss biofertilizer production
	4	Classify and categorise various organism biofertilizer production
	5	Distinguish and estimate effect of biofertilizer on crop
	6	Design model of biofertilizer production

Post Graduate Course

Course Outcomes: M.Sc.-I SEMESTER I		
PSB (BOUT 111) Plant systematics I	1	Describe and define various terminology and concept of plant systematics
	2	Summarise the systems of plant systematics
	3	Demonstrate and examine morphological and anatomical features
	4	Distinguish and compare characters of lower plants
	5	Summarize the economic importance of lower cryptogams
	6	Propose the life cycles of various cryptogams
PSB (BOUT 112) Cell Biology & Evolution II	1	Define and describe various aspects of cell biology and evolution
	2	Discuss features and organisation of cell
	3	Illustrate cellular signalling and trafficking
	4	Compare and contrast various cellular processes
	5	Summarize genome instability and cell transformation
	6	Design evolutionary time scale
PSB (BOUT 113) Cytogenetics and plant breeding III	1	Describe the principles of Mendelian inheritance
	2	Summarise Concept and methods of plant breeding
	3	Illustrate the methods of hybridisation
	4	Compare and contrast classical genetics, microbial genetics and cytogenetics
	5	Evaluate and categorise plant genetic resources
	6	Organize linkage and recombination
PSB (BODT 114) Pomoculture and Fruit Processing Technology IV	1	Define pomology
	2	Explain fruit processing technology
	3	Illustrate harvesting, preservation, processing and marketing of fruits
		Compare various methods of propagation
		Evaluate present status of fruit growing in India and Maharashtra
		Develop fermented products and plant by-product waste utilization
PSB (BODT 114) Practical Based on BODT 114: V	1	Describe, recognise different fruit processing technology
	2	Discuss and explain different harvesting technology
	3	Demonstrate any one by-product of wastes of fruits
	4	Compare methods of Pruning and training of fruit plants
	5	Estimate maturity in locally growing fruit plants
	6	Develop jam, Jelly, Marmalade from locally available fruits
PSB (BOUP 115) Practical based on BOUT 111, BOUT 112 & BOUT 113	1	Describe morphological, anatomical and reproductive structures of lower cryptogams
	2	Classify plants on the basis of different systems of classification
	3	Demonstrate isolation of various cell organelles and their relevant estimation

	4	Investigate different plant fossils and geological time scale
	5	Estimate gene and genotypic frequencies
	6	Organise induced cell senescence
		SEMESTER II
PSB (BOUT 121) Plants Systematics II	1	Describe and memorise characteristics of pteridophytes
	2	Recognise orders of pteridophytes
	3	Classify gymnosperms by Raizada and Sahani (1996)
	4	Distinguish between Gymnosperm and Angiosperms
	5	Summarise characteristics features of Pteridophytes, Angiosperms & Gymnosperms
	6	Arrange phases of plant classification
PSB (BOUT 122) Molecular Biology II	1	Define and describe Molecular biology
	2	Explain techniques and tools in molecular biology
	3	Write structure and functions of DNA
	4	Distinguish and differentiate between minor and major techniques in molecular biology
	5	Compare between Genomics and proteomics
	6	Generalise concept and importance of gene regulation
PSB (BOUT123) Biochemistry III	1	Define and describe fundamental aspects of biochemistry
	2	Discuss and classify biomolecules of biochemistry
	3	Demonstrate phytochemical extraction
	4	Classify and describe proteins
	5	Estimation of different biomolecules
	6	Invent and compose in phytochemistry

PSB (BODT 124) Floriculture and Nursery Management IV	1	Define and describe floriculture
	2	Classify and summarise horticultural practices
	3	Demonstrate growing media for plant growth
	4	Distinguish and compare between floriculture and nursery management
	5	Select and summarise steps of producing plants from seed
	6	Design different types of nurseries
PSB (BODP 124) Practical based on BODT 124 Floriculture and Nursery Management V	1	Define and describe methods pf post harvesting technology
	2	Discuss and explain different special cultural practices for flower crop
	3	Demonstrate and experiment on grafting and budding methods
	4	Categorise different methods of seed germination
	5	Revise and summarise propagation and planting-pruning management
	6	Design and construct bed for nursery
PSB (BOUP 125) Practical based on BOUT 121,122 &123	1	List and memorise plant families as per Bentham & Hooker's system
	2	Recognise and classify of plant families on the morphological basis
	3	Illustrate and write isolation & quantification of plant genomic DNA
	4	Test & contrast, investigate seed storage proteins from legumes
	5	Estimate protein by Lowry and Bradford methods
	6	Formulate preparation of solutions & buffers

	Class : M.Sc. Botany -II	
	SENESTER III	
PSB (BOUT 231) Computational Botany	1	Describe, define and tabulate different statistical methods
	2	Classify and explain statistical techniques
	3	Demonstrate, Apply and Examine statistical techniques
	4	Distinguish and categorise different technique of statistics, scientific Communication and Bioanalytical techniques
	5	Compare and Estimate different statistical and bioanalytical techniques
	6	Generalised, Create and Formulate computational techniques
PSB (BOUT 232) Developmental Botany	1	Describe and Define concept of developmental Botany
	2	Discuss and classify different developmental stages of embryology
	3	Demonstrate, Classify and Examine different stages of plant Development
	4	Distinguish and Differentiate sequence of plant development
	5	Summarise and Evaluate different Techniques and characteristics of morphogenesis
	6	Generalise different terms and developmental Stages of plant development
PSB(BOUT 233) Plant Physiology	1	Describe, Define able to understand the various physiological life processes in plants
	2	Summarize, describe and distinguish of mechanisms of physiological phenomenon in plants
	3	Demonstration, examine and classify about various mechanisms of growth, development and functioning of plants
	4	Differentiate and Compare physiological processes of plants
	5	Summarise physiological phenomenon
	6	Generalise different mechanism of plant physiological processes
PSB (BODT 234) Plant Ecology	1	Describe and Define various ecological terms
	2	Clarify and Discuss ecological phenomenon
	3	Relate and Classify ecological concepts
	4	Distinguish and compare different types of ecology
	5	Evaluate and Estimate general and applied ecology
	6	Generalise and Derive Ecological phenomenon
SEMESTER IV		
PSB (BOUT 241) Botanical Techniques	1	Describe and define various botanical techniques and bioinformatical terms
	2	Compare and Explain different botanical techniques
	3	Demonstrate and examine several botanical techniques
	4	Distinguish and compare various botanical techniques
	5	Discriminate and summarise different botanical techniques
	6	Formulate and organise different botanical techniques
PSB (BOUT 242)	1	Describe and state various advanced plant ecological terms
	2	Classify and review on basic and advanced ecological phenomenon
	3	Illustrate and Examine concepts of advanced ecology

PSB (BODT 243) **Advanced Medicinal Botany**	1	Define and Describe Pharmacognosy, various plant drug types
	2	Discuss and clarify advanced medicinal phenomenon
	3	Relate and examine pharmacogenetic techniques
	4	Distinguish and inspect advanced medicinal techniques
	5	Compare and summarise advanced medicinal botany
	6	Derive and generalise advanced pharmacognostic study.
PSB (BODT 244) **Herbal Technology**	1	Define and state herbal technology and Herbal Nutraceuticals
	2	Discuss and Estimate Herbal medicines and Nutraceuticals
	3	Examine and relate Herbal technology, Nutraceuticals, Drug Industry & Herbal Products
	4	Differentiate and compare various ayurvedic terms
	5	Estimate and discriminate Cosmaceuticals, Nutraceuticals along with various drug types
	6	Generalise and formulate various legal rights such patenting, IPR
PSB (BODP244) PG Dissertation	1	Define terminology of research methodology
	2	Describe technique of micro-biotechnique of plants
	3	Give poster presentation
	4	Demonstrate and identified types of research
	5	Analysis of statistical test
	6	Demonstrated plagiarism and bibliography
PSB (BOUP 245) Botany Practical paper based on BOUT241 and BOUT242	1	Explain, classify and handling of botanical techniques
	2	Estimate and demonstration of the plant contents ,plant diversity
	3	Summarise and categorized ecological parameters, types of ecosystem
	4	Calculate and analysis of water bodies ,soil contents, stomatal index
	5	Compare and summarized ecological parameters
	6	Formulate and generalise component of ecosystem

Advanced Plant Ecology

2. Department of Chemistry

Under Graduates Course

Program Outcomes (2020-2021)		
Name of Programme : Bachelor of Science (B. Sc.) Chemistry		
PO. No.	**Program Outcomes Chalked out by Department**	**Graduate Attributes**
1	Demonstrate comprehensive knowledge and understanding of one or more disciplines which form a part of an undergraduate programme of study.	Disciplinary knowledge
2	Express thoughts and ideas effectively in writing and orally.	Communication Skills
3	Evaluate practices, policies and theories by following scientific approach to knowledge development.	Critical thinking
4	Apply one's learning to real life situations.	Problem solving
5	Draw valid conclusions and support them with evidence and examples.	Analytical reasoning
6	Plan, execute and report the results of an experiment or investigation.	Research-related skills
7	Work effectively and respectfully with diverse teams.	Cooperation/ Team work
8	Critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.	Scientific reasoning
9	Work independently, identify appropriate resources required for a project, and manage a project through to completion.	Self-directed learning
10	Effectively engage in a multicultural society and interact respectfully with diverse groups.	Multicultural competence
11	Adopt objective, unbiased and truthful actions in all aspects of work.	Moral and ethical awareness/reasoning
12	Have a capability for mapping out the tasks of a team or an organization.	Leadership readiness/qualities
13	Acquire skills to learn how to learn.	Lifelong learning
14	Develop social, cultural and national integrity.	Reflective thinking

Program Specific Outcomes (2021-2022) B.Sc. Chemistry		
Name of Program (with Specialization) - Bacher of Science in Chemistry		
PO. No.	**Programme Specific Outcomes Chalked out by Department**	**Graduate Attributes**
1	Students learn the basic terms, theories, principles of chemistry and of its different sub-subjects.	Critical thinking
2	Identify and analyse problems and issues with well-defined solutions.	Lifelong learning
3	Students get the hands on training of the chemistry related equipment's.	Digitally literate
4	Use modern techniques, software's and web resources	Problem solving
5	Create an awareness about the impact of chemistry on the environment, in and ouside the scientific society.	Reflective thinking & Cooperation/Team work
6	Know the safety rules of chemistry required for working in and outside the laboratory	Moral and ethical awareness/reasoning
7	Know historical development of chemistry	Moral and ethical awareness/reasoning
8	Role of Chemical industry in the economy.	Leadership readiness/qualities
9	Get acquainted with advance chemistry related equipment's.	Lifelong learning
10	Use modern research techniques	Reflective thinking

Course Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachelor of Science in Chemistry		
Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department**
(CH-101) Physical Chemistry	1	Students should be define thermodynamic principles(Remembering)
	2	Students should illustrate for Calculations of enthalpy, Bond energy, Bond dissociation energy, resonance energy, Kirchhoff's equation.(Understanding)
	3	Students should be identify Relation between Free energy and equilibrium and factors affecting on equilibrium constant.(Appling)
	4	Students examine Gas equilibrium, equilibrium constant and molecular interpretation of equilibrium constant, Van't Haff equation and its application.(Analyzing)

	5	Students will be justify concept to ionization process occurred in acids, bases and pH scale (Evaluating)
	6	Students will estimate concepts such as Common ion effect hydrolysis constant, ionic product, solubility Analyzing)
(CH-102) Organic Chemistry	1	Define Physical Effects, Electronic Displacements: Inductive Effect, Electrometric Effect, Resonance and Hyper conjugation. (Remembering)
	2	Understand the fundamentals, principles, and recent developments in the subject area.(Understanding)
	3	Interpret R/S, E\Z Configurations of organic compounds.(Appling)
	4	Explain Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer. representations. Conformations concerning ethane, butane and cyclohexane.(Analyzing)
	5	Develop a method for the preparation of alkane, alkene, and alkyne. (Evaluating)
	6	Create the foundation for research and development in Chemistry .(Creating)
(CH-103) Chemistry Practical Course I	1	Students should be define the Importance of chemical safety and Lab safety while performing experiments in the laboratory, Set up the apparatus properly.(Remembering)
	2	Students will classify thermochemical parameters and related concepts.(Understanding)
	3	Students make use of techniques of pH measurements.(Appling)
	4	Students should analyse preparation of buffer solutions.(Analyzing)
	5	Students should be determine organic compounds (non instrumental) (Evaluating)
	6	Students will test of chromatographic techniques for separation of constituents of mixtures.(**Creating)**
Semester-II		
(CH-201): Inorganic Chemistry	1	Students define various theories and principles applied to revel atomic structure origin of quantum mechanics and its need to understand structure of hydrogen atom(Remembering)
	2	Students explain schrodinger equation for hydrogen atom, radial and angular part of hydrogenic wave functions.(Understanding)
	3	Students apply rules for filling electrons in various orbitals- Aufbau's principle, Pauli exclusion principle, Analyzing)
	4	Hund's rule of maximum multiplicity (Appling)
	5	Students design Skeleton of long form of periodic table, atomic structure, geometry and effect of lone pairs with examples such as ClF3, Cl2O, BrF5.(Analyzing)
	6	Students assess the Skeleton of the long form of the periodic table.(Evaluating)
(CH-202) Analytical Chemistry	1	Define term mole, millimole, molar concentration, molar equilibrium concentration and Percent Concentration. **Remembering**)

	2	Outline the Basics of type determination, characteristic tests and classifications, reactions of different functional groups.(**Understanding**)
	3	Calculations of mole, molar concentrations and various units of concentrations will be helpful for the preparation of the solution (**Appling**)
	4	Assemble SI units, the distinction between mass and weight (**Analyzing**)
	5	Decide Working of pH meter, elemental analysis (**Evaluating)**
	6	Designing flow sheet of separation of binary mixture, Purification techniques. (Creating)
(CH-203) Practical Chemistry	1	Students should be defined inorganic estimations using volumetric analysis(**Remembering**)
	2	Students should analyses synthesis of inorganic compounds(**Understanding**)
	3	. Students will classify commercial products(**Appling**)
	4	Students will able to build techniques of purification of organic compounds(**Analyzing**)
	5	Students should evaluate mechanism of reactions.(**Evaluating)**
	6	Student plan for preparations and Mechanisms of reactions(**Creating**)

Semester-III		
(CH-301) Physical and Analytical Chemistry	1	Students should be define kinetics, rate law, order, molecularity.(Remembering)
	2	Students should illustrate calculations of Arrhenius equation, Collision and transition state theory.(Understanding)
	3	Students should be illustrates surface chemistry, adsorption, adsorption materials. Relation with Langmuir adsorption isotherm, Freundlich's adsorption isotherm, BET theory.(Appling)
	4	Students assumes errors, accuracy, precision, minimization of errors, significant figures and computation and shows reliability of results and numerical.(Analyzing)
	5	Students will be perceive concept of volumetric analysis in Neutralization, Complexometric, redox and precipitation titrations.(Evaluating)
	6	Students will adapt theory of bimolecular reaction, adsorption process to real life problem, statistical methods in analytical chemistry.(Creating)
CH-302 Inorganic and Organic Chemistry	1	Define terms related to MOT, coordination compound, Hydrocarbons. (Remembering)
	2	Explain the terms LCAO principle, types of MO's.(Understanding)

	3	Recognize functional groups and their reactions, addition reaction, nucleophilic substitution, elimination reaction(Appling)
	4	Apply reaction mechanism to predict the products of the reaction in SN1, SN2, E1, E2, rearrangement reaction. Apply rules of absolute configuration and will predict the configuration at chiral C atom.(Analyzing)
	5	Decide whether the reaction SN1, SN2, E1, E2 Reaction.(Evaluating)
	6	Plan for the synthesis of Alcohol, Ether, and Phenols.(Creating)
CH-303 Practical Chemistry	1	Students understand basic concept/principles of Physical, Analytical, Organic and Inorganic chemistry.(Remembering)
	2	Students demonstrate practical skills and learn basics behind the experiments.(Understanding)
	3	. Students developed background for advanced and applied studies in chemistry.(Appling)
	4	Students assumes techniques of experiments to do smart work.(Analyzing)
	5	Students agree to the provided procedure to do laboratory work.(Evaluating)
	6	Students elaborate the idea and apply skill in the practical.(Creating)

Semester-IV		
CH-401 Physical and Analytical Chemistry	1	students should define phase, components, degrees of freedom Gibbs phase rule. (Remembering)
	2	Students should illustrate phase diagrams of one- component systems- water, carbon dioxide and sulphur systems, problems.(Understanding)
	3	Students should apply ideal solutions, Raoult's and Henry's Law to relation with binary systems of partially miscible liquids-CST.(Appling)
	4	Students assumes Electrolytic Conductance, Resistance, conductance, Ohm's law, cell constant Kohlrausch's law and Whetstone Bridge.(Analyzing)
	5	Students will perceive concept Lambert-Beer's Law Principle, Construction and Working of calorimeter. Students conclude column chromatography with application.(Evaluating)
	6	Students will adapt theory of Phase equilibrium, working of calorimeter, column chromatography methods in analytical chemistry.(Creating)
CH-402 Inorganic and	1	Define Isomerism in coordination complexes (Remembering)
	2	Explain principle of CFT, Apply crystal field theory to different type of complexes (Td, Oh, Sq. Pl complexes) & Correlate no of

Organic Chemistry		unpaired electrons and orbitals used for bonding. (Understanding)
	3	Apply principles of VBT to explain bonding in coordination compound of different geometries. (Appling)
	4	Examine: i) strong field and weak field ligand approach in Oh complexes ii) Magnetic properties of coordination compounds on the basis of weak and strong ligand field ligand concept. iii) Origin of colour of coordination complex. (Analyzing)
	5	Determine field stabilization energy and magnetic moment for various complexes. (Evaluating)
	6	Discuss synthesis of expected aldehydes and ketones. Perform inter conversion of functional groups. Give synthesis of expected carboxylic acids and their derivatives.(Creating)
CH-403 Practical Chemistry	1	Student find theoretical principles experimentally (Remembering)
	2	Student Interpret the experimental data on the basis of theoretical principles. (Understanding)
	3	Student make use of theory to the experiments. Understand / verify theoretical principles by experiment.(Appling)
	4	Student take part in systematic methods of identification of substance by chemical methods. (Analyzing)
	5	Student assess to write balanced equation for all the chemical reactions performed in the laboratory. (Evaluating)
	6	Student develop and perform organic and inorganic synthesis and able to follow the progress of the chemical reaction. Perform the quantitative chemical analysis of substances and able to explain principles behind it.(Creating)

Semester-V		
501: Physical Chemistry- I	1	Tell historical of development of quantum mechanics in chemistry. (Remembering)
	2	Explain the differences between classical and quantum mechanics. (Understanding)
	3	Utilize the idea of wave function, Photochemistry & Quantum chemistry (Appling)
	4	Simplify De Broglie hypothesis and the uncertainty principle (Analyzing)
	5	Interpret the operators: Position, momentum and energy (Evaluating)
	6	Estimate Schrodinger equation for 1D, 2D and 3D model(Creating)
CH-502 Analytical Chemistry-I	1	Define basic terms in gravimetry, spectrophotometry, qualitative analysis and parameters in instrumental analysis. (Remembering)
	2	Illustrate important parameters in analytical processes or estimations. (Understanding)

	3	Experiment with different principles involved in the gravimetric, spectrophotometer, parameters in instrumental analysis, ualitative analysis. (Appling)
	4	Examine quantitative calculations depending upon equations student has studied in the theory. (Analyzing)
	5	Evaluate the different analytical terms, process and analytical methods. (Evaluating)
	6	Design analytical procedure for given sample. (Creating)
CH-503 Physical Chemistry Practical-I	1	Recall of Refractometer, Spectrophotometer, Conductometer and Viscometers and their principles. To find R.I. , absorbance, maximum wavelength, conductance and viscosity of different solutions (Remembering)
	2	Demonstration of refractometer, spectrophotometer, conductometer and viscometer (Understanding).
	3	Application of various intruments and developing knowledge (Appling)
	4	Examining the changes in solution on mixing by using instrumental methods (Analyzing)
	5	Imporatance of the instruments like Refractometer, Conductometer, Spectrophotometer, Viscometer . (Evaluating)
	6	Building of knowledge of handling the instruments. (Creating)
CH-504: Inorganic Chemistry - I	1	To define all the terms in MOT of Coordination Compounds, Metals, Semiconductors and Superconductors etc. (Remembering)
	2	To explain electro neutrality principle and different types of pi bonding, Nephelauxetic effect towards covalent bonding, electrical conductivity of metals with respect to valence electrons, effect of temperature and impurity on conductivity of metals and semiconductors. (Understanding)
	3	To develop the interest in MOT of Coordination Compounds, Metals, Semiconductors and Superconductors etc. (Applying)
	4	To compare the different approaches to bonding in Coordination compounds and to distinguish the difference between Na, Mg, and Al in terms of valence electrons and conductivity. (Analysing)
	5	To give importance of lanthanide elements in different industries. (Evaluating)
	6	To develop interest in MOT of Coordination Compounds, Metals, Semiconductors and Superconductors and Inorganic Reaction Mechanism etc. (Creating)
CH-505 Industrial Chemistry	1	Define various term used in chemical industries & list the application of chemicals.(Remembering)
	2	Explain physic-chemical principle to the manufacturing of various chemicals. (Understanding)
	3	Make use of catalyst in chemical reaction.(Appling)
	4	Distinguish between soap & detergents, Dyes & pigments.(Analyzing)

	5	Decide the used of correct raw material for particular production.(Evaluating)
	6	Construct a flow sheet diagrams.(Creating)
CH-506 Inorganic Chemistry Practical-I	1	Define the terms Gravimetric estimation, Inorganic preparation and Inorganic Qualitative analysis.(Remembering)
	2	Interpret Gravimetric estimation, Inorganic preparation and Inorganic Qualitative analysis.(Understanding)
	3	Experiment with Gravimetric estimation, Inorganic preparation and Inorganic Qualitative analysis.(Applying)
	4	Examine the inorganic practical techniques.(Analysing)
	5	Determine the various techniques of inorganic practical chemistry.(Evaluating)
	6	Test the various inorganic salts and mixtures.(Creating)
CH-507 ORGANIC CHEMISTRY-I	1	Recall the terms- Aromatic, Non-aromatic, Anti aromatic compounds. (Remembering)
	2	Explain different types of elimination reactions and factor affecting the reactivity-effect of structure, attacking base, and leaving groups (Understanding)
	3	List of different types of rearrangement reaction and their synthetic applications. (Applying)
	4	Make use of different active methylene compounds in organic synthesis. (Analysing)
	5	Criteria for deciding the compounds into aromatic, non-aromatic anti aromatic etc. (Evaluating)
	6	Discuss the electrophilic and nucleophilic substitution reaction of polycyclic and hetero aromatic compounds. (Creating)
CH-508 Chemistry of Biomolecules	1	To define various terms in Carbohydrates, Lipids Amino acids and proteins, Enzymes and Hormones. (Remembering)
	2	To classify different amino acids and proteins. (Understanding)
	3	To makes uses of different charts of Carbohydrates, Lipids Amino acids and proteins, Enzymes and Hormones prepared by students. (Applying)
	4	List different types of amino acids and proteins. (Analysing)
	5	To explain classes of enzyme with subclasses and examples. (Evaluating)
	6	To discuss concept of endocrinology, types of endocrine gland and their hormones. (Creating)
CH-509 Organic Chemistry Practical-I	1	Student should define general concept in Organic chemistry practicals.(Remembering)
	2	Student should apply the effectively communicate scientific information and research results in written and oral formats.(Understanding)
	3	Students develop experimental techniques by using modern instrumentation methods.(Appling)
	4	Student should take part in the laboratory skills needed to design, safely conduct and interpret chemical research.(Analyzing)

	5	Student should deduce the qualitative chemical analysis of substances and able to explain principles behind it.(Evaluating)
	6	Student should develop skills required in chemistry such as the appropriate handling of apparatus and chemicals. (Creating)
CH-510 (B) : Polymer Chemistry	1	Define the history of polymers. (Remembering)
	2	Compare the simple compounds and polymer. (Understanding)
	3	dentify the names of polymers and various ways of nomenclature.(Appling)
	4	Distinguish between natural, synthetic, organic and inorganic polymers. (Analyzing)
	5	Terms-Monomer, Polymer, Polymerization, Degree of polymerization, Functionality, Number average, Weight average molecular weight. (Evaluating)
	6	Predict the role of polymer industry in the economy and advantages of polymers.(Creating)
CH-511 A Environmental Chemistry	1	To define environment, some environmental concepts, segments of environment, hydrosphere, and water pollution. Which analytical techniques and methods of treatments used in water pollution? (Remembering)
	2	Explaination of various terms used in environmental chemistry. Classification of water pollutants, anions, cations elements in water. (Understanding)
	3	Identification of water pollutants, different elements in water. Make use of various water treatments. To plan various measures to minimize water pollution..(Appling)
	4	To assume various factors affecting environmental pollution, to classify pollutants into different categories. List of water pollutants. (Analyzing)
	5	Explaining natural cycles, COD, BOD, DO. To evaluate DO, organic, inorganic pollutants Evaluating)
	6	Building a knowledge of environmental pollution, various segments in environment, Minimizing water pollution by designing different methods decreasing pollution. .(Creating)

Semester-VI		
CH-601 : Physical Chemistry-II	1	Recall the terms related to electrochemistry, Nuclear Chemistry,Crystal Structure and Quantum chemistry.(Remembering)
	2	Understand the single electrode potentials,Cell reactions and it's classification and Various quantum equations (Understanding)
	3	. Apply Knowledge to explain experimental observations.(Appling)
	4	Explain the various terms related to electrochemistry , Nuclear chemistry, crystal structures and basic of quantum chemistry (Analyzing)

	5	Prove the equations for secondary references electrode , various types of cells and electrodes , kinetic deacy and quantum equations.(Evaluating)
	6	Plan for solve numericals related to nuclear chemistry and crystal structure.(Creating)
CH-602 : Physical Chemistry-III	1	Define Colligative properties, polymer ,solid state, Concept in electronic structurer,Dilute solution and macroscopic properties.(Remembering)
	2	Distinguished and explain discuss the concept of kinetic reaction ,the parabolic rate law ,electronic structurer of solid.(Understanding)
	3	Draw the diagrams of Backemans reactions , Abbe Nollets experiments, Hartley- Berkeleys method, Osmotic pressur, Modern Osmometer(Appling)
	4	Estimate the modelung constant equation, electronic conductivity of various ionic crystal.(Analyzing)
	5	Justify the Prout- Tompki s equations , Semiconductor,Osmotic pressurer , and Lowering of vapour pressure.(Evaluating)
	6	Prove Vant Hoff equation, Arrhenius theory of electrolytic Dissociation.(Creating)
CH-603 : Physical Chemistry Practical	1	Recall of Instruments like Potentiometer, Ph meter and their principles ((Remembering)
	2	Demonstration of potentiometer, ph meter .(Understanding)
	3	Application of various instruments and developing knowledge of operating these instruments. (Appling)
	4	Examining the changes of solutions on mixing using these instruments (Analyzing)
	5	Imporatance of the instruments like potentiometer and ph meter .(Evaluating)
	6	Building knowledge of handling the instruments. .(Creating)
CH-604 : Inorganic Chemistry -II	1	To define organometallic chemistry, homogeneous and heterogeneous catalysis. (Remembering)
	2	To classify essential properties of heterogeneous catalysts, metals as enzymatic and non-enzymatic. (Understanding)
	3	To identify the biological role of inorganic ions & compounds. (Applying)
	4	To compare organic polymers . (Analysing)
	5	To explain the functions of hemoglobin and myoglobin in O2 transport and storage. (Evaluating)
	6	To develop the interest in Homogeneous and Heterogeneous catalysis, Inorganic solids/ionic liquids of technological importance. (Creating)
CH-605: Inorganic Chemistry -III	1	To define different theories of Acid-Bases,Pauling's univalent radius and crystal radius. (Remembering)
	2	To explain various methods of nanoparticle synthesis, Zeolite synthesis and their structure, Strength of various types acids. (Understanding)

	3	To solve simple problems based on Pauling's univalent radii and crystal radii, simple problems based on Born- Haber cycle. (Applying)
	4	To distinguish between the defects. (Analysing)
	5	To explain Application of zeolites, Nanoparticles, carbon nanotube . (Evaluating)
	6	To develop interest in Nano chemistry. (Creating)
CH-607: Organic Chemistry-II	1	Define the terms volumetric estimations, Flame photometry, chromatography, nanosynthesis.(Remembering)
	2	Interpret volumetric estimations, Flame photometry, chromatography, nanosynthesis. (Understanding)
	3	Experiment with volumetric estimations, Flame photometry, chromatography, nanosynthesis.(Appling)
	4	Examine the inorganic practical techniques.(Analyzing)
	5	Determine the various techniques of inorganic practical chemistry.(Evaluating)
	6	Test the various inorganic estimations and synthesis. (Creating)
CH-608: Organic Chemistry-II	1	Students will define the principle of mass spectroscopy, its instrumentation and nature of mass spectrum. (Remembering)
	2	Students will illustrate the principle of UV spectroscopy and the nature of UV spectrum. They will learn types of electronic excitations. (Understanding)
	3	Students will be able to Experiment with calculate maximum wavelength for any conjugated system. And from the value of λ-max they will be able to find out the extent of conjugation in the compound. (Appling)
	4	Students will examine the principle of IR spectroscopy, types of vibrations and the nature of IR spectrum. (Analyzing)
	5	Justify the IR spectrum, they will be able to find out IR frequencies of different functional groups. And thus, they will be able to find functional groups present in the compound. (Evaluating)
	6	Students will be able to design the NMR data and they will be able to use it for determination of structure of organic compounds.(Creating)
CH-609 Organic Chemistry Practical-III	1	Recall the terms related to Retrosynthetic Analysis and Applications, Organic Reaction Mechanism and Synthetic Applications ,Reagents in Organic Synthesis, Natural Products (Remembering)
	2	Compare and classified various retrosynthetic reactions and explain the terms related to natural products(Appling)
	3	Apply stability, energy calculations and optical activity of conformers (Understanding)
	4	Analyze and distinguish different models and to draw different types of conformational isomers of decalin in chair form (Analyzing)
	5	Justify the stability of geometrical isomers of decalin (Evaluating)

	6	Design various types of molecular rearrangement reactions (Creating)
CH-610 (B) Introduction to Forensic Chemistry	1	The define significance of forensic science to human society. (Remembering)
	2	Explain fundamental principles and functions of forensic science. (Understanding)
	3	Identify the work nature in a forensic science laboratory. .(Appling)
	4	Compare encourage academic students towards the noble career .(Analyzing)
	5	Design forensic identification of illicit liquors. (Evaluating)
	6	Develop narcotics, drugs and psychotropic substances. (Creating)
CH-611(A): Analytical Chemistry-II	1	Define basic terms in solvent extraction, basics of chromatography, HPLC, GC, and AAS and AES. (Remembering)
	2	Explain different principles involved in the analyses using solvent extraction, basics of instrumental chromatography, HPLC, GC, and atomic spectroscopic techniques. (Understanding)
	3	Identify important parameters in analytical processes or estimations.(Appling)
	4	Compare among the different analytical terms, process and analytical methods.(Analyzing)
	5	explain theoretical principles with help of practical. (Evaluating)
	6	Design analytical procedure for given sample. (Creating)

Post Graduate Course

Program Specific Outcomes (2021-2022)		
Name of Program (with Specialization) - Master of Science in Chemistry		
PSO. No.	**Programme Specific Outcomes Chalked out by Department M.Sc. Chemistry**	**Graduate Attributes**
1	having a clear understanding of modern challenges and subject-related concepts.	Critical thinking
2	demonstrate your understanding of the essential concepts of chemistry and use it in a variety of disciplines.	Lifelong learning
3	Apply cutting-edge ideas from analytical, physical, chemistry to address challenging issues and enhance human lives	Digitally literate
4	By working in the pure, transdisciplinary, and multi-disciplinary fields of chemicalsciences, one can design experiments, analyse data, synthesise information, and interpret data to offer answers to various industrial challenges.	Problem solving
5	Conduct independent research or investigation to address issues of practical importance.	Reflective thinking & Cooperation/ Team work
6	Increase environmental awareness and accountability, and use knowledge to address environmental pollution-related problems.	Moral and ethical awareness/reasoning
7	Apply diverse chemistry principles to the synthesis, characterisation, and theoretical study through research	Moral and ethical awareness/reasoning
8	produce fresh scientific insights or lead to the development of innovative new uses for chemical research	Leadership readiness/qualities
9	Targeted strategy of the CSIR-NET and GATE exams for Ph. D. programme research possibilities at the global level.	Lifelong learning
10	Opportunities to work for organisations affiliated with the national and state governments, such as IISC, IIT, NCL, ONGC, ISRO etc.	Reflective thinking

Course Outcomes (2020-2021)		
Name of Program (with Specialization) – Master of Science in Chemistry		
Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department**
		SEM I
CHP-110 Physical Chemistry-I	1	Student should list thermodynamics concepts, quantum mechanics and change of state concepts of chemical bonding, chemical kinetics, enzyme catalysis & molecular thermodynamics (Remembering)
	2	Student should interpret & explain concepts of V.B.T, Helmholtz function, Schrodinger wave function, molecular reaction dynamic and explain complex reaction, thermodynamics and collision. (Understanding)
	3	Student Should apply and solve the problem on quantum chemistry, chemical kinetics, thermodynamics. (Applying)
	4	Student should take part in diagram of flash photolysis, flow technique and energy level diagram. (Analyzing)
	5	Student Should estimate the Schrodinger equation normalization wave function, method for determining of molar qualities V.B.T, chain reaction, Eyring equation and Michalis mechanism attrition function. (Evaluating)
	6	Student should plan for daily life based on thermodynamics, rewrite H2-Br2 mechanism. (Creating)
(CHI-130) Inorganic Chemistry-I	1	Define the concept of point group, trends of periodic table. (Remembering)
	2	Compare the concept of symmetry, symmetry elements and hydrides of alkali and alkaline earth metals(Understanding)
	3	Classify the molecules according to their point group and oxides and oxyacids of phosphorus and sulphur. (Analyzing)
	4	Student will build hybridization, geometry of interhalogen compounds. (Appling)
	5	Evaluate the point group of different molecules and nature, bonding, geometry of oxides and halides of xenon. (Evaluating)
	6	Student apply symmetry operations present in a molecule. (Creating)
CHO-150 Organic Chemistry-I (Basic Organic Chemistry)	1	Recall the concept stereochemistry and its importance; their rules and the concept of chirality. (Remembering)
	2	*Understand the role of various reaction intermediates like carbocation, carbanion, carbenes, radicals, and nitrenes in organic reactions; concept of NGP. (Understanding)*
	3	Plan the synthesis of monocyclic heterocyclic compounds. (Applying)

	4	Distinguish between the aromatic, anti-aromatic and non-aromatic organic compounds. (Analysing)
	5	Explain the mechanism of different rearrangement reactions and appreciates the various steps involved in the molecular rearrangements. (Evaluating)
	6	Choose the synthetic reagent for oxidation and reduction reactions. (Creating)
CHG – 190, General Chemistry-I	1	To recall the concepts: Crystalline solids, unit cell, and types of unit cells. **(Remembering)**
	2	To classify extrinsic defects and intrinsic defects. **(Understanding)**
	3	To make use of charts to explain BCS Theory Of Superconductivity and Meissner's effect. **(Applying)**
	4	List the different methods of synthesis of solids. **(Analysing)**
	5	To explain bonding in solids and electronic properties. **(Evaluating)**
	6	To discuss about high temperature superconductors and their uses. **(Creating)**
CHP-107 Basic Practical Chemistry-I	1	Student should find out the acidity, basicity and PKa Value on p^H meter. **(Remembering)**
	2	Student should explain the preparation of organic compounds, their purifications and run TLC. **(Understanding)**
	3	Student should apply the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry. **(Applying)**
	4	Student should simplify the energy of activation and second order reaction. **(Analysing)**
	5	Student should conclude the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry. **(Evaluating)**
	6	Student should estimate specific rotations and percentage of optically active substances by polarimetrically. **(Creating)**

SEM II		
Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department**

CHP-210 Physical Chemistry - II (Molecular Spectroscopy and Nuclear Chemistry)	1	Student should Find the types of molecule on the basis of moment of inertia and rotational spectra of di- and poly-atomic molecules **(Remembering)**
	2	Student should explain the concept of harmonic and Anharmonic oscillator and able to breakdown of the Born-Oppenheimer approximation. **(Understanding)**
	3	Student should choose the concept of Quantum and classical theory of Raman effect, pure rotational Raman spectra, vibrational Raman spectra, polarization of light and Raman effect, structure determination from Raman and Infra-red spectroscopy, applications **(Applying)**
	4	Student should discover the Electronic Spectroscopy of molecules. **(Analyzing)**
	5	Student should assess the concept of Mossbauer Spectroscopy Principle, Instrumentation and Applications of Mossbauer Spectroscopy **(Evaluating)**
	6	Student should adapt and solve the concept of Radioactivity, Elements of Radiation, Nuclear Fission**.(Creating)**
CHI-230) Inorganic Chemistry-II	1	Students define quantum number, term, states, spectrochemical series, nephelauxetic series and HSAB, chelate effect. **(Remembering**
	2	Student classify interelectronic repulsion, importance and transport of metal ions. (**Understanding**)
	3	Solve the problem based on terms, states, microstates, selection rules and recognize the role of metal complexes in biological systems. (**Appling)**
	4	. Distinguish between the weak field and strong field splitting of the terms, states and electron transfer reaction, electronic substitution reaction. reactions of coordinated ligands and Template effect, concept of spontaneous self-assembly model compounds. (**Analyzing**)
	5 6	Students evaluate the selection rules, terms, states and microstates and role of Cu, Fe, Mn and Mo in metalloprotein and metalloenzymes. (**Evaluating)** Students design the correlation table, orgel diagram, splitting of terms different mechanism involved in exchange of ions across cellwall,Na+/K+-ATPase ion pump for active transport of Na+ and K+.(**Creating**)
CHO-250 Organic Chemistry-II (Photochemistry, Pericyclic and Organic spectroscopy)	1	Recall the basic principle of spectroscopic methods and their applications in structure elucidation of organic compounds. **(Remembering**
	2	Explain the concepts of free radical reactions, mechanism and the stereochemistry of pericyclic reactions. **(Understanding)**
	3	Apply the concept of MOT and will be able to extend this in predicting reaction mechanism and stereochemistry of electrocyclic reactions. **(Applying)**

	4	Analyze the 1H-NMR spectrum for simple organic compounds mentioning multiplicity pattern and coupling constant with the help of Tree Diagram. **(Analysing)**
	5	Determine the λmax of organic compounds containing more than one and less than four conjugated systems. **(Evaluating)**
	6	Solve Problems based on UV, IR, MS, 1H-NMR, 13C-NMR. (**Creating**)
CHG – 290, General Chemistry -II, Elective Option - B: Organometallic and Inorganic Reaction Mechanism	1	List organic ligands and their nomenclature, recall 18 electron rule. **(Remembering)**
	2	To summarize bonding between Metal Atoms and organic pi systems. **(Understanding**
	3	To identify 18 electron complexes. **(Applying**
	4	Distinguish between inert and labile complexes. **(Analysing)**
	5	To explain Catalytic reaction involving organometallic compounds and mechanism of these reactions. **(Evaluating**
	6	To discuss types of reactions in coordination compounds, substitution reactions in coordination complexes and their mechanism, stereochemistry of reaction, kinetics of reactions. **(Creating)**
CHG-290 A Electro analytical Techniques of Analysis	1	Student should find the equivalence conductance, cell Constant, specific conductivity and order of reaction by conductometrically. **(Remembering)**
	2	Student should illustrate the unknown concentration of anion and amount of substance in given solution by polarographically. **(Understanding)**
	3	Student should develop the construction of cell and solve the stability constant, solubility product and amount of halides mixture in solution by potentiometrycally. **(Applying)**
	4	Student should examine the concept of pH metry**(Analysing)**
	5	Student should determine the acid and base dissociation constant of an amino acid and tribasic acid. **(Evaluating)**
	6	Student should adopt the concept of XRD, Interpretation of Raman Spectra of diatomic molecule. **(Creating)**

SEM III		
Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department M.Sc.-II Organic Chemistry (PSCO)**

CHO-350) Organic reaction mechanism and Biogenesis	1	. Define all the terms in different reaction mechanism & Biogenesis. (**Remembering**)
	2	Classify all the Biogenesis product such as terpenoids, alkaloid etc. and to compare the Kinetic and non-kinetic methods Generation, stability, reactivity of Free radical in synthesis. (**Understanding**)
	3	To solved general reactions of free radicals via Inter- and intra-molecular bond formation and bond cleavage also different method for synthesis of Biogenesis product. (**Appling**)
	4	Motivate the students to develop an interest in Biogenesis of natural products such as terpenoids, alkaloid etc. and different mechanisms in organic reaction mechanism. (**Analyzing**)
	5	To explain the Hammet plots, Hammet equation, substituent constants, reaction constants, use of Hammet plots, calculation of k and K, Deviations from straight line plots, Taft equation, solvent effects. (**Evaluating**)
	6	Predict the product in different reactions (**Creating**
Structure Determination of Organic Compounds by Spectroscopic Methods	1	Define the terms NMR, 13C NMR, 15N, 19F and 31P NMR spectroscopy ,2D NMR, Mass spectroscopy. (**Creating)**
	2	Interpret various signals of spectroscopy. (**Understanding**)
	3	Identify various signals of NMR, 13C NMR, 15N, 19F and 31P NMR spectroscopy ,2D NMR, Mass spectroscopy. (**Applying**)
	4	Analyse spectroscopic information to find structural information of molecule. (**Analyzing**)
	5	Compare the signals with each other using spectroscopic method. (**Evaluating**)
	6	Formulate spectroscopic information to find structural information of molecule. (**Creating)**
CHO-352 Stereochemistry and Asymmetric Synthesis.	1	Recall the terms related to stereochemistry of polysubstituted cyclohexane and its conformation, Fused and bridged ring system, resolution method, chiral auxillary, chiral pool, application of asymmetric synthesis **(Remembering)**
	2	Outline the different interaction or effect in conformation of polysubstitud cyclohexanes and their stabilities. **Understanding)**
	3	Utilize different types of chiral catalyst in asymmetric synthesis. **(Applying)**
	4	Comparison between symmetric and asymmetric synthesis. **(Analyzing)**
	5	Decide the stability of products using crams model, felkin anh model, crams chelation, cram dipolar models etc. **(Evaluating)**

	6	Design the synthesis using different chiral reagents and chiral auxillary. **(Creating)**
CHO-353(B): Designing Organic Syntheses and Heterocyclic Chemistry	1	Students should be able to define the retrosynthetic analysis, disconnection approach, Synthons, multiple step synthesis, functional group intercoversion. **(Remembering**)
	2	Students should be able to interpret the retrosynthesis and synthesis of following Molecules**(Understanding)**
	3	Students will be able to identify the systematic nomenclature (Hantzsch-Widman System) **(Applying)**
	4	Analyze chemical behaviour of heterocyclic compounds and their applications in: Biological systems**(Analysing)**
	5	Prove Synthesis, reactions and structural effects of heterocyclic rings**(Evaluating)**
	6	Build Methods in Ring Synthesis of Aromatic Heterocyclic Systems**(Creating)**
PSC(CHO-354) Solvent free reaction	1	Students can find different methods for solvent free organic synthesis. (**Remembering**)
	2	Classify solvent free organic synthesis into Solvent Free C-C, C-N, C-X, C-S, N-N Bond formation(**Understanding**)
	3	Students utilize pre- and post-experiment skills work-up, isolation and purification of products, physical constants etc. (**Appling**)
	4	Students can examine the progress of the reaction using TLC. (**Analyzing**)
	5	Students can explain different molecular rearrangement & name reaction mechanism. (**Evaluating**)
	6	Students can minimize the use of solvent by solvent free organic synthesis(**Creating)**

SEM IV		
Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department**

(CHO-450) Chemistry of natural product	1	To find different methods in synthesis of natural products. **(Remembering**)
	2	To explain the Total Synthesis of Hirsutellone B, Ribisins A and B, Subincanadine E ,Vannusals and Pinnaic acid **(Understanding)**
	3	To solved the stereochemistry case study of Longifolene **(Applying)**
	4	To mention different function of all the natural product. **(Analysing)**
	5	To compare all the methods for synthesis of the natural product. **(Evaluating)**
	6	To solved different problems on the natural product. **(Creating)**
(CHO-451) Organometallic Reagents in Organic Synthesis	1	What are the uses of organometallic reagents in different types of organic reaction. (**Remembering**)
	2	Illustrate the C=C formation reactions: Wittig, Horner-Wordworth-Emmons, Shapiro, Bamford Stevens,etc. (**Understanding**)
	3	Examine the Multi-component reactions: Ugi, Passerini, Biginelli and Mannich reaction (**Analyzing**)
	4	Explain the C-C, C-N, C-O bond formation reactions using organometallic catalyst. (**Evaluating**)
	5	Elaborate the use of silicon and boron reagents in organic synthesis. (**Creating)**
	6	Utilize the organometallic reagent for Multi-component reactions: Ugi, Passerini, Biginelli and Mannich reaction (**Applying**)
(CHO-452 A) Concepts and applications of Medicinal Chemistry	1	What are peptides, proteins . What is medicinal chemistry, QSAR, SAR **(Remembering)**
	2	Classification of peptides, medicines. Explanatioon of SAR, QSAR (**Understanding**)
	3	Application of proteins, peptides, SAR **(Applying)**
	4	Analysis of peptides, proteins, nucleic acids, medicines, physicochemical analysis, mode of action. **(Analyze)**
	5	Importance of proteins, peptides, sequencing, QSAR, SAR **(Evaluating)**
	6	To plan synthesis and action of Anti-infective agents, Tetracyclines, macrolides. Development of knowledge about medicine and application. **(Creating)**
	1	Define concept of type determination and separation **(Remembering**)

(CHO-453)Ternary Mixture separation, carbohydrate synthesis and Isolation Natural Products and Project	2	Classify meticulously record physical constants **(Understanding)**
	3	Plan micro scale chemical elemental analysis **(Applying)**
	4	. Simplify qualitative estimation of functional groups **(Analysing)**
	5	Evaluate recrystallize /distill the separated compounds **(Evaluating)**
	6	Modify these skills to organic synthesis **(Creating)**
CHO- 454 Practical II- Convergent and Divergent Organic Synthesis	1	What is convergent and divergent organic synthesis. How compounds are synthesized using this method **(Remembering)**
	2	Outline of the synthesis of compound in stages like two, three and five stages. **(Understanding)**
	3	Choose of different starting compound for synthesis and planning **(Applying)**
	4	Inspection of formed compounds at different stages **(Analysing)**
	5	Comparing the purity, yield of formed compounds with standards. (**Evaluating)**
	6	Development of knowledge of synthesis and creationg practical knowledge **(Creating)**

Course Outcomes (2021-2022) MSc II
Name of Program (with Specialization) – Master of Science in Chemistry

Title of Course	CO. No.	Course Outcomes Chalked out by Department MSc II Physical Chemistry (PSCP)
		SEM III
CHP-310 Quantum and Solid State	1	Define basic postulates of quantum mechanics, properties of quantum mechanical operators, eigen functions and values**.(Remembering)**
	2	Understand the basic of calculation of ground state energy and wave function variation principle, wave function for multielectron system**.(understabding)**
	3	apply approximation methods, nondegenrate perturbation method and variation method **(Applying)**
	4	analyse Defects in solids, point defects, line defects **(Analyzing)**
	5	Student must know the importance of the crystal growth techniques, general principles, methods of crystal growth **(Evaluating)**
	6	elaborate the solid state reactions thermal decomposition, kinetic characteristics, gas solid reactions and their characteristics **(Creating)**
CHP-311 Nuclear Radiation and Polymer chemistry	1	tell the basic of nuclear reaction and its type, along with nuclear reactors**, (Remembering)**
	2	demonstrate the different aspects thermal, fast and intermediate reactors. **(Understanding**
	3	develop the knowledge of reactor fuel materials, reactor moderators and reflects coolants, control materials, shield**.(Applying)**
	4	classify and compare the different nuclear models like The liquid drop model and shell model **(Analyzing)**
	5	estimate the nuclear nuclear binding energies, properties of isobars**, (Evaluating)**
	6	Discuss the basic concepts and thermodynamics of polymer solutions, copolymerisation and measurements of molecular weights**.(Creating)**
CHP-312 Physicochemical methods of analysis	1	Which are the different X-ray methods and properties of' X-rays, **(Remembering**
	2	illustrate the Concept of absorptive edge, X-ray absorptive apparatus. X ray fluorescence, and fundamental principles. **(Understanding)**
	3	identify the difference between wavelength dispersive and energy dispersive, qualitative and quantitative analysis. **Creating)**
	4	Catagorised spectral splitting and chemical shift . (Evaluating)
	5	Explain Thermal methods of analysis: TGA, DTA, DSC and Voltammetry Amperometric Titrations: **(Analyzing)**
	6	Discuss Inductively coupled plasma atomic emission spectroscopy: Luminescence, chemiluminescence, electrochemiluminescence, and Coulometry **(Creating)**

CHP-313 Photochemistry and Polymer	1	Tell the basics of photochemistry along with the laws of photochemistry in details **(Remembering)**
	2	Explain the mechanism of absorption emission of radiation and draw the Jablonski diagram **(Understnding)**
	3	Build the Photophysical kinetics of uni and bimolecular processes (Applying)
	4	Classify the types of Lasers **(Analyzing)**
	5	importance of techniques and properties in polymer chemistry such as morphology, rheology **(Evaluating)**
	6	Disucss polymer processing, conducting polymers. **(Creating)**
CHP-314 Practical I	1	Know how the Thermodynamic data of electrochemical cell can be determine by e.m.f. measurements.and Find the equilibrium constant of triiodide ion formation **(Remembering)**
	2	Illustrate dipole moment of liquid at various temperatures and interprete the Kinetics of iodination of aniline: pH effect and base catalysis. **(Understanding)**
	3	Make use of spectrophotometry to find the Dissociation constant of an acid- base indicator and to utilise actinometer for photolysis of uranyl oxalate. **(Applying)**
	4	Discover Absorption coefficient and half thickness of lead for gamma radiation.and examine the photometric titration of a mixture of Bi and Cu with EDTA. **(Analyzing**
	5	Determine the reaction between potassium persulphate and potassium iodide by colorimetry and to estimate chain linkage in poly (vinyl alcohol) from viscosity measurements. **(Evaluating)**
	6	Predict concentration of Boric acid titrating withn NaOH by Conductometry. **(Creating)**

Title of Course	**CO. No.**	**Course Outcomes Chalked out by Department MSc II Physical Chemistry (PSCP)**
		Semester IV
CHP-410	1	Define Nuclear spin. nuclear resonance saturation. Shielding of magnetic nuclei, chemical shift, deshielding. spin-spin interactions. **(Remembering**

	2	Explain basic principles of Electron Spin Resonance Spectroscopy, zero field splitting and Kramer's degeneracy and to interpret factors affecting the"g" value. **(Understanding**
	3	Make use of Nuclear quadrupole resonance spectroscopy **(Applying)**
	4	Analyse X-Ray diffraction, Index reflections and Identifications of unit cell from systematic absences in diffraction pattern. **(Analyzing)**
	5	Determine scattering intensity and scattering angle and explain Neutron Diffraction analysis **(Evaluating**
	6	Discuss Magnetic susceptibility, Pascal constant, Diamagnetic susceptibility, paramagnetic susceptibility, and elaborate Magnetic susceptibility by Faraday and Gouy Techniques **(Creating)**
CHP-411	1	Define Adsorption at liquid surfaces, Gibbs equation and its verification, Gibbs Monolayers, insoluble films on liquid substrates, states of monomolecular Films and relate Wetting, flotation, detergency. **(Remembering)**
	2	Explain Adsorption forces, thermodynamics of physical adsorption, heat of adsorption and extend its determination, measurement of adsorption by different methods, chemisorption and its mechanism. **(Understanding)**
	3	Utilize the BET, Potential and Polanyi models (no derivation)for Multilayer adsorption. **(Applying**
	4	Categorise pore size distribution methods and to discover Adsorption behaviours of porous materials. **(Analyzing)**
	5	Explain Debye Huckel Theory, limited and extended law, Fick's laws of diffusion and to Interpret the Einstein relation between diffusion coefficient and ionic mobilities, The Nernst-Einstein equation, Butler- Volmer equation, and Tafel equation. **(Evaluating)**
	6	Discuss Standard electrode between absolute and potentials, Liquid junction potential, Zeta potential, and to elaborate electro-kinetic phenomena, electrode-electrolyte interface, double layer theories. **(Creating**
CHP-412A Material and catalysis chemistry	1	Tell hi tech materials Defect perovskites, super conductivity in cuprates. **(Remembering)**
	2	Explain the preparation & characterization of 1-2-3 & 2-1-4, Normal state properties, anisotropy, temperature dependents of electrical resistance and applications of hitech materials **(Understanding)**
	3	Make use of preparation techniques of thin films and their application **(Applying)**
	4	Dissect the concepts of superconducting solid-solid materials and high and low critical temperature superconductors. **(Analyzing)**

	5	Explain the knowledge of materials of solid devices **(Evaluating)**
	6	To understand the theories of catalysis preparation, characterisation, catalysis in green chemistry and photocatalysis. **(Creating)**
CHP-413A Physical Chemistry Practical III	1	Find the Hydrolysis constant of aniline hydrochloride by distribution coefficient method and know the method for determination of the dimerization constant of an organic acid in benzene**. (Remembering)**
	2	Explain the determination of the stability constant of a complex by spectrophotometry and studies on a clock reaction: determination of the energy of activation a. Reactions such as bromate-bromide reaction, iodate iodide reaction, b. Formaldehyde - bisulphite reaction etc **(Understanding)**
	3	Experiment with the determination of half-life of two isotopes in a mixture and study of characteristics of GM counter. **(Applying)**
	4	Analyze the effect of salt on the distribution of acetic acid between water ethyl acetate and the effect of addition of a salt on the solubility of an acid in water. **(Analyzing)**
	5	Measure the concentration of sulfuric acid, acetic acid and copper sulphate by conductometric titration with sodium hydroxide and order of reaction of iodination of aniline. **(Evaluating)**
	6	Propose a method to determine second order velocity constant of ethyl acetate by conductometry. **(Creating**
CHP-414 Physical Chemistry Practical II	1	Show the solubility of a sparingly soluble salt by conductometry and titration of polybasic acid with sodium hydroxide by pH-metry. **(Remembering**
	2	Explain the formation constant of a complex by pH- metry and solubility diagram for a three Component liquid system. **(Understanding)**
	3	Experiment with Molecular weight of a polymer by end group estimation and the formula of complexes such as silver -ammonia complex by titration, cuprammonium ion complex by distribution coefficient measurement. **(Applying)**
	4	Discover the transport number of silver and nitrate ions in aqueous solution from the cell potential of the concentration cell with junction potential and TGA curve of $CuSO_4$ and NaCl **(Analyzing)**
	5	Determination of the heat of ionization of phenol/weak acid and determine the relative strength of acetic acid, chloroacetic acid and tri-chloroacetic acid by conductometry. **(Evaluating)**
	6	Estimate the solubility of given salt at room temperature from its solubility curve and the effect of amount of different salts on critical temperature of phenol water system. **(Creating)**

3. Department of Electronic Science

Under Graduates Course

Program Outcomes (2021-2022)		
Name: of Programme : Bachelor of Science (B. Sc.) Electronics Science		
PO. No.	**Program Outcomes Chalked out by Department**	**Graduate Attributes**
1	Demonstrate comprehensive knowledge and understanding of one or more disciplines which form a part of an undergraduate programme of study.	Disciplinary knowledge
2	Express thoughts and ideas effectively in writing and orally.	Communication Skills
3	Evaluate practices, policies and theories by following scientific approach to knowledge development.	Critical thinking
4	Apply one's learning to real life situations.	Problem solving
5	Draw valid conclusions and support them with evidence and examples.	Analytical reasoning
6	Plan, execute and report the results of an experiment or investigation.	Research-related skills
7	Work effectively and respectfully with diverse teams.	Cooperation/Team work
8	Critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.	Scientific reasoning
9	Work independently, identify appropriate resources required for a project, and manage a project through to completion.	Self-directed learning
10	Effectively engage in a multicultural society and interact respectfully with diverse groups.	Multicultural competence
11	Adopt objective, unbiased and truthful actions in all aspects of work.	Moral and ethical awareness/reasoning
12	Have a capability for mapping out the tasks of a team or an organization.	Leadership qualities
13	Acquire skills to learn how to learn.	Lifelong learning
14	Develop social, cultural and national integrity.	Reflective thinking

Program Specific Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachelor of Science in Electronic science		
PO. No.	**Program Outcomes chalked out by Department**	**Graduate Attributes**
PSO1	To frame the syllabus with specific focus on technical learning areas.	Digital and technical literate
PSO2	To cultivate students with necessary basic concepts and knowledge of electronics science and technology.	Critical thinking
PSO3	To develop practical skills among students such as handling, using various electronics gadgets.	Lifelong learning
PSO4	To train students to develop skills so that they can design, analyze, build and test various electronic gadgets.	Problem solving
PSO5	To develop skills among the students to demonstrate the acquired knowledge	Communication skill, Reflective thinking & Cooperation/Team work
PSO6	To encourage students to accept the challenges and threats of upcoming technological advancements.	Moral and ethical awareness/reasoning

Course Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachelor of Science in Electronic science		
Title of Course	**CO. No.**	**Course Outcomes chalked out by Department**
Paper-I (EL-111): Basics of Applied Electronics	CO1	To identify different parameters/functions/specifications of components used in electronic circuits. (Understanding)
	CO2	To solve problems based on network theorems. (Analyzing)
	CO3	To perform simulations using simulator for analyzing network performance. (Understanding, thinking, Applying and reasoning)
Paper-II (EL-112): Electronic Devices and Circuits	CO1	To analyse performance parameters based on study of characteristics of electronic devices like diode, transistors etc. (Understanding)
	CO2	To choose proper electronic devices as per the need of application (Remembering)
	CO3	To perform simulations for designing and analysing diode/transistor circuits. (Understanding, thinking, Applying, reasoning and Evaluating)
	CO4	To build and test the circuits like street light controller using electronic devices. (Understanding, Applying and Evaluating)
Practical Course-I (EL- 113): ELECTRONICS LAB Sem-I	CO1	To identify different components and devices as well as their types. (Remembering)
	CO2	To understand basic parameters associated with each device. (Understanding)
	CO3	To know operation of different instruments used in the laboratory. (Remembering)
	CO4	To connect circuit and do required performance analysis.(Understanding)
	CO5	To compare simulated and actual results of given particular experiment. (Understanding, thinking,Applying , reasoning and Evaluating)
Paper-I (EL-121): Fundamentals of Digital Electronics Sem-II	CO1	To solve problems based on inter conversion of number systems. (Understanding)
	CO2	To reduce the expression using Boolean theorems. (Analyzing)
	CO3	To reduce expressions using K maps in SOP and POS forms(Understanding, Remembering)
	CO4	To understand how to use flip flops to build modulus counter(Creating, analyzing)
	CO5	To familiarize with applications of counters like ring counter or event counter.(Evaluating)
Paper-II (EL-122): Analog and Digital Device applications	CO1	To compare different op-amp as per specifications or performance parameters.(Remembering)
	CO2	To understand op-amp circuits and its usefulness indifferent applications.(Understanding, Remembering)
	CO3	To know operating principle of IC 555 indifferent configurations.
	CO4	To understand different types of DAC and their performance parameters.(Analyzing)

	CO5	To study different types of ADC and their performance parameters.(Analyzing)
Practical Course-II (EL-123): ELECTRONICS LAB	CO1	To connect op-amp circuits and analyze the output.(creating, analyzig)
	CO2	To build application circuits of op-amp.(creating, analyzig)
	CO3	To design the output frequency of IC 555 as a astable/monostable multivibrator.
	CO4	To compare simulated and actual results of given circuit.(Understanding, thinking,Applying and reasoning)
S. Y. B. Sc. (CBCS): Paper – I (EL-231): Communication Electronics	CO1	Understand basics of communication electronics.
	CO2	Understand techniques of communication.
	CO3	Able to differentiate between different modulation techniques..(creating, analyzig)
	CO4	Identify the application areas of each communication technique(remembering)
Paper – II (EL-232): Digital Circuit Design	CO1	Able to compare different logic families.(remembering)
	CO2	Understand design procedure of combination logic circuit.(Understanding)
	CO3	Understand design procedure of sequential logic circuit.(Understanding)
	CO4	Able to understand types of DAC and ADC.(thinking)
Practical Course-I (EL-233): ELECTRONICS LAB	CO1	Understand basic skill development techniques.(applying)
	CO2	Able to design and develop different analog and digital systems as per application.(Creating)
	CO3	Familiarity with different communication systems and techniques of modulation and demodulation.(understanding)
	CO4	Skill and logic development through different activities like project or PLE(Understanding, thinking,Applying , reasoning and Evaluating)
Paper-I (EL-241): Analog Circuit Design	CO1	Develop an ability to design amplifier circuit with given specification.(Understanding, thinking,Applying , reasoning and Evaluating)
	CO2	Understand and able to differentiate different types of power amplifier and their applications.(evaluation)
	CO3	Able to design different application circuits using operational amplifier.(creating, analyzing)
	CO4	Understand systematic approach of designing analogy systems.(Understanding)
Paper-II (EL-242): Microcontroller and Python Programming	CO1	Understand basics of Arduino board architecture.(Understanding)
	CO2	Understand programming technique of Arduino.(Understanding)
	CO3	Understand basics of python programming.(Understanding)
	CO4	Able to develop an Arduino based applications using python programming.(Creating)
Practical Course-II(EL-243):	CO1	Understand basic skill development techniques.(Understanding)
	CO2	Able to design and develop different analog and digital systems as per application.(Creating)

ELECTRONICS LAB	CO3	Familiarity with different communication systems and techniques of modulation and demodulation.(Understanding)
	CO4	Skill and logic development through different activities like project or PLE.(critical thinking)
T.Y.B.Sc: EL 351: Paper I: Digital Design using VERILOG	CO1	Know and understand structure of HDL and Verilog. (understanding)
	CO2	Understand different modeling styles in Verilog (understanding)
	CO3	Use Verilog effectively for simulation, verification and synthesis of digital system. .(critical thinking)
	CO4	Understand basics of programmable logic devices. (understanding)
EL 352:Paper II: Microcontroller Architecture and Programming	CO1	Understand the basics of microcontroller. (understanding)
	CO2	Acquire basic programming skills in C language. (analysis)
	CO3	Understand and acquire basic programming skills for AVR microcontroller. (Understanding, applying)
EL 353 Paper III: Analog circuit Design and Applications	CO1	Understand basics of analog circuit design. (remembering)
	CO2	Analyze waveform generators required for testing different circuits.(analysis)
	CO3	Build application circuits using specialized ICs.(remembering)
	CO4	Design analog systems using available ICs. (applying)

EL 354: Paper IV: Nanoelectronics	CO1	Understand basic concepts of nano electronic devices and nano-technology.(understanding)
	CO2	Understand the electron transport mechanism in nanostructures.(understanding)
	CO3	Understand techniques of characterization of nanostructures.(remembering)
	CO4	Understand different devices constructed using nanotechnology(understanding)
EL 355: Paper V: Signals and Systems	CO1	Know basics of electronic signals.(understanding)
	CO2	Know different types of systems.(understanding)
	CO3	Analyze systems using Laplace and Fourier analysis.(analyzing)
	CO4	Understand digital signal processing system. (understanding)
EL 356(A): Paper VI(A): Optics and Fiber Optic Communication	CO1	To acquire Knowledge of optical fiber communication system.(understanding, analysis)
	CO2	To understand different parameters of optical fibers.(remembering)
	CO3	To learn essential optical components of Fiber Optic Communication.(remembering)
	CO4	To analyze and integrate fiber optical network components in variety of networking schemes(analyze)
EL 357: Paper VII: Practical Course I	CO1	Analyze different design and test procedures for analog circuits and systems.(remembering)
	CO2	Measure different parameters of optical fiber communication systems(understanding)
	CO3	Understand importance of product design and entrepreneurship.(applying)

	CO4	Develop electronic systems for given application. (applying)
EL 358: Paper VIII: Practical Course II	CO1	Develop and simulate design digital systems using Verilog.(critical thinking)
	CO2	Design and develop AVR microcontroller based systems.(critical thinking)
	CO3	Understand different nanoelectronic devices.(remembering)
	CO4	Inculcate basic skills required for design and development of embedded. (reasoning)
EL 359: Paper IX: Practical Course III (Project)	CO1	Understand basic methodology of selection of topic for project.(critical thinking)
	CO2	Understand how to do literature review for selected topic for project.(analyze)
	CO3	Apply the knowledge for design and development of the selected project.(applying)
	CO4	Use different software and hardware for testing, validation and verification of circuits for successful outcome of project(remembering, understanding)
	CO5	Understand documentation process in the form of presentation and project report (understanding)
	CO6	Understand process of systematic development of electronic system and Development of skills for successful outcome (applying)
ELSEC 351: Paper X: SEC1: Electronic Design Automation Tools	CO1	Design the electronics circuits using EDA software tools(applying)
	CO2	Simulate various analog and digital circuits using EDA software tools(applying)
	CO3	Plot various waveforms.(analysis)
	CO4	Simulate basic electronic system blocks(evaluating)
ELSEC 352: Paper XI: SEC2: Internet of Things and Applications	CO1	Know the basic building blocks of IoT(understanding)
	CO2	Know IoT protocols(remembering)
	CO3	Understand how to Design and Develop IoT based system through case studies. (analysis)
T.Y.B.Sc: EL 361: Paper I: Modern Communication Systems	CO1	Understand the digital modulation techniques.(analysis)
	CO2	Understand different types of pulse modulation techniques.(understanding)
	CO3	Describe the evolution and importance of Mobile communication and cellular communication(evaluating)
	CO4	Know the basics of satellite communication systems. (analyze)
T.Y.B.Sc: EL 362: Paper II: Embedded System Design using Microcontrollers	CO1	Understand features and architecture of PIC microcontroller.(understanding)
	CO2	Demonstrate how to interface PIC microcontroller with different peripherals.(evaluating)
	CO3	Understand features and architecture of ARM microcontroller.(remembering)

	CO4	Demonstrate embedded system using given microcontroller(reasoning)
T.Y.B.Sc: EL 363: Paper III: Industrial Electronics	CO1	Understand basics of semiconductor power devices.(understanding)
	CO2	Analyze basic power electronics circuits and demonstrate applications.(analyze)
	CO3	Understand basics of motor control.(remembering)
	CO4	Understand basics of Electric Vehicle systems.(understanding)
T.Y.B.Sc: EL 364: Paper IV: Manufacturing Processes for Electronics	CO1	Understand basics of Passive Electronic Component Manufacturing Processes(remembering, analyzing)
	CO2	Understand process involved in PCB manufacture and Modern Circuit Assembly(remembering)
	CO3	Know about the Semiconductor Device and IC Fabrication Process(remembering)
T.Y.B.Sc: EL 365: Paper V: Process Control Systems	CO1	Familiar with different types of sensors and related systems(understanding)
	CO2	Know different types of measurement systems.(understanding)
	CO3	Understand control parameters in process automation.(analyzing)
	CO4	Understand different types of process control systems and their characteristics(analyzing)
EL 366(A): Paper VI (A): PLC and SCADA	CO1	Know about the basics of programmable logic controllers and their components.(understanding)
	CO2	Demonstrate PLC programming using ladder programming.(critical thinking)
	CO3	Develop PLC based systems by programming different components in PLC (critical thinking)
EL 367: Paper VII: Practical Course I	CO1	Demonstrate power electronic circuits. (remembering)
	CO2	Demonstrate different types of digital communication systems. (remembering)
	CO3	Understand working principles of different power devices and their characteristics(remembering)
EL 368: Paper VIII: Practical Course II	CO1	Design embedded systems using PIC microcontroller. (evaluating)
	CO2	Design embedded systems using ARM microcontroller. (analyze, evaluating)
	CO3	Demonstrate PLC SCADA using ladder programming. (remembering, understand)
	CO4	Design and develop sensor systems for different applications (evaluating, analyzing)
EL 369: Paper IX: Practical Course III (Project)	CO1	Understand basic methodology of selection of topic for project. (Understandiong)
	CO2	Understand how to do literature review for selected topic for project, (Understanding, remembering)
	CO3	Apply the knowledge for design and development of the selected project. (applying)
	CO4	Use different software and hardware for testing, validation and verification of(applying)

ELSEC 361: Paper X SEC1: Design of Printed Circuit Boards	CO1	Understand basics of PCB. (understanding, remembering)
	CO2	Know about the PCB design technology. (applying)
	CO3	Know about different soldering techniques. (applying)
ELSEC 362: Paper XI: SEC2: Mobile Application Development	CO1	Understand basics of Mobile application development. (remembering)
	CO2	Develop ability to work in android development environment. (applying)
	CO3	Design and develop mobile applications. (critical thinking)

4. Department of Mathematics

Under Graduates Course

Course Outcomes (2021-22)		
Name of Program (with Specialization) - Bachelor of Science in Mathematics		
Title of Course	**CO. No.**	**Course Outcomes**
MT-111:- Algebra (Theory)	CO1	Find the gcd of two integers and express it as a linear combination of those two integers. (Evaluating)
	CO2	Learn about some important results in the theory of numbers including the Euclid's lemma and Fermat's theorem.(Understanding)
	CO3	Apply De Moivre's theorem in a number of applications to solve numericalproblems.(Applying)
	CO4	Identify the different types of relations and interrelate equivalence classes and partitions. (Analysing)
	CO5	Justify the algebraic properties of complex numbers. (Analysing)
	CO6	Construct a relation satisfying conditions of none, one or many of reflexive, symmetric and transitive relations.(Creating)
MT-112:- Calculus-I (Theory)	CO1	Describe fundamental properties of the real numbers and find the limits of sequences and functions. (Remembering)
	CO2	Understand the concept of sequence, properties of sequences and continuous functions. (Evaluating)
	CO3	Solve algebraic equations and inequalities and prove simple identities. .(Understanding)
	CO4	Identify the different types of sequences.
	CO5	Decide the existence of limit of sequences and the continuity of functions of one variable.
	CO6	Imagine the graphs of simple functions. .(Understanding)
MT- 113:- Mathematics Practical (Sem-I)	CO1	Relate the knowledge of Mathematics in real life. (Remembering)
	CO2	Learn to find graphs, roots and primes integer using Maxima software.(Understanding)
	CO3	Gain confidence in solving problems. (Evaluating)
	CO4	Compare the graphs of two different functions using Maxima software.(Applying)
	CO5	Decide the sequence whether it is convergent, divergent or bounded. (Analysing)
	CO6	Construct different types of relations and sequences of real numbers (Creating)
	CO1	Understanding:Functions of two, three or more variables, Domain and Range of functions Chain Rule, Change of order of

MT- 231:-Calculus of Several variables		integration for two variables. Local Maxima and minima, saddle point.
	CO2	Evaluating: Domain and range, limit, continuity, partial derivatives of two variables functions. Double and triple integration of function of two and three variables respectively. (Remembering)
	CO3	Creating: By Graphs creates domain , range of functions, Level curves. Limit , derivatives at different points
	CO4	Remembering : function of one variable, limit and continuityand Integration of one variable function.
	CO5	Analysing : Maxima and minima, Change of order of integration for two variables. Double integral in Polar coordinates.Triple integrals , Triple integrals in spherical coordinates
	CO6	Applying: Claraiut's theorem, Chain Rule, Euler's theorem. Secon derivative Test, Langranges Multipliers, Fubini's theorem and Jacobian to solve examples. Applying Maxima Software to draw a graph, domain. Also solve Patial derivaties and double, triple integration by Maxima software.
	CO7	Comparing : Compare solution obtained by graph and by calculation. Compare a solution by changing order of derivatives.
MT-232(B):-Graph Theory	CO1	The mathematical maturity of students in their current and future courses shall develop. (Understanding)
	CO2	The students develops theoretical, applied and computational skills. (Remembering)
	CO3	The student gains confidence in proving theorems and solving problems. (Evaluating)
	CO4	The students gains interest in the course and can contribute in research field in future. (Analyzing)
	CO5	The students relates daily life problems with the content and apply the taught techniques to solve them. (Applying)
	CO6	Enabling students to develop a positive attitude towards graph theory as an interesting and valuable subject of study. (Creating)
MT- 233:- Mathematics Practical (Sem-III)	CO1	Relate the knowledge in real life. (Applying)
	CO2	Learn to draw graphs, find number of vertices and degree of each vertex, shortest paths and Hamiltonian circuits by using Maxima software. (Applying)
	CO3	Gain confidence in solving problems. (Evaluating)
	CO4	Understands limits and continuity, partial derivatives, differentiability, extreme values and multiple integrals and their applications. (Understanding)
	CO5	Build critical thinking regarding Calculus of several variables and Graph theory. (Creating)
	CO6	Acquire thinking skills in Calculus of several variables and Graph theory. (Analyzing)
MT-351:- Metric Spaces (Theory)	CO1	Recall basic concepts of real numbers. Classify the intervals and sets into open and closed sets in R.(Remembering)

	CO2	Examine continuous functions, compact sets in $\mathbb{R}$. (Evaluating)
	CO3	Define metric spaces & it's different inequalities and apply them to check metrices. (Applying)
	CO4	Define sequences and their properties. Apply it to check and classify compact, connected, dense sets.(Understanding)
	CO5	Define, examine, verify continuous functions on general metric space. (Analysing)
	CO6	Discuss and explain the open and closed sets in Metric spaces. Describe the domain, range, graphs and limits and continuity of functions. (Creating)
MT-352:-Real Analysis-I	CO1	Learn basic techniques and examples in analysis to be well prepared for courses like Topology, Measure theory and Functional analysis. (Understanding)
	CO2	Study various types of sets and relations, and concept of countable and uncountable. (Remembering)
	CO3	Solving problems on sequence and series and hence find sum of infinite terms with different methods. (Evaluating)
	CO4	Apply notion of lub and glb which helps to learn integrations which helps to find area under any functions. (Applying)
	CO5	Creating logic tables and use in real life. (Creating)
	CO6	Decide the convergence and divergence of series. (Analysing)
MT-353: Group Theory	CO1	Learn Fundamental properties and Mathematical tools such as closure, identity, inverse and generators.(Remembering)
	CO2	Study algebraic stucture 'Groups' in detail which is useful in study of Rings, Modules, Algebraic topology, Analysis. (Analysing)
	CO3	Enhance abstract thinking of students. (Creating)
	CO4	Learn about structure preservating maps between groups and their consequences. (Understanding)
	CO5	Learn to compare two different algebraic stuctures and study transfer of properties in between these stuctures through homomorphism and isomorphism. (Applying)
	CO6	Explain the significance of the notion of cosets, normal subgroups and factor groups. (Evaluating)
MT-354:-Ordinary Differential Equations	CO1	Understand the world of differential equations, system of differential equations and their applications. (Understanding)
	CO2	Solve simultaneous linear equations with constant coefficients and total differential equations. (Evaluating)
	CO3	Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients. (Analyzing)
	CO4	Understand the genesis of ordinary differential equations. (Understanding)
	CO5	Learn various techniques of getting exact solution of solvable 1st order differential equations and linear differential equations of higher order. (Remembering)
	CO6	Grasp the concept of a general solution of a linear differential equations of an arbitrary order and also learn a few methods to

		obtain the general solution of such equation. (Creating)
MT-355(A):- Operations Reaserch	CO1	Learn conversion of real life problems into mathematical models which enhance their problem solving and decision making abilities. (Understanding)
	CO2	Calculate optimal solution of models through graphical and iterative method. (Evaluating)
	CO3	Study transportation and assignment models and methods to solve them. (Remembering)
	CO4	Analyze and solve linear programming models of real-life situations. (Analysing)
	CO5	Find graphical solution of LPP with only two variables, and illustrate the concept of convex set and extreme points. (Creating)
	CO6	Determining solutions with applications to transportation, assignment and two-person zero-sum game problem. (Applying)
MT-356(B): Number Theory	CO1	Illustrate the Division and Euclidean Algorithm.
	CO2	Some of the open problems related to prime numbers.
	CO3	Write a formula for a number of +ve integer less than n that are relatively prime to n.
	CO4	State the Chinese Remainder Theorem, Fermat's Theorem and Wilson's Theorem.
	CO5	About number theoretic functions and modular arithmetic.
	CO6	The Law of Quadratic Reciprocity and other methods to classify primitive roots, quadratic residues, and quadratic non-residues.
MT-358:- Practical Course Lab-II (on Group Theory and Ordinary Differential equations)	CO1	Learn how to use different methods of solving differential equations and group theory to solve problems in daily life. (Understanding)
	CO2	Gain confidence in solving problems. (Evaluating)
	CO3	Acquire thinking skills in ordinary differential equations and group theory. (Applying)
	CO4	Build interest in courses and go in future for further studies. (Remembering)
	CO5	Research today's problems of ordinary differential equations and group theory and find solutions of them. (Analyzing)
	CO6	Invent new ideas and methods in ordinary differential equations and group theory. (Creating)
MT-3510:- Programming in python- I	CO1	Understand python looping,control statements and string manipulations. (Understanding)
	CO2	Learn how to use lists,tuples and dictionaries in python. (Evaluating)
	CO3	Explain basic principles of python programming language. (Remembering)
	CO4	Implement object oriented concepts. (Creating)

	CO5	Gain confidence in solving difficult problems in mathematics using python. (Analysing)
	CO6	Visualize the mathematical functions using python. (Applying)
MT-3511: Latex for Scientific Writing	CO1	Understanding: Definition and application of Latex. Preparation and Compilation of Latex input file.
	CO2	Evaluating: Latex Syntax, Key board Characteristics in Latex
	CO3	Creating: Text and Math mode fonts,Emphasized and colored fonts, creating and filling blank spaces
	CO4	Remembering : Formatting words, lines and Paragraph, text alignment and Qupted text, new line and paragraphs
	CO6	Analysing : Table through the tabular and tabularX Environment, Merging rows and columns of Tables.
	CO5	Applying: Table through the tabular and tabularX Environment, New lines and paragraphs,
	CO7	Comparing : Vertical Positioning of Tables, Rotated texts in Tables, Adjusting column width in tables.
		TERM-II
MT-121: ANALYTICAL GEOMETRY	CO1	Understands transformations by Translation and Rotation. (Understanding)
	CO2	Analyze the various forms of equation of plane, line, sphere and circle. (Analysing)
	CO3	Find centre of Conic, nature of Conic, Direction Ratios and Direction Cosines. (Applying)
	CO4	Evaluate length of the perpendicular from a point to a plane, angle between a line and a plane, intersection of a Sphere and a Line. (Evaluating)
	CO5	Define General and Normal form of equation of Plane, Coplanar Planes, General equation of second degree in two variables. (Remembering)
	CO6	Describe System of Planes, Determination of a plane under conditions. (Creating)
MT- 122:- Calculus-II (Sem-II)	CO1	Find the series expansion of different functions using Taylor's and Maclaurin's theorem.
	CO2	Understand differentiation and fundamental theorem in differentiation.
	CO3	Apply L'Hospital rule to find the limits in indeterminate forms.
	CO4	Find the nth derivatives of the function, evaluate its indeterminate forms.
	CO5	Explain the different methods of solving differential equations.
	CO6	Use appropriate method to find an integrating factor of differential equation.

MT- 123:- Mathematics Practical (Sem-II)	CO1	Relate the knowledge of Mathematics in real life. (Applying)
	CO2	Learn to find solutions of differential equations using maxima software.
	CO3	Gain confidence in solving problems. (Evaluating)
	CO4	Compare two dimensional shapes and three dimensional shapes using Maxima software. (Understanding)
	CO5	Decide the method to solve the given ordinary differential equation. (Creating)
	CO6	CO6Create syntax in maxima softwareto draw the graphs and to find the solutions of differential equations. (Analyzing)
MT-241: Linear Algebra	CO1	Solve systems of linear equations and interpret their results.(Evaluating)
	CO2	Describe properties of linear systems using vectors. (Remembering)
	CO3	Demonstrate and understanding of vector spaces, subspaces, bases, dimension, and their properties. (Analysing)
	CO4	Compute and interpret determinants of matrices. (Applying)
	CO5	Demonstrate and understanding of linear transformations. (Understanding)
	CO6	Obtain various variants of diagonalisation of linear transformation. (Creating)
MT 242(A) : Vector Calculus	CO1	Understanding: Vector, Scalar, Curves in Space, Limits and Continuity, Derivatives and Motion, Differentiation Rules for Vector Function, Vector Functions of Constant Length.Arc Length along a Space Curve, Speed on a Smooth Curve, Unit Tangent Vector.
	CO2	Evaluating: Curvature of a Plane Curve, Circle of Curvature for Plane Curves, Curvature and Normal Vectors for a Space Curve. Ntegrals,Surface Integrals
	CO3	Creating: Line Integral in Plane, Vector Fields, Gradient Fields, Line Integral of Vector Fields, Line Integrals with respect to dx, dy, dz .
	CO4	Remembering : Work done by a Force over a Curve in Space, Flow Integrals and Circulation for Velocity Fields, Flow across the Simple Closed Plane Curve. Path Independence, Conservative and Potential Functions. Divergence, Two forms for Green's Theorem, Green's Theorem in the Plane
	CO5	Analysing : Parameterizations of Surfaces, Implicit surfaces. Surface integrals, Orientation of Surfaces. Surface Integrals of Vector Fields
	CO6	Applying: Divergence in three Dimensions, Divergence Theorem, Unifying the Integral Theorems.

	CO7	Comparing : The Curl Vector Field, Stokes' Theorem , Conservative Fields and Stokes' Theorem, Divergence in three Dimensions, Divergence Theorem
MT-361:-Complex Analysis (Sem-VI)	CO1	Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers. (Understanding)
	CO2	Calculate exponentials and integral powers of complex Numbers (Remembering)
	CO3	Write equation of straight line, circle in complex form (Evaluating)
	CO4	Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.(Analyzing)
	CO5	Determine whether a given function is analytic. (Creating)
	CO6	Use Cauchy's integral theorem and formula to compute line integrals
MT-362:Real Analysis-II	CO1	Beta and gamma functions and their properties. (Understanding)
	CO2	Rcognize the difference between pointwise . (Remembering)
	CO3	Uniform convergence of a sequence of functions.(Evaluating)
	CO4	Some of the families and properties of Riemann integrable functions. (Creating)
	CO5	Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability. (Analysing)
	CO6	Applications of the fundamental theorems of integration. (Applying)
MT-263: Ring Theory	CO1	To write precise and accurate mathematical objects in ring theory.(Creating)
	CO2	For checking the irreducibility of higher degree polynomials over ring. (Evaluating)
	CO3	To understand the concepts like ideals and quotient rings. (Applying)
	CO4	To understand the concepts of ring homomorphism.(Understanding)
	CO5	Describe polynomial rings, principal ideal domain, Euclidean domain and unique factorisation domain, and their relationship.(Analysing)
	CO6	To understand the concepts of gaussian integers and norms. (Remembering)
MT-364:-Partial Differential Equations	CO1	Understand the world of partial differential equations, surfaces & curves in 3 dimensions, simultaneous differential equations of 1st order & 1st degree in 3 variables. (Understanding)
	CO2	Solve Pfaffian differential equations in 3 variables, . (Evaluating)
	CO3	Compute all the solutions of reducible equations & irreducible equations with constant coefficients, Integral equations passing through given Curve. (Analyzing)

	CO4	Understand the Origin of 1st order PDE and Canonical forms of 2nd order differential equations. (Understanding)
	CO5	Learn mathods of solving Linear Partial Differential Equations & rules of finding complementary functions & particular integrals. (Remembering)
	CO6	Grasp the concept of solution of Laplace equations, periodic differential equations & wave equation by Separation Variables method. (Creating)
MT- 366(B): Computational Geometry	CO1	Describe and construct basic geometric shapes and concepts by computational means (Creating)
	CO2	Construct algorithms for simple geometrical problems.(Evaluating)
	CO3	Three dimensional – Scaling, shearing, rotation, reflection, translation.(Remembering)
	CO4	Characterize invariance properties of Euclidean geometry by groups of transformations. (Analysing)
	CO5	Projection – A Geometric Interpretation of Homogeneous Coordinates.(Understanding)
	CO6	Bezier Curves – Introduction, definition, properties Curve fitting , equation of the curve in matrix form .(Applying)
MT-365(C): Financial Mathematics	CO1	Describe and explain the fundamental features of the instruments.
	CO2	Demonstrate a clear understanding of financial research planning.
	CO3	Demonstrate a clear understanding of financial research methodology and implementation.
	CO4	Demonstrate understanding of basic concepts of linear algebra relating to the linear equations.
	CO5	Demonstrate understanding of basic concepts of matrices and optimization.
	CO6	Demonstrate understanding of basic concepts relating to functions and annuities.
MT-3610: Programming in Python –II	CO1	Demonstrate the use of Python in Mathematics such as operations research and computational Geometry etc. (Evaluating)
	CO2	Study graphics and design and implement a program to solve a real world problem. (Applying)
	CO3	The students will implement the concepts of data with python and database connectivity. (Creating)
	CO4	Develop the skill of designing Graphical user Interfaces in Python. (Analysing)
	CO5	Learn and understand Python programming basics and paradigm. (Understanding)
	CO6	Study data visualization using python libraries as Matplotlib,Plotly,MayaVI. (Remembering)
MT-3611: Mathematics Into Latex	CO1	Commands and Environments, Inserting figures, Mathematical Operators, User-Defined Macros. (Understanding)
	CO2	Functional Values and Splitting in Math Mode. (Evaluating)

	CO3	Figures in Tables, Mathematical Notations, Operators and Expressions on Latex. (Creating)
	CO4	Array of Equations, Alignment and Numbering a Set of Equations. (Analysing)
	CO5	Vector and Matrix, Sub-numbering a set of Equations. (Remembering)
	CO6	New Commands, New Environments, Conditional Expressions. (Comparing)

Post Graduate Course

Program Outcomes (2021-22)		
Name: of Programme : Master of Science (M. Sc.) in Mathematics		
PO No.	**Program Outcomes Chalked out by Department**	**Graduate Attributes**
1	**Knowledge domain:** Demonstrate an understanding of the basic concepts in mathematics, statistics, operations research and their importance in the solution of some real- world problems.	Disciplinary knowledge
2	**Problem analysis:** Analyze and solve the well-defined problems in mathematics statistics, and operations research. Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decision. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.	Communication Skills
3	**Presentation and Interpretation of Data:** Demonstrate the ability to manipulate and visualize data and to compute standard statistical summaries.	Critical thinking
4	**Modern tool usage**: Learn, select, and apply appropriate methods and procedures, resources and computing tool such as PYTHON, Machine Learning,Excel, MATLAB, MATHEMATICA, SPSS etc with an understanding of the limitations.	Problem solving
5	**Ethics:** Analyze relevant academic, professional and research ethical problems and commit to professional ethics and responsibilities with applicable norms of the data analysis and research practices.	Analytical reasoning
6	**Communication**: Effectively communicate about their field of expertise on their activities, with their peer and society at large. Such as, being able to comprehend and write effective reports and design documentation, make effective presentations.	Research-related skills
7	**Project Management:** Apply Knowledge and understanding of principles of mathematics and statistics effectively as an individual, and as a member or leader in diverse teams to manage projects in multidisciplinary environment.	Cooperation/Team work

8	**Research Proposal:** Define, design and deliver a significant piece of research work that is clear and concise. Demonstrate the necessary skills and knowledge of deeper understanding of their chosen research area. Understand the philosophy of research in mathematical sciences and appreciate the value of its development.	Scientific reasoning
9	**Thrust area:** Riemannian Geometry studies smooth manifolds using a Riemannian metric. There are many applications of Riemannian geometry to other branches of mathematics and to the sciences. Einstein used it and its generalization. It impacted group theory, representation theory analysis, algebraic and differential topology.	Self-directed learning

Program Specific Outcomes (2021-22)

Name of Program (with Specialization) - Master of Science in Mathematics

PO. No.	Program Specific Outcomes Chalked out by Department	Graduate Attributes
1	Understand the mathematical concepts and application in the field of algebra / analysis, statistic, manifolds, relativity & astrophysics.	Critical thinking
2	Get jobs in public / private sectors and pursuing higher studies at national and international level.	Lifelong learning
3	To apply knowledge of Mathematics in all the fields of learning including higher research and extensions.	Digitally literate
4	To provide a systematic understanding of the concepts and theories of mathematics and analyze the situations.	Problem solving

5. Department of Physics

Under Graduates Course

POs : Program Outcomes 2021-2022 Physics		
Name of Programme : Bachelor of Science (BSc)		
PO.No.	**Program Outcomes Chalked out by Department**	**Graduate Attributes**
1	Apply the scientific knowledge to solve the complex physics problems.	Disciplinary knowledge
2	Identify, formulate, and analyze advanced scientific problems reaching substantiated conclusions using first principles of mathematics, physical, and natural sciences.	Communication Skills
3	Design solutions and system for advanced scientific problems or processes that meet the specified needs with appropriate attention to health and safety,risks, applicable standards, and economic, environmental, cultural and societal consideration.	Critical thinking
4	Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	Problem solving
5	Create and apply appropriate techniques, resources, and modern scientific tools to complex physics problems with an understanding of the limitations.	Analytical reasoning
6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional scientific practice	Research-related skills
7	Understand the impact of the scientific solution s in societal and environmental context and demonstrate the knowledge of, and need for sustainable development	Cooperation/Team work
8	Apply ethical principles and commit to the norms of scientific practice	Scientific reasoning
9	Function effectively as an individual and as a member in diverse teams, and in multidisciplinary settings.	Self-directed learning
10	Communicate effectively on scientific activites with the concerned and society at large.	Multicultural competence
11	Demonstrate knowledge and understanding of the scientific principlesand apply these o one's own work, as a member in a team, to manage projects and in multidisciplinary environments.	Moral and ethical awareness/reasoning

12	recognize the need for continuous learning and develop throughout for the professional career	Leadership qualities

Name of Programme : Bachelor of Science (BSc)		
PSO. No.	**Program Specific Outcomes Chalked out by Department**	**Graduate Attributes**
1	Understand the basic and advaance concepts of differernt branches of physics	Digital and technical literate
2	Perform and design experiments in the areas of Atomic Physics, Nuclear Physics, Electronics, Mechanics, Programming,thin & Thick film Physics.	Critical thinking
3	Enhance skills and adapt methodologies for attaining professional excellence and carrying research.	Lifelong learning
4	Apply the concepts of Physics in specialized areas of Claasical & Quantum Physics, Nuclear Physics,Atomic and Molecular , Nanomaterials, Energy , etc in industry, academic, research and day today life.	Problem solving

Course Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachelor of Science in Physics		
Title of Course	**CO. No.**	**Course Outcomes chalked out by Department**
T.Y.B.Sc. (Physics) SEM V PHY-355 Computational Physics	1	Learn the basic programming concept (Understand)
	2	Improve the logical as well as computational ability. (Evaluate)
	3	To be familiar about the basic constructs of programming such as data, (Create)
	4	operations, conditions, loops, functions etc. (Analyse)
T.Y.B.Sc. (Comp. Science) SEM V CS3510 Python Programming	1	Develop logic for problem solving (Create)
	2	Determine the methods to create and develop Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. (Analyse)
	3	To be familiar about the basic constructs of programming such as data, operations,conditions, loops, functions etc. (Understand)
	4	To write python programs and develop a small application project (Evaluate)
T.Y.B.Sc. (Physics) SEM VI PHY-361 Solid State Physics	1	study the difference between crystalline and amorphous materials, crystal structures, Millar indices etc. (Analyse)
	2	understand different crystal stuctures, Reciprocal lattice. (Evaluate)
	3	understand Bragg's Diffraction, Bragg's law, X-Ray Diffraction. Stucture determination etc., Applications in Nanotechnology. (Create)
	4	understand the Laue method, Powder method etc. Stucture determination etc., Applications in Nanotechnology. (Understand)
T.Y.B.Sc. (Physics) SEM VI PHY-363 Thermodynamics and Statistical Physics	1	study the transport phenomenon such viscosity, thermal conductivity and diffusion. .(remembering)
	2	to learn about thermodynamic functions, variables and their relations. .(thinking)
	3	to learn about distribution functions, random walk problem, mean values etc. .(Creating)

	4	to learn Gaussian probability distribution etc. .(Analyzing)
T.Y.B.Sc SEM V PHY-352 Electrodynamics	1	Define the Biot-savart law, Amperes law, Coulombs law, Electric field, Electric susceptibility, Magnetic field &Faradays law. Explain method of electrical images, equation of continuity, Magnetic vector potential, B.H curve, Maxwell's equation &wave equations (applying)
	2	Solve numerical problem on coulombs force, magnetic induction, magnetic permeability and induced voltage, magnitude of electric &magnetic vectors. Determine work done by charges, total charge, force on the wire in different symmetry. (remembering)
	3	Summarize pointing vector, polarization, reflection &refraction. Apply Biot-Savart law in different symmetry problem. .(Analyzing)
	4	List the applications of Amperes law, Biot-Savart law, Poynting theorem.Elaborate magnetic properties of the material. .(Creating)
SEM VI PHY-365 (A): Electronics-II	1	Define the Biot-savart law, Amperes law, Coulombs law, Electric field, Electric susceptibility, Magnetic field &Faradays law. Explain method of electrical images, equation of continuity, Magnetic vector potential, B.H curve, Maxwell's equation &wave equations (Create)
	2	Solve numerical problem on coulombs force, magnetic induction, magnetic permeability and induced voltage, magnitude of electric &magnetic vectors. Determine work done by charges, total charge, force on the wire in different symmetry. (Analyse)
	3	Summarize pointing vector, polarization, reflection &refraction. Apply Biot-Savart law in different symmetry problem. (Understand)
	4	List the applications of Amperes law, Biot-Savart law, Poynting theorem.Elaborate magnetic properties of the material. (Evaluate)
SEM V PHY 351 Mathematical Methods in Physics-II	1	Generate a general equation for gradient ,divergence ,curl & laplacian in an orthogonal curvilinear coordinate system & their applications in physics. (Create)
	2	Interpret relative motion, Galilean & Lorentz transformation equation (Analyse)
	3	Convert commonly occurring partial differential equations in physics into ODE's (Understand)
	4	Illustrate the problems on Frobenius method of series solution and to differentiate point of expansion of given differential equations and Evaluate &plot Legendre polynomials, Hermite polynomials ,Bessel function of first kind. (Evaluate)

SEM VI PHY 362 Quantum Mechanics		Outline the historical aspects of development of quantum mechanics; Explain the differences between classical and quantum mechanics; Describe matter waves, wave function and uncertainty principle; (Understand)
		Describe Schrodinger's equation and its steady state form; Apply Schrodinger's steady state equation for spherically symmetric potentials obtain eigen functions and eigen values; (Analyse)
		Solve Schrodinger's steady state equation for simple potentials to obtain eigen functions and eigen values (Create)
		Interpret quantum numbers in atomic system; Discuss operator algebra in quantum mechanics. (Evaluate)

Post Graduate Course

Program Outcomes (2021-22)		
Name of Programme : Master of Science (M. Sc.) in PHYSICS		
PO No.	Program Outcomes Chalked out by Department	Graduate Attributes
1	Apply the scientific knowledge to solve the complex physics problems.	Disciplinary knowledge
2	dentify, formulate, and analyze advanced scientific problems reaching substantiated conclusions using first principles of mathematics, physical, and natural sciences.	Communication Skills
3	Design solutions and system for advanced scientific problems or processes that meet the specified needs with appropriate attention to health and safety,risks, applicable standards, and economic, environmental, cultural and societal consideration.	Critical thinking
4	Use research-based knowledge and methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	Problem solving
5	Create and apply appropriate techniques, resources, and modern scientific tools to complex physics problems with an understanding of the limitations.	Analytical reasoning
6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional scientific practice.	Research-related skills
7	Understand the impact of the scientific solution s in societal and environmental context and demonstrate the knowledge of, and need for sustainable development	Cooperation/Team work
8	Apply ethical principles and commit to the norms of scientific practice	Scientific reasoning
9	Function effectively as an individual and as a member in diverse teams, and in multidisciplinary settings.	Disciplinary knowledge
10	Communicate effectively on scientific activites with the concerned and society at large.	Analytical reasoning
11	Demonstrate knowledge and understanding of the scientific principlesand apply these o one's own work, as a member in a team, to manage projects and in multidisciplinary environments.	Research-related skills
12	recognize the need for continuous learning and develop throughout for the professional career	Critical thinking

Name of Programme : Master in Science (MSc Physics)		
PSO. No.	**Program Specific Outcomes Chalked out by Department**	**Graduate Attributes**
1	Understand the basic and advaance concepts of differernt branches of physics	Critical thinking
2	Perform and design experiments in the areas of Atomic Physics, Nuclear Physics, Electronics, Mechanics,	Lifelong learning
	Programming,thin & Thick film Physics.	Digitally literate
3	Enhance skills and adapt methodologies for attaining professional excellence and carrying research.	Problem solving
4	Apply the concepts of Physics in specialized areas of Claasical & Quantum Physics, Nucleaur Physics,	Critical thinking
5	Atomic and Molecular , Nanomaterials, Energy , etc in industry, academia, research and day today life.	Research-related skills

6. Department of Zoology

Under Graduates Course

Program Outcomes (2021-2022)		
Name: of Programme : Bachelor of Science (B. Sc.)		
PO. No.	**Program Outcomes chalked out by Department**	**Graduate Attributes**
1	Demonstrate comprehensive knowledge and understanding of one or more disciplines which form a part of an undergraduate programme of study.	Disciplinary knowledge
2	Express thoughts and ideas effectively in writing and orally.	Communication Skills
3	Evaluate practices, policies and theories by following scientific approach to knowledge development.	Critical thinking
4	Apply one's learning to real life situations.	Problem solving
5	Draw valid conclusions and support them with evidence and examples.	Analytical reasoning
6	Plan, execute and report the results of an experiment or investigation.	Research-related skills
7	Work effectively and respectfully with diverse teams.	Cooperation/Team work
8	Critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.	Scientific reasoning
9	Work independently, identify appropriate resources required for a project, and manage a project through to completion.	Self-directed learning
10	Effectively engage in a multicultural society and interact respectfully with diverse groups.	Multicultural competence
11	Adopt objective, unbiased and truthful actions in all aspects of work.	Moral and ethical awareness/reasoning
12	Have a capability for mapping out the tasks of a team or an organization.	Leadership readiness/qualities
13	Acquire skills to learn how to learn.	Lifelong learning
14	Develop social, cultural and national integrity.	Reflective thinking

Program Specific Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachler of Science in Zoology		
PO. No.	**Program Outcomes chalked out by Department**	**Graduate Attributes**
1	Understand, Analyze & Compare various aspects of Zoology at different levels and its interactions with the nature through theory, practical's and field visits.	Critical thinking
2	Acquire skills & abilities to implement different biological applications for self & society development	Lifelong learning
3	Understand Physiology of different animals at different levels by using / Applying advanced Technology	Digitally literate
4	Sought out problems by applying scientific research methodologies.	Problem solving
5	Communicate & Contribute the knowledge for Nature Conservations & Nation building.	Reflective thinking & Cooperation/Team work
6	Understand , Inculcate & Communicate/Aware the ethics in Zoology & Research domain.	Moral and ethical awareness/reasoning

Course Outcomes (2021-2022)		
Name of Program (with Specialization) - Bachelor of Science in Zoology		
Title of Course	**CO. No.**	**Course Outcomes**
ZO111: - Animal Diversity I (Theory)	1	Classify animal diversity (Understanding)
	2	Recognize animals by their General characters (Analyzing)
	3	Identify organisms of Phylum- Protozoa, Porifera, Cnidaria, Platyhelminthes and Metazoa according to the Principles of taxonomy (Applying)
	4	Recall useful & harmful organisms (Remembering)
	5	Compose the diversity and its role in ecoysytem (Creating)
	6	Evaluate their role in conservation of diversity (Evaluating)
ZO112:- Animal Ecology (Theory)	1	Summarize Concepts of Ecology viz., Environment, Population, Community, Ecosystem, Biosphere, Autecology and synecology (Understanding)
	2	Find out types, structures of ecosystem (the biotic and abiotic world) around them (Remembering)
	3	Determine the food chain, energy flow and productivity in the ecosystems (Evaluating)
	4	Analyze the interactions, interrelations between varoius biotic and abiotic factors at different levels (Evaluating)
	5	Understand the characteristcs of varoious aspects of population and community (Understanding)
	6	Elaborate the resources from nature without disturbing or harming it (Creating)
ZO 113:-Zoology (Practical Paper) Sem-I	1	Identify Euglena, Paramecium, Amoeba, Plasmodium sp. With the help of compound microscope (Applying)
	2	Prepare the culture of *Paramecium* (Creating)
	3	Define various animals of different Phylum based on morphological features & taxonomic identification key (Remembering)
	4	Demonstrate the animal community structure by quadrate method (Understanding)
	5	Estimate different hydrobiological parameters & soil quality (Evaluating)
	6	Examine microscopic fauna of freshwater ecosystem (Analyzing)
ZO 121-Animal Diversity- II (Theory)	1	Identify organisms of Phylum- Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata as per taxonomy (Understanding)
	2	Distinguish differences and similarities in the various aspects of classification.(Analyzing)

	3	Define the Economic & health related role of class Nematoda (Remembering)
	4	Plan to make most use of earthworms for improving quality & quantity of crops in farms (Creating)
	5	Measure their role towards nature as conserver and promoter of life at various levels (Evaluating)
	6	Demonstrate econimic & health related roles of different insects (Understanding)
ZO123: Zoology (Practical Paper) Sem-II	1	Distinguish the animal diversity depending upon morphology, biological characters and taxonomical importance of Phylums. Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata (Analyzing)
	2	Make use of economically important Honey bees, Lac insects Silk worms, Earthworms, Bivalves, Sea Star (Applying)
	3	Outline the Principle and use of microscopes and micrometry (Understanding)
	4	Design haematologiucal studies (Creating)
	5	Identify the phases of cell division (Applying)
	6	Develop temporary mount of human buccal epithelial cells (Applying)
ZO 231-Animal Diversity III (Theory)	1	Uunderstand animal diversity of higher vertebrates (Understanding)
	2	Discover the origin and advancement of higher vertebrates (tetrapoda). (Analyzing)
	3	Identify the organisms of Chordata, Protochordata, Vertebrata, Pisces Amphibia according to the principles of taxonomy & study of scoliodon (Analyzing)
	4	Asses difference in the behaviours and adaptations in higher vertebrates (Evaluating)
	5	Measure their role in conservation of animal diversity (Evaluating)
	6	Justify his role and responsibility towards nature as a protector (Evaluating)
ZO 232: Applied Zoology I (Theory)	1	Understand the basics of life cycle of the silk worms, required tools & equipments for management of sericulture (Understanding)
	2	Distinguish different species of silk worms (Analyzing)
	3	Know the process of cultivation, rearing and management mulberry plants (Understanding)
	4	Identify different types of agricultural, stored grains, veterinary pests, Non insect pests damages due to them and their control (Applying)
	5	Manage control of different silkworm & agricultural crops related diseases (Creating)
	6	To apply the knowledge gained to their farms, agriculture which will give them good crop productivity in less efforts in a systematic way & generate revinue (Applying)
ZO 233: Zoology (Practical Paper) Sem-III	1	Identify Balanoglossus, Herdmania, Petromyzon, Pisces: Labeo, Scoliodon, Hippocampus, Amphibia :Salamandra, Rana & Ichthyophis by morphological observations (Applying)

	2	Examine External characters, types of scales, tail fins, brain & digestive system of locally available fishes (Evaluating)
	3	Able to make temporary mountings (Creating)
	4	List out different types of insect and non insect pests by morphological identification marks, nature of damage, economic importance and control measures (Analyzing)
	5	Develop operationl skill of pest control appliances (Applying)
	6	Compusory field visits will make students more expertize, confident & will be motivated towards Sericulture, Fisheries, Apiculture, Vermiculture & Lac culture businesses (Applying)
ZO 241-Animal Diversity IV (Theory)	1	Identify class Reptilia by their salient features (Understanding)
	2	Distinguish poisonous and non-poisonous snakes.(Analyzing)
	3	Know Snake venom, symptoms, effect and cure of snake bite, first aid treatment of snakebite (Understanding)
	4	Distinguish different species of aves by their salient features, adaptions in beeks and feets & Migrations (Analyzing)
	5	Identify egg laying, aqautic, flying Mammals alongwith Cursorial and fossorial adaptation (Understanding)
	6	Understand the systematic position, habit and habitat, External characters, Digestive, Respiratory, Circulatory, Nervous system, Sense organs, & Reproductive system (Understanding)
ZO 242: Applied Zoology II (Theory)	1	Understand the basics of life cycle of the honeybees, beekeeping tools, equipment, and management of beehives (Understanding)
	2	Identify different species and casts of honey bees (Applying)
	3	Evaluate the importance of byproducts of honey bees to human beings (Evaluating)
	4	Recognize important & harmful pests & diseases related to apiculture (Understanding)
	5	Realize the value of honey bees in pollination and sustaining life due to them (Evaluating)
	6	Understand fisheries and its types (in brief) : Freshwater fisheries, Marine fisheries, Brackish water fisheries. Study of Habit, habitat and culture methods of freshwater & marine water forms with examples,importance of byproducts & their preservation technioques (Understnding)
ZO 243: Zoology (Practical Paper) Sem-IV	1	Define animals of higher groups in Invertebrates and Vertebrates (Remembering)
	2	Distinguish between poisonous and non-poisonous snakes by taxonomical keys (Analyzing)
	3	Understand external and internal body of Rat (Understanding)
	4	Make use of various tools, crafts and gears used in Apiary & Fishery (Applying)
	5	Identify the pests & diseases in Apiary & Fisheries (Applying)
	6	Students can set up Apiary & Fisheries (Pond Cuulture) by their own for generating revenue (Creating)
	1	Describe the economic, ecological, and sociological benefits of IPM. (Understanding)

ZO-351 - Pest Management (Theory)	2	Distinguish positive and negative impacts of pesticide use (Analyzing)
	3	Understand problems resulting from misuse, overuse, and abuse of chemical pesticides (Understanding)
	4	Define and describe pesticide resistance and how it develops (Rememberring)
	5	dentify ecological and biological characteristics important in development of pest populations (Applying)
	6	Identify tactics commonly used in IPM and be able to distinguish them (Applying)
ZO 352 - Histology (Theory)	1	Understand basic terms related to histology and different types of tissues (Understanding)
	2	Understand the various diseases related to organs (Understanding)
	3	Distinguish the normal histology with altered organ structure in disease progression (Applying)
	4	Outline the processes involved in the preparation of tissue sections and explain the purpose of each of these processes (Understanding)
	5	Develop skill in various histological staining techniques (Creating)
	6	Relate important vital organs (Remembering)
ZO 353 - Biological Chemistry (Theory)	1	Explain the concept of pH, buffer and water , its importance the biological system (Understanding)
	2	Illustrate in details Carbohydrates its types its biological importance & its Clinical Significance (Understanding)
	3	Classify different types of Amino acids and Proteins their structure & its biological importance (Understanding)
	4	Recall Enzymes its nomenclature, types, properties, Regulatory and non-regulatory enzymes, Enzyme inhibition. & Clinical significance of enzymes - PKU and AKU (Remembering)
	5	Classify Lipids, Fatty acids - Types and nomenclature (saturated and unsaturated) , Clinical significance (obesity, atherosclerosis, myocardial infarction) & Biological importance of lipids (Understanding)
	6	Importance of Biochemistry in Life Sciences (Evaluating)
ZO 354 Genetics (Theory)	1	Described the genetic variation through linkage and crossing over, gene frequency, chromosomal aberrations and sex determination (Understanding)
	2	Interpret the theories of classical genetics and blood group inheritance in man (Understanding)
	3	Explain the concept of mutation and DNA structure (Understanding)
	4	Compare evolutionry stages (Understanding)
	5	Recall different genetic diseases (Remembering)
	6	Determine the sex and there types (Evaluating)

ZO 355 - Developmental Biology (Theory)	1	Define Concepts in Developmental Biology: Growth, Differentiation, Dedifferentiation, Cell determination, Cell communication, Morphogenesis, Induction and Regeneration (Remembering)
	2	Summarize different theories of Developmental Biology (Understanding)
	3	Examine and analyze the process of Spermatogenesis, Structure of sperm, Oogenesis, Structure of ovum with respect to human, Types of eggs (Analyzing)
	4	Explain the process Fertilization and its related aspects (Understanding)
	5	Outline the physiology of Cleavage, Blastula,Gastrulation & Chick Embryology (Understanding)
	6	Know the importance of Developmental Biology in day to day life (Evaluating)
ZO 356 - Parasitology (Theory)	1	Gain knowledge of basic terms and general concepts related parasitology (Understanding)
	2	Interpret the interactions between parasite with its host (Evaluating)
	3	Explain the basic biology and lifecycle of parasites including epidemiology, diagnosis and treatment (Understanding)
	4	Inspect morphological characteristics for identification of parasites and their developmental stages (Evaluating)
	5	Analyze the medical and public health aspects of human parasitic infections (Analyzing)
	6	Justify the control measures of arthropod vectors and Understand the importance of hygiene with respect to epidemic diseases (Evaluating)
ZO 3510: Aquarium Management (Theory)	1	Summarize the potential scope of Aquarium Fish Industry, Exotic and Endemic species Exotic and Endemic species and their nutritional values (Understanding)
	2	Examine detail biology of aquarium fishes (Evaluating)
	3	Outline food and feeding of aquarium Fishes (Understanding)
	4	Demonstrate fish transportation, handling & packaging techniquesc (Understanding)
	5	Summarize general fish aquarium maintenance & their common diseases (Understanding)
	6	Measure physico-chemical parameters of water for fish culture,preservation & breeding techniques (Evaluating)
ZO – 3511 Poultry Management (Theory)	1	Able to understand the Poultry farming practices (Understanding)
	2	Examine poultry breeding techniques (Analyzing)
	3	Able to understand poultry rearing techniques (Understanding)
	4	Analyze feeding requirement and food ingredients (Analyzing)
	5	Able to understand the poultry disease and their pathogens (Understanding)
	6	Evaluate market value of poultry products (Evaluating)

ZO 361 - Medical & Forensic Zoology(Theory)	1	The students will be able to understand the basics principles of Medical and Forensic Zoology (Understanding)
	2	Utilize scientific methods in crime detection (Applying)
	3	Make use of the advancements in the field of Medical and Forensic Zoology (Applying)
	4	Design modern tools, techniques and skills in forensic investigations (Creating)
	5	Describe the fundamental principles and functions of forensic science and its significance to human society (Understanding)
	6	Judge Medico-legal matters (Evaluating)
ZO 362 - Animal Physiology (Theory)	1	The various physiological organ-systems and their importance to the integrative functions of the human body.
	2	Understand Concept of Nutrition, Diet & energy requirements (Understanding)
	3	Explain anatomy & physiology of human Digestive system (Understanding)
	4	Recall anatomy & physiology of human circulatory & excretory system (Remembering)
	5	Demonstrate respiratory mechanism and gases transport (Understanding)
	6	Summarize the process of reproduction, endocrine Glands & Structure of smooth, skeletal, cardiac muscles & Structure of smooth, skeletal and cardiac muscles (Understanding)
ZO 363 - Molecular Biology (Theory)	1	Utilize knowledge of molecular mechanisms of various biological processes in cells and organisms (Applying)
	2	Recall structure of DNA and RNA, DNA and RNA as genetic material (Remembering)
	3	Understand to get insight into the Central Dogma of Molecular Biology, DNA Replication, Transcription, Translation - (Understanding)
	4	Understand the concept of gene regulation (Understanding)
	5	Illustrate DNA Damage, Repair & Recombinant DNA Technology (Understanding)
	6	Define Lac operon (Remembering)
ZO 364 - Entomology (Theory)	1	Define basic concepts in Entomology and its scope (Remembering)
	2	Comapre Morphology and anatomy of Insects (Analyzing)
	3	Explain social organization in Insects (Understanding)
	4	Understand the process of Metamorphosis & development process of Insects (Understanding)
	5	Identify disease causing insect vectors (Applying)
	6	Make use of economically important insects (Applying)
ZO 365 - Techniques in Biology (Theory)	1	Make use of techniques spectrophotometry in biological experiments (Applying)
	2	Understand use of different microscopes & basic principle of microscopes (Understanding)
	3	Experiment with Microtomy: tissue fixation, processing & permanent silde preparations (Applying)

	4	Estimate Total count of RBCs, WBCs and Differential count of WBCs, Bleeding time, clotting time and their significances by Haematological Techniques (Evaluating)
	5	Understand Immunological Techniques, Types of PCR & DNA Barcoding & their applications (Understanding)
	6	Interpret different Methods in Biodiversity, Instruments in Field Biology & Laboratory techniques (Understanding)
ZO 366 - Evolutionary Biology (Theory)	1	Understand Concept of Evolution, Origin of life & Evidences of Evolution (Understanding)
	2	Analyze Historical Review of Evolutionary Concept & Theories (Analyzing)
	3	Explain Sources of Variations & Isolation (Understanding)
	4	Apply evolutionary theory and concepts to address empirical and theoretical questions in evolutionary biology (Applying)
	5	Demonstrate concepts of Speciation, Population Genetics & Origin of Man (Understanding)
	6	Assess Zoogeographical Realms With reference to fauna & importance-threats of Extinctions (Evaluating)
ZO 3610 - Environmental Impact Assessment (Theory)	1	Explain Environment, imporatnce its conservations & Pollution in details (Understanding)
	2	To Understand the various act related with environment & Sustainable development (Understanding)
	3	Make use of Baseline data collection, Impact analysis, Mitigation, Reporting, Public hearing (Applying)
	4	Understand Overview of Scheme for Accreditation of EIA Consultant Organizations (Understanding)
	5	Examine interaction of humans with environment (Analyzing)
	6	Design new policies, equipments for human welfare in relation to environment (Creating)
ZO-357 - Zoology Practical-I	1	Make use ofplant protection appliances (Applying)
	2	Explain beneficial insects, pests and diseases of honeybees & Rearing of pest species (Understanding)
	3	Classify life cycle of Red cotton bug, Lemon butterfly & detection of damage caused by pests
	4	Estimate Detection of pesticides residues in food stuffs, techniques of Separation of the pesticides or plant products (Evaluating)
	5	Assess Plant disease, its intensity & calculation of VI (Virulence Index) (Evaluating)
	6	Experiment histological & haematological studies, preparation of permanent slides of different tissues of different organs and their microspcopic studies (Applying)
ZO-358 - Zoology Practical-II	1	Determine the enzyme activity, specific activity of an enzyme & Protein estimation by Lowry et al. method (Evaluating)
	2	Detection of carbohydrates, Isolation of starch from potato and digestion by salivary amylase, Isolation of Caesin from milk by adjusting iso-electric point (Evaluating)

	3	Preparation of buffer of desired pH, Principle, Working & Measurement of pH, molarity, Preparation of Acid, Alkali & it's standardisation & (Evaluation)
	4	Determine blood groups in human (ABO and Rh) (Evaluating)
	5	Explain external characters, life cycle, Rearing of Drosophila & its mutants (Understanding)
	6	Analyze human karyotypes and numerical alterations structural chromosome aberrations (Analyzing)
ZO-359 - Zoology Practical-III	1	Examine microscopically ultrastructure of Sperm and Ovum of Mammal (Analyzing)
	2	Examine microscopically different types of eggs, cleavage, blastulae gastrulae with reference to Amphioxus, Frog and Hen (Analyzing)
	3	Demonstrate chick embryology -whole mount, temporary mount of 24 hrs, 33 hrs and 48 hrs. to Study T. S. and V. S. of chick embryo of Brain & Heart (Understanding)
	4	Develop Ex-ovo culture of chick embryo (Applying)
	5	Compare different parasites & their parasitic association (Understanding)
	6	Illustrate life cycle, pathogenecity, diagnosis, conntrol measures and treatment of Entamoeba histolytica,Plasmodium vivax, Ascaris lumbricoides, Taenia solium, Soft tick, Pediculus humanus, Xenopsylla cheopis, Cimex lectularius, Tick, Mite & cockroach (Understanding)
ZO-367 - Zoology Practical-I	1	Examine Physical Properties, Chemical Properties of given urine sample, serum urea, serum uric acid & serum Calcium (Analyzing)
	2	Distinguish hair and determine the species to which the hair belongs by morphology of human hair cortex and medulla (Analyzing)
	3	Know working of Forensic Laboratory, differentiate various types of Finger prints unfolding secrets of death/crime scientifically (Applying)
	4	Estimate Haemoglobin, blood glucose level, bleeding, clotting time, preparation of haemin and haemochromogen crystals (Evaluating)
	5	Recall disorders caused by endocrine glands with the help of photographs (Remembering)
	6	Detection of blood groups, Differential, nitrogenous waste products & Measurement of lung capacity in human being (Evaluating)
ZO-368 - Zoology Practical-II	1	Outline Lab safety techniques, sterilisation, preparation of DNA paper model and study its characteristics (Remembering)
	2	Apply stain to DNA and RNA (Applying)
	3	Estimation of DNA & RNA , Isolation of DNA from Bacteria / liver / Onion & its Absorption spectra (Evaluating)
	4	Define Principle & application of Spectrophotometer & PCR (Remembering)

	5	Demonstrate external characters of Insect its Head articulations, types of mouthparts, Legs, wings and their modifications (Understanding)
	6	Summarize Digestive, Reproductive system in pests, Social organization in Termites and Honey Bees, Insect egg, larva, pupa and their types, Insect vectors & Preservation of Insect pest (Understanding)
ZO-369 - Zoology Practical-III	1	Make use of different types of microscopes, usage, maintenance (Applying)
	2	Demonstrate Tissue collection, fixation, Block preparation, Sectioning, staining & mounting (Understanding)
	3	Determine population density, calculating the different alpha and beta biodiversity indices (Evaluating)
	4	Explain Principle & working of PCR & DNA Barcoding (Understanding)
	5	Analyze morphological similarities and differences between man and ape , types of fossils, animal adaptations, evidences of evolution (Analyzing)
	6	Compare successive stages of evolution of man, Zoogeographical distribution of animals to respective zoogeographical Realms on the world map (Analyzing)

Post Graduates Course

7. Department of Statistics

Under Graduates Course

Name of Programme : Bachelor of Science (B.Sc.)		
PO.No.	**Program Outcomes**	
	After successful completion of this program, a student will be able to	
PO-1	Demonstrate comprehensive knowledge and understanding of one or more disciplines which form a part of an undergraduate programme of study.	Disciplinary knowledge
PO-2	Express thoughts and ideas effectively in writing and orally.	Communication Skills
PO-3	Evaluate practices, policies and theories by following scientific approach to knowledge development.	Critical thinking
PO-4	Apply one's learning to real life situations.	Problem solving
PO-5	Draw valid conclusions and support them with evidence and examples.	Analytical reasoning
PO-6	Plan, execute and report the results of an experiment or investigation.	Research-related skills
PO-7	Work effectively and respectfully with diverse teams.	Cooperation/Team work
PO-8	Critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.	Scientific reasoning
PO-9	Work independently, identify appropriate resources required for a project, and manage a project through to completion.	Self-directed learning
PO-10	Effectively engage in a multicultural society and interact respectfully with diverse groups.	Multicultural competence
PO-11	Adopt objective, unbiased and truthful actions in all aspects of work.	Moral and ethical awareness/reasoning
PO-12	Have a capability for mapping out the tasks of a team or an organization.	Leadership readiness/qualities
PO-13	Acquire skills to learn how to learn.	Lifelong learning
PO-14	Develop social, cultural and national integrity.	Reflective thinking

PSOs : Program Specific Outcomes Name of Programme : Bachelor of Science (B.Sc.) (STATISTICS) Program Specific Outcomes		
PSO. No.	**After successful completion of this program, a student will be able to**	**Graduate Attributes**
PSO-1	To Understand the concepts of statistical theory with real life applications.	Basic Knowledge
PSO-2	To improve problem-solving and computational skills	Evaluation
PSO-3	To enhance self- learning and improve own performance.	Apply
PSO-4	To get acquainted with the knowledge of software available for statistical analysis of data	Analysis & Computational Skill
PSO-5	To improve the ability in applying the theory/ tools/techniques of statistics in project on real life data	Professional Skills

Course Outcomes (2021-22)		
Name of Program (with Specialization) - Bachelor of Science in Statistics		
Title of Course	**Cos**	**Course Outcomes**
Sem – I FYBSc (Paper-I) **ST 111: Descriptive Statistics**	1	Representation of data diagrammatically (Evaluating)
	2	Compute various measures of central tendency, .(Understanding)
	3	To understand the concept of dispersion, .(Applying)
	4	To identify data and method of collections (Analysing)
	5	To develop computational skill in Skewness and kurtosis. (Analysing)
	6	Analysis of data and to interpret the results. .(Creating)
Sem – I FYBSc- (Paper-II) **ST 112: Discrete Probability and probability distributions**	1	To Distinguish between random and nonrandom Experiments. (Remembering)
	2	To get knowledge of sample space & events (Evaluating)
	3	find probabilities of events. .(Understanding)
	4	To identify variable & random variable(Analysing)
	5	Obtain probability distribution of random variable in the given situation .(Understanding)
	6	To identify the standard probability distribution.(Understanding)
Sem – I FYBSc- (Paper-III) **ST 113: Practical**	1	Use various graphical and diagrammatic techniques and interpretation. (Analysing)
	2	Analyse data related to discrete and continuous variables and to interpret the results, .(Understanding)

	3	Compute various measures of central tendency, dispersion, skewness and kurtosis.
	4	Interpret summary statistics of computer output. (Analysing)
	5	Summarize and analyze the data using computer. (Evaluating)
	6	Analyzing, interpreting and writing project report on real life situation. .(Understanding)
SEM II FYBSc		
Sem – II FYBSc (Paper-I) **ST 121: Descriptive Statistics – II**	1	To study bivariate data. (Evaluating)
	2	To analyze the data using scatter diagram . (Analysing)
	3	To Compute the correlation coefficient for bivariate data and interpret it. (Creating)
	4	To fit linear, quadratic and exponential curves to the bivariate data to investigate the relation between two variables. .(Understanding)
	5	To study the concept of various index numbers and it construction(Creating)
Sem – II FYBSc- (Paper-II) **ST 122: Discrete Probability and probability distributions**	1	To Understand Meaning of standard distribution (Evaluating)
	2	To identify Applications of Poisson, Binomial distributions .(Understanding)
	3	To remember Mathematical expectation of bivariate random variable(Analysing)
	4	Apply standard discrete probability distributions to different real situations. (Evaluating)
	5	To compute mean & variance using mathematical expectation.
Sem – II FYBSc- (Paper-III) **ST 123: Practical**	1	To remember recurrence relation of probability. (Analysing)
	2	To Fit standard distributions (Evaluating)
	3	To apply standard distributions for given real life situation
	4	To get knowledge of Ms-Excel (Creating)
	5	To find various price & quantity index numbers(Analysing)
Sem – III SYBSC Paper – I ST 231: Discrete Probability Distribution & Time Series	1	To Apply the discrete distributions in real life problem. (Creating)
	2	To Understand the concept of time series with its components. (Evaluating)
	3	To apply time series in forecasting
	4	To study various standard distribution (Creating)
	5	To estimate parameters of the distribution(Analysing)
SYBSc (Paper-II) ST - 232 :	1	To understand the meaning of continuous random variable .CO2: To identify the real life examples of continuous random variable (Evaluating)

Continuous Probability Distribution – I		
	2	To obtain pdf of a random variable (Creating)
	3	Obtain summary statistics of a continuous random variable. (Remembering)
	4	To find probability of events related to continuous random variable. (Remembering)
	5	To Identify whether variables are independent. (Evaluating)
	6	To Apply the concept in computing correlation and regression lines ,m.g.f. (Creating)
	7	moments, probabilities for bivariate continuous random variable., nature of curve, properties of continuous probability distributions (Creating)
	8	To Study uniform, exponential, normal, gamma distributions and relations between them (Evaluating)
SYBSc (Paper-III) ST – 233 : Practical	1	Real life applications of various discrete and continuous distributions. (Evaluating)
	2	To learn various commands in R software . (Creating)
	3	To Perform various operations on data in R- Software and MS- Excel. (Evaluating)
	4	To apply descriptive statistical analysis using R- Software and MS- Excel. (Analysing)
	5	To Perform different large and small sample test using Software and MS- Excel.
	6	Knowledge of model sampling (Creating)
SYBSC Paper – I **ST 241: Mathematical Methods & Testing of Hypothesis**	1	To Understand multiple linear regression models with applications. to get the evaluation of Partial and Multiple Correlations (Analysing)
	2	To understand the null and alternative hypotheses and apply small, large sample tests in real life problems. (Creating)
	3	To Understand the different ways of summarizing the Vital Statistics.
	4	To understand and Formulate M/M/1 queue and find its parameter also find the average waiting time in queue (Analysing)
	5	To Apply R software in analysis of data (Analysing)
SYBSC Paper – II	1	Derive probability distribution function of chi-square, t, F distribution (Creating)

ST 242: Continuous Probability Distribution	2	Explains interrelation between the above distributions and their properties. (Remembering)
	3	Get familiar with statistical tests of hypothesis and are able to apply in real life situations in various fields (Creating)
	4	To find the relation between distributions (Analysing)
	5	To find the distributions of conditional random variables (Creating)
SYBSC Paper – III **ST – 243 Practical**	1	Real life applications of various discrete and continuous Distributions. (Analysing)
	2	Perform various operations on data in R- Software and MS-Excel. (Remembering)
	3	Do descriptive statistical analysis in R- Software and MS-Excel. (Creating)
	4	Perform different large and small sample test using RSoftware and MS- Excel.
TYBSc (Paper-I) **ST 351: Distribution Theory – I**	1	Prove students with a formal treatment of probability theory. (Creating)
	2	Equip students with essential tools for statistical analyses at the graduate level. (Analysing)
	3	Foster understanding through real-world statistical applications. (Remembering)
	4	Understand techniques for quantifying these uncertainties (Creating)
TYBSc (Paper-II) ST 352: Theory of Estimation	1	To understand the concept of inference and basics of estimate and estimator.
	2	To Un derstand meaning of Statistical Inference. (Creating)
	3	To Know the methods of Estimation. (Creating)
	4	To Study characteristics of good estimator. TYBSc
	5	To evaluate confidence interval. (Creating)
TYBSc (Paper-III) ST 353: Design and Analysis of Experiments	1.	Understand the concept of ANOVA and basic principles of DOE (Remembering)
	2	To analyze mathematical model of various design (Remembering)
	3	Analyze the data using CRD, RBD, LSD and factorial experiments. (Analysing)
	4	Understand the concept of ANOCOVA with real life situations. (Creating)
	5	Study the Application of confounding in real life problems (Remembering)
TYBSc (Paper-IV) ST 354: Statistical Process and Product Control	1	Understand online and offline process controls. (Remembering)
	2	To know basics of control charts for variable and attributes. . (Creating)
	3	Apply X-bar chart, R-chart, C-chart and P-chart in real life data.

	4	Apply the acceptance sampling plans in production process. (Analysing)
	5	Compute capability indices. (Remembering)
TYBSc (Paper-V) ST 355: Operations Research – I	1	Understand the need of operation research for effective decision making. (Remembering)
	2	To Formulate the dual LP Problem and understand the relation between primal and dual LP problems. (Analysing)
	3	Solve artificial variable technique, duality theory, revised simplex method, sensitivity analysis, transportation and assignment problems. (Analysing)
	4	Solve real life problems using integer programming. Analysing)
TYBSc (Paper-VI) ST 356: Regression Analysis	1	Apply simple linear regression model to real life examples. (Remembering)
	2	Understand multiple linear regression models with applications(Analysing)
	3	Compute multiple and partial correlation and checking residual diagnostic to validate model. (Analysing)
	4	Apply Logistic models and its implementation in real life situation. (Creating)
TYBSc (Paper-VII) ST 357: Practical Paper – I	1	To draw various charts, check the status of process and revising the limits to bring the process under control. (Evaluating)
	2	To Study lot quality (Analysing)
	3	Find optimal solution using various techniques like LPP, TP, AP. (Creating)
	4	Find optimum project completion path and probability of completion of project. (Analysing)
TYBSc (Paper-VIII) **ST 358: Practical Paper – II**	1	To Analyze data using various designs like RBD,LSD, (Understanding)
	2	To analyze Factorial 2^2 experiments (Remembering)
	3	To analyze factorial 2^3experiments(Evaluating)
	4	Find efficiency of designs and its comparison. (Analysing)
	5	To analyze design using ANOCOVA (Analysing)
TYBSc (Paper-IX) ST 359: Practical Paper – III	1	To fit regression model (Understanding)
	2	Analyze the regression model using MS-Excel / R software (Analysing)
	3	To find estimates of dependent variable. (Understanding)
	4	Identify the data for regression analysis. (Remembering)
	5	Fitting of second degree curve. (Understanding)
TYBSc (SEC-I)	1	To study basic commands of Turbo C . (Analysing)
	2	Write short and long programs in C. . (Understanding)

ST 3510: **SEC 1: Turbo C** **(Practical Course)**	3	Create recursive and non-recursive function in C. (Understanding
	4	Perform simple, multiple and logistic regression analysis using C . (Creating)
	5	To write the program on parametric and non-parametric test. . (Understanding)
	6	To write program for calculation of area and summary statistics.. . (Analysing)
TYBSc (SEC-II) **ST 3511: SEC 2: Statistical Computing using R-software (Practical Course)**	1	Learn the basics of R with descriptive statistics (measures of central tendency and dispersion). Import, review, manipulate and summarize data-sets in R. (Analysing)
	2	Visualization of the data through different diagrams (simple, multiple and sub- divided bar diagram) and graphs (histogram, frequency polygon, stem and leaf plot, boxplot). (Creating)
	3	Compute probabilities and fitting of probability distribution with R environment. (Understanding)
	4	Perform correlation, regression analysis and appropriate statistical tests for real life situations using R. . (Creating)
	5	Perform non-parametric tests for real life data sets (Understanding)
TYBSc (Paper-I) **ST 361:** **Distribution Theory – II**	1	Prove students with a formal treatment of probability theory. (Analysing)
	2	Equip students with essential tools for statistical analyses at the graduate level.
	3	Foster understanding through real-world statistical applications. . (Understanding)
	4	Understand techniques for quantifying these uncertainties (Remembering)
	5	To understand concept of order statistics. (Understanding)
TYBSc **(Paper-II)** **ST 362:** **Testing of Hypothesis**	1	To Study basics of parametric tests(Analysing)
	2	To understand MP test, UMP test, (Understanding)
	3	To calculate LR test, SPR test. (Understanding)
	4	Understand the difference between MP, UMP,LR,and SPR tests. (Creating)
	5	Understand the difference between parametric and nonparametric tests.
	6	Study various non-parametric tests. (Remembering)
TYBSc **(Paper-III)** **ST 363:** **Sampling Theory**	1	Understand the basic principles of sample survey. (Evaluating)
	2	Apply the different sampling methods for designing and selecting a sample from a population. (Understanding)
	3	Implement Ratio and Regression estimation in real life problems. (Creating)

	4	To find the estimates of sample and population mean (Analysing)
	5	To understand the role of sample survey in Research. (Evaluating)
TYBSc (Paper-IV) ST 364: Introduction to Survival Analysis	1	To understand the concept of survival analysis. (Creating)
	2	To Understand the elements of reliability, hazard function and its applications.
	3	Understand the concept of censoring, life distributions and ageing classes.
	4	Estimate nonparametric survival function of the data. (Remembering)
	5	Explain test of exponentially against nonparametr ic classes, two sample problems.
TYBSc (Paper-V) **ST 365 (A): Actuarial al Statistics** OR ST 365 (B): Operations Research – II	1	To understand basics of actuarial statistics. (Analysing)
	2	To Understand the utility theory, insurance products and life tables. . (Understanding)
	3	To Understand the concept of interest . (Creating)
	4	To Understand the concept of life insurance and the existing insurance products of different insurance company. (Understanding)
	5	Know life annuities, net premium. (Analysing)
TYBSc (Paper-VI) ST – 366 **A) Reliability Theory** B) Clinical statistics C) Stochastic Process	1	To Understand the elements of reliability, hazard function and its applications.
	2	To Understand the concept of censoring, life distributions and ageing classes.
	3	Estimate nonparametric survival function of the data. (Evaluating)
	4	Explain test of exponentially against nonparametri classes, two sample problems.
	5	To study the meaning of series and parallel system. (Remembering)
TYBSc (Paper-VII) ST 367: Practical Paper – IV	1	Apply and fit continuous distribution to real life situations.
	2	Perform parametric and non-parametric tests. (Creating)
	3	Perform sampling methods analysis. (Evaluating)
	4	Calculate accumulated value, present value, effective rate of discount and benefit premiums. (Creating)
	5	Construct life tables. (Remembering)
TYBSc (Paper-VIII) ST 368: Practical Paper – V	1	To Understand The Standard Distribution(Analysing)
	2	To Identify Real Life Situations Of Distribution
	3	Make Student Aware Of Model Sampling(Evaluating)
	4	To Make Student Competent In Computation (Analysing)
	5	To Create Analytical Approach In Data Analysis (Remembering)
TYBSc (Paper-IX)	1	To Develop Data Collection Habit Amonsgt Students(Analysing)

ST 369: Project	2	To Make Students Aware Of Sampling Techniques. (Creating)
	3	To Understand The Concept Of Statistics (Remembering)
	4	To Provided Knowledge Of Real Life Situations of The Data
	5	To Analyze The Data Using Statistical Tools (Understanding)
	6	To Provide Knowledge Of Statistical Software (Understanding)
TYBSc (SEC-3) ST 3610: SEC 3: Introduction to Python (Practical Course)	1	To Understand The Python(Creating)
	2	To Get Knowledge Of Various Commands In Python. (Creating)
	3	To Analyze The Data Using Statistical Tools(Evaluating)
	4	To Provide Knowledge Of Statistical Software(Remembering)
	5	To Evaluate The Problems (Analysing)
TYBSc (SEC- 4) ST 3611: SEC 4: Data Analytics (Practical Course)	1	To Understand The Concept Of Data Analytics(Remembering)
	2	To Get Knowledge Data Science (Evaluating)
	3	To Develop Competency In Analysis (Creating)
	4	To Analyze The Data Using Statistical Tools. (Creating)
	5	To Provide Knowledge Of Statistical Softwares (Remembering)
	6	To Evaluate The Problems (Analysing)