Department of Biochemistry

B.Sc Biochemistry Programme Outcome

Sr.No.	Subject Code/ Class	Course objective	Learning outcome	Programme Implemaented From
1	BC-101 F.Y.B.Sc	To acquaint students with basic concepts of biomolecule chemistry	Students will be able to: • Learn the elements present in biomolecules • Differentiate between monomers and polymers. • Explain the role of water in synthesis and breakdown of polymers. • Compare and contrast the structure and function of the oligo and polysaccharides. • Summarize the functions of proteins and able to recognize the importance of the three dimensional shape of a protein on its function and the role of non-covalent bonds in maintaining the shape of a protein.	June 2018 CBCS pattern
2	BC-102 F.Y.B.Sc	To complement the students with the basic understanding on the general aspects of animals and plants cell biology	Students will be able to: • Differentiate prokaryotic from eukaryotic cells and plant cells from animal cells • Discern structure and functions of cell organelles • Understand mitosis and meiosis processes.	June 2018 CBCS pattern
3	BC-103 F.Y.B.Sc	To acquaint with various techniques used in biochemistry	Students will be able to: • Understand hazards and safety measure in laboratory. • Do normality, molarity, and percent solution based calculations. • Perform qualitative tests for carbohydrates, lipids and	June 2018 CBCS pattern

			amino acids • Use, handling and care of compound microscope • Identify various phases of mitosis	
4	BC-201 F.Y.B.Sc	To complement the students with the fundamental concepts of biochemistry	Students will be able to: • Recall DNA structure and functions • Discuss types and functions of RNA • Describe classification and properties of enzymes • Understand industrial applications of enzymes	June 2018 CBCS pattern
5	BC-201 F.Y.B.Sc	To complement the students with the various concepts about microorganisms	Students will be able to: • Explain types, characteristics and significance of microorganisms • Describe the structure and functions of major components of microbial cells • Understand microbial growth, its measurement and bacterial growth curves • Classify microorganisms based on nutrition • Apply isolation techniques to screen bacteria on solid media	June 2018 CBCS pattern
6	BC-203 F.Y.B.Sc	To impart practical knowledge on basic techniques adopted in Biochemistry	Students will be able to understand: • Working principle of spectrophotometer and able to handle spectrophotometer • Various staining techniques and Isolate bacteria by streak plate method • Familiarize with viable count of the micro-organisms.	June 2018 CBCS pattern
7	BC-301	To accustom students with basic concepts of Food	Student will be able to- ☐ Classify food based on	June 2018-19

			functions	CBCS pattern
	S.Y.B.Sc	Biochemistry	☐ Calculate energy value of food and its measurement ☐ Explain food adulteration and its types ☐ Discuss food spoilage and various factors determining food spoilage ☐ Discuss various methods of food preservation ☐ Understand the concept of food allergy and food additives	
8	BC-302 S.Y.B.Sc	To accustom students with basic concepts of Human Physiology	Student will be able to- • Understand histology and anatomy of various organs of digestive system • Explain structure and functions of various parts of respiratory system • Understand mechanism of respiratory process • Learn various types of hematopoiesis • Understand mechanism of blood coagulation • Explain structure and functions of nephron.	June 2018-19 CBCS pattern
9	BC-303 S.Y.B.Sc	To acquaint students with various techniques used in biochemistry	Students will be able to: • Enumerate RBCs and WBCs and determine the health status • Determine blood groups, ESR and understand its clinical significance	June 2018-19 CBCS pattern

			• Determine energy value of food stuff using bomb calorimeter • Determine rancidity in edible oil and its applications • Determine moisture content in food sample • Examine food for microorganisms	
10	BC-401 S.Y.B.Sc	To accustom students with basic concepts of Environmental Biochemistry	Students will be able to: • Understand the concept of pollution and pollutants • Learn about greenhouse effect and global warming and measures to control greenhouse effect • Understand the concept of bioenergy • Explain biodegradation and bioremediation • Discuss concept and types of toxins	June 2018-19 CBCS pattern
11	BC-402 S.Y.B.Sc	To accustom students with basic concepts of Human Physiology	• Explain structure, functions and types of neurons • Discuss mechanism of synaptic transmission • Understand anatomy, istology and functions of male and female reproductive system • Learn molecular events during fertilization • Learn mechanism of hormone action • Explain various hormones secreted by endocrine glands and their functions	June 2018-19 CBCS pattern

12	BC-403 S.Y.B.Sc	To acquaint students with various techniques used in biochemistry	Students will be able to: • Record blood pressure by sphygmomanometer and explain its significance • Determine bleeding time and clotting time and explain its significance • Determine sodium and potassium content in blood serum samples by flame photometer • Analyze wastewater for BOD/COD • Analyze soil and water for various parameters	June 2018-19 CBCS pattern
13	BC-501 T.Y.B.Sc	• To accustom students with basic concepts of Genetics.	After successful completion of this course, students are expected to: • Understand the importance of Mendel's work. • Understand structure of chromosome and DNA organization. • Understand replication, transcription, translation processes.	June 2020-21 CBCS pattern
14	BC-502 T.Y.B.Sc	• To accustom students with basics of Plant Biochemistry. • To study the life processes of plants	• Learn life processes like photosynthesis, photorespiration and energy generation. • Study various phytohormones, secondary metabolites and their mechanism.	June 2020-21 CBCS pattern
15	BC-503 T.Y.B.Sc	• To accustom students with Biochemistry of various diseases	• Learn various disorders related to carbohydrate metabolism. • Study different	June 2020-21 CBCS pattern

		To understand inborn errors of metabolism	hemoglobinopathies. • Understand clinical importance of various enzymes and isoenzymes.	
16	BC-504 T.Y.B.Sc	• To accustom students with basics of metabolism To comprehend catabolism and anabolism of various metabolites	• Learn various catabolic and anabolic reactions related to carbohydrate and amino acids. • Study lipid and nucleotide metabolic reactions. .	June 2020-21 CBCS pattern
17	BC-505 T.Y.B.Sc	• To study various biophysical processes. To study laws of thermodynamics and bioenergetics.	• Understand the concept of acid-base and buffers. • Study various biophysical processes like diffusion, osmosis, viscosity, etc. .	June 2020-21 CBCS pattern
18	BC-506 T.Y.B.Sc	• To accustom students with basics of Fermentation Technology. .	• Learn screening of microbes, their preservation and inoculum development. • Understand instrumentation, types and working of bioreactors.	June 2020-21 CBCS pattern
19	BC-507 T.Y.B.Sc	• To accustom with Techniques in Molecular Biology. To study techniques in Plant Biotechnology.	• Isolate DNA and estimate DNA, RNA, secondary metabolite and chlorophyll pigments. • Produce alcohol, citric acid, amylase and vermicompost.	June 2020-21 CBCS pattern
20	BC-508	• To accustom with	• Estimate various	June 2020-21

	T.Y.B.Sc	various pathological tests. To generate awareness about clinical significance of the tests.	clinically important components with their clinical significance. • Estimate various clinically important enzymes and their clinical significance.	CBCS pattern
21	BC-509 T.Y.B.Sc	• To accustom students with practical applications of biophysical chemistry. To give practical experience of biophysical processes.	• Prepare buffers of desirable pH and molarity. • Determine viscosity and surface tension of the sample.	June 2020-21 CBCS pattern
22	BC-601 T.Y.B.Sc	• To introduce students to the genetic engineering field. To make students aware about various genetic engineering techniques.	• Learn role of enzymes and vectors involved in gene transfer. • Study various gene transfer methods. • Study gene library preparation.	June 2020-21 CBCS pattern
23	BC-602 T.Y.B.Sc	• To accustom students with plant tissue culture techniques. To study the role of membranes in biological systems	• Learn various plant tissue culture techniques. • Understand Agrobacterium mediated gene transfer.	June 2020-21 CBCS pattern
24	BC-603 T.Y.B.Sc	• To accustom students with basics of immunology To comprehend various immunochemical tests	• Explore cells and organs of immune system. • Learn immunity and immune response. • Study concept of antigen and antibody.	June 2020-21 CBCS pattern
25	BC-604	• To accustom	• Understand	June 2020-21

	T.Y.B.Sc	students with basics of enzymology. To understand applications enzyme in various fields.	classification and specificity of enzymes. • Learn mechanism of enzyme action and enzyme kinetics. • Study activation and deactivation of regulatory enzymes.	CBCS pattern
26	BC-605 T.Y.B.Sc	• To accustom students with basics of various analytical techniques. To explore applications of analytical techniques.	• Study concept, principle, and applications of various spectrophotometries. • Learn principles and applications of various chromatography Understand concept of	June 2020-21 CBCS pattern
27	BC-606 T.Y.B.Sc	• To accustom students with basic concepts of toxicology. To study biotransformation of toxicants.	• Learn basic concepts of toxicants, toxicity and dose-response relationship. • Study metabolism and mode of action of toxicants.	June 2020-21 CBCS pattern
28	BC-607 T.Y.B.Sc	• To accustom students with Techniques in Molecular Biology. To study Techniques in Plant Biotechnology.	• Prepare MS media and will have knowledge about macro and micro elements. • Perform various plant tissue culture techniques. • Separate DNA fragments by agarose gel electrophoresis.	June 2020-21 CBCS pattern
29	BC-608 T.Y.B.Sc	• To accustom students with immunological methods To make students aware	• Differentially count WBCs. • Know the importance of cross matching of donor's and recipient's blood.	June 2020-21 CBCS pattern

		about toxicological methods.	• Perform various immunological Ag-Ab tests.	
30	BC-609 T.Y.B.Sc	• To accustom students with various analytical techniques. To study enzyme kinetics practically.	• Perform enzymology related practical. • Perform separation of mixture using chromatography and electrophoresis.	June 2020-21 CBCS pattern
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UNDER GRADUATE (UG)

After successful completion of three year degree program in B.Sc. Biotechnology a student should be able to	
Sr. no.	**Program outcomes (POs)**	**Program specific outcomes(PSOs)**
1	Provide students an excellent academic experience and equip them with ability to solve a broad range of problems in our rapidly-changing technological environment.	Understand Fundamentals of Biological sciences.
2	Strong foundation and knowledge in scientific fundamentals with a capacity to know how, when and where to use the knowledge in specific ways.	Build a strong knowledge of Basics of cell , molecular biology, genetics, biochemistry, microbiology
3	Gain comprehensive understanding of the principles and practices of biotechnology and broad-based concepts in an interdisciplinary structure	Comprehend Importance of Industrial and medical application of Biotechnology in day to day life
4	Design, perform experiments, analyze and interpret data for investigating basic problems in biotechnology and related fields.	Learn and master techniques required to handle and work in a biotechnology Laboratory
5	Apply appropriate tools and techniques in biotechnological manipulation and ability to combine experimental and computational approaches to address biotechnological research	Develop a Well-rounded and confident personality with ability for smooth transition to industrial or research sector

Course Outcomes

Semester-I (FY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT101: Cell Biology (Theory)	1) To introduce students to the basic concepts in organization, structure and function of prokaryotes and eukaryotes 2) To introduce students to the importance and applications of basic microscopy as well as staining

	techniques in the study of microorganisms
BT102: Biochemical Tools (Theory)	1) Structure and function of biomolecules 2) Working of biological buffers 3) Basics of thermodynamics and electrochemistry
BT103: Practical Paper I (Practical)	1) Safety rules when in the Microbiology Laboratory and become proficient in Aseptic techniques 2) To gain proficiency in the use of Micropipettes and glass pipettes 3) To learn principles of Microscopy, to gain proficiency in the use and care of the Compound Microscope and to successfully focus and observe stained bacteria

Semester-II (FY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT 201: Biomolecules (Theory)	1) Understand the structure, properties and functions of important biomolecules from carbohydrates, lipids, and nucleic acids 2) Correlate the properties and apply the same during for other courses such as molecular biology and cell biology.
BT 202: Basic Microbiology B (Theory)	1) Landmarks in Microbiology. Fundamental aspects of Prokaryotic and Eukaryotic Cell structure and function, and the differences between these cells 2) Principles of working of the light microscope and to be able to apply this knowledge in the laboratory. 3) Develop analytical skills, critical & creative thinking
BT 203: Practical Paper II (Practical)	1) To introduce students to the basic concepts in microbial nutrition and microbial growth 2) To provide students with the knowledge of different methods for the isolation, storage and culture of microorganisms

Semester-III (SY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT: 301 Basic Genetics (Theory)	1) Understand the organization of genome in prokaryotes, eukaryotes and viruses 2) Know about organization of DNA in the chromosomes, coding and non-coding portions of the DNA 3) Know about chromosome structure, banding and karyotypes and chromosomal disorders 4) Understand the basics of inheritance of traits, gene interactions and expression
BT 302: Bioprocess Technology (Theory)	1) Basic bioreactor design and types of reactors. 2) Screening and Strain improvement techniques. 3) Media components used in fermentation industry, optimization techniques. 4) Techniques for Air and Media sterilization
BT 303: Practical Paper III (Practical)	1) Understand Pedigree chart analysis 2) Understand Mendelian inheritance 3) Understand MIC, microbe screening 4) Understand mushroom cultivation
SEC I: Algae and Mushroom Cultivation	1) Understand commercial development of algal culture 2) Get aware about commercial utilization of algae 3) Understand diversity of morphological and biochemical 4) Know role of algae in industries

Semester-IV (SY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT 401: Molecular Biology (Theory)	1) Discuss the mechanisms associated with gene expression at the level of transcription and translation. 2) Understand how genetic information is stored in DNA and RNA, how that information is decoded by the cell

	3) Discuss the mechanisms associated with regulation of gene expression in prokaryotes and understand how the flow of information is controlled in response to the changes in environment by the operon models
BT 402: Immune Response (Theory)	1) Understand cellular and molecular basis of immune responsiveness. 2) Understand antigen antibody reaction 3) Understand the importance of vaccines.
BT 403: Practical Paper IV (Practical)	1) Understand basics in serological practicals and its handling. 2) Aware of molecular biology techniques about isolation of genetic material. 3) Aware and train spectrophotometric estimations of metabolites 4) Know about the basic concept in immunology
SEC II: Bioanalytical Instrumentation	1) Student should be able to understand basic concepts of biophysics 2) Should be able to relate it to day today life.

Semester-V (TY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT-501: Genetics and Molecular Biology	1) Get the knowledge of mobile genetic elements in prokaryotes and eukaryotes 2) Learn the principles of recombinant DNA technology and its applications for understanding and application in future research. 3) Learn the applications of molecular biology and recombinant DNA technology in various fields so that the students should be able to take up careers in the field of Biotechnology
BT-502: Agriculture Biotechnology	1) Understand applications of biotechnology in agriculture, plant disease control and floriculture.

	2) Understand Nitrogen fixation and Biofertilizer, Rhizosphere microflora and its role in the rhizosphere. 3) Understand the basics of Plant pathology and disease control, horticulture and floriculture
BT-503: Animal Tissue Culture	1) Basic concepts in animal tissue culture with understanding of different physicochemical requirements, variations in techniques and applications of animal tissue culture 2) Gain an understanding of cell culture techniques and their applications
BT-504: Bioengineering	1) Gain an in-depth understanding of the manufacturing principles and practices associated with dairy food products 2) Possess a comprehensive knowledge of the science and technology involved in various fermentation processes 3) Develop an understanding of the process control, upstream and downstream processing stages in an industry
BT-505: Food Biotechnology	1) Understand fundamental principles food and milk microbiology 2) Understood fermented products, and pasteurization of milk 3) Understood the basics of food spoilage, food preservation, and fermented food.
BT-506A: Environmental Biotechnology-I	1) Have a perspective on global environmental problems and environmental toxicants. 2) Know about the role of environmental biotechnology in management of environmental problems. 3) Have a concept of Biodegradation, Bioremediation, Phytoremediation
BT 507 Practical Course: Industrial Biotechnology	1) Learn principles underlying fermentation processes. 2) Know various stages in bioprocess that involve upstream and downstream process. 3) Understand actual fermentation process of some metabolites

Course	Outcomes
BT-508: Practical Course: Animal Biotechnology and Immunology	1) achieve skill in animal cell culture techniques 2) Learn principles underlying immunological techniques 3) Know various immunological techniques and blood group detection
BT-509: Practical Course: Applied and Environmental Biotechnology	1) Isolation and characterization of food fermenting organism, 2) Understand various aspects of environmental biotechnology like BOD, COD 3) Understand the soil contents.

Semester-VI (TY B.Sc. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT-601: Recombinant DNA Technology	1) Get the knowledge of mobile genetic elements in prokaryotes and eukaryotes 2) Learn the principles of recombinant DNA technology and its applications for understanding and application in future research. 3) Learn the applications of molecular biology and recombinant DNA technology in various fields so that the students should be able to take up careers in the field of Biotechnology
BT-602: Plant Biotechnology	1) Understand the relevance of plant tissue culture techniques in large scale cultivation of plants and production of secondary metabolites 2) Know the methods of development of transgenic plants and their applications, understanding and application in future research
BT-603: Immunology	1) The concepts of the components and mechanisms of immune responses and its role. 2) The basic principles of immunological methods and understand their application in different fields
BT-604: Bioprocess Technology	1) Basic principles of upstream and downstream process of different

	commercially important products: enzymes, antibiotics, organic acids 2) Understand Quality and economic aspects ion fermentation 3) Understand the principles and role of biotechnologist in QC, QA, IPR and patenting
BT-605: Pharmaceutical Biotechnology	1) Gain basic knowledge applications of biotechnology in the field of pharmaceuticals. 2) Will understand the concept of drug discovery, drug designing.
BT-606A: Environmental Biotechnology-II	1) The principles of microbial ecology, the importance of microbial diversity in environmental systems, interaction of microbial population with the environment, microbial life in extreme environments and the method used to study the microbial ecology for practical applications in environmental biotechnology 2) Few examples of integrated applications of biotechnology for sustainable development as ecofriendly alternatives.
BT-607: Practical Course: Plant Biotechnology	1) Isolate and characterization of: *Xanthomonas citri*, *Rhizobium* sp, preparation and efficiency testing of biofertilizer. 2) Preparation of stock solutions, explant sterilization, media preparation and sterilization, callus culture, shoot tip culture.
BT-608: Practical Course: Genetics and Bioinformatics	1) Understand and verification of Mendel's laws using color beads 2) Shall able to perform DNA isolation, perform transformation and conjugation in bacteria.
BT-609: Practical Course: Pharmaceutical Biotechnology	1) Understand and perform sterility testing of pharmaceutical products, chemical and biological, MIC 2) Understand and perform MLT, validation of LAF, membrane filtration and sterility testing.

POST GRADUATE (PG)

After successful completion of three year degree program in M.Sc. Biotechnology a student should be able to	
Sr. no.	**Program outcomes (POs)**	**Program specific outcomes (PSOs)**
1	To help the students to build interdisciplinary approach	Analyze and interpret scientific data to solve technical, conceptual and abstract scientific problems including prediction and modeling to complex molecular and biotechnological activities.
2	To empower students to excel in various research fields of Life Sciences	Apply knowledge to develop critical thought and practical understanding in the field of biotechnology to find solutions for human benefits in health care, agriculture, environment and related fields
3	To inculcate sense of scientific responsibilities and social and environment awareness	Can become entrepreneurs in various demanding sector of biotechnology such as diagnostics, drug designing, stem cell biology, immunology, environmental biotechnology etc
4	To help students build-up a progressive and successful career	The student will develop sensitivity to environmental issues and concerns and shall understand principles of ethics within the framework and apply these principles for environmentally and culturally sensitive issues.
5	Understand the importance of quality control, bioethics, intellectual property and know the process to file patents in for inventions in the fields of sciences	Identify and analyze a molecular or biochemical problem and formulate, research literature, review existing knowledge to reach substantiated conclusions using principles of Biotechnology independently or in a team

Course Outcomes

Semester-I (M.Sc.Jr. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT- 101 : Microbial diversity and physiology	1) The expanse of microbial diversity 2) Estimates of total number of species

	3) Species Divergence and the measurement of microbial diversity. 4) Measures and indices of diversity.
BT-102: Biomolecules and molecular enzymology	1) Fundamentals of structure and function of biomolecules with special emphasis on proteins 2) Techniques to study protein structure and interactions 3) Enzyme kinetics and the complexity of metabolic reactions
BT–103: Immunology	1) Concept of "Resistance" against diseases in our body. Antigen antibody reactions. 2) An Understanding of clinical transplantation. 3) Autoimmunity and strategies for treating autoimmune diseases. 4) Properties of viruses and their replication cycle. 5) Mode of action of antiviral drugs and viral vaccines.
BT-104 Laboratory course – i	1) Acquire expertise in basic biochemical techniques. 2) Get knowledge in the analysis and estimation of biomolecules 3) Develop expertise in basic analytical techniques of microbiology.
BT-105 Laboratory course - ii	1) Undertake enzyme kinetics in industrial application 2) Apply molecular diagnostic and immunodiagnostic techniques.

Semester-II (M.Sc.Jr. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT-201: Molecular biology	1) Understand how different genomes are packaged and organized 2) Understand various transposable DNA elements and their mechanism of transposition 3) Understand various Molecular Biology processes like replication, transcription, translation 4) Understand control and regulation of various processes

BT-202: Bioinstrumentation and biostatistics	1) Acquire knowledge on basic biophysical and biochemical aspects and Biostatistics 2) learn purification of molecules, analytical tools, electrophoretic separation 3) learn how to interpret protein mobility on PAGE under native and SDS
BT-203 Bioprocess engineering and technology	1) Design of Fermenter/ bioreactors 2) Liquid-Solid, Liquid-liquid and Gas-liquid mass transfer equations and significance in bioprocess. 3) Fermentation Media, Media Sterilization and monitoring of process variables
BT-204 Laboratory course - iii	1) Isolation of genomic DNA from bacteria, animal and plant cells. 2) Marks Restriction Digestion/Size fractionation of restricted DNA fragments by Agarose Gel
BT-205 Laboratory course - iv	1) Understanding growth kinetics 2) Understanding practical aspect of TDT, TDP

Semester-III (M.Sc.Sr. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT-301 - Recombinant DNA Technology	1) Various natural and laboratory based modifications of DNA 2) How damage is repaired 3) Tools creating DNA constructs 4) Various protein expression strategies
BT-302 – Plant Biotechnology	1) Transgenic methods to improve algal, fungal and plant productivity 2) Importance of secondary metabolites and production in plants 3) Molecular approaches used for plant breeding and trait selection
BT-303: Advanced Environmental Biotechnology	1) Global and regional threats to the environment; Air, water and soil pollution. 2) Role of Biotechnology in effluent treatment, biodegradation, bioremediation, bioaugmentation with examples 3) Concept of EIA and environmental laws.

| BT-304: Methods in Plant Biotechnology | 1) Understanding PTC basics
2) Understanding embryogenesis
3) Understanding DNA analysis methods |
| BT-305: Methods in Environmental Biotechnology | 1) Understanding COD determination
2) Understanding MIC and application |

Semester-IV (M.Sc.Sr. Biotechnology)

After completion of these courses students should able to	
Course	**Outcomes**
BT- 401 Food and Pharmaceutical Biotechnology	1) To impart the knowledge of use of microorganisms in food preparation, preservation and spoilage. 2) To impart the knowledge of genetic engineering and pharmaceutical biotechnology
BT - 402: Bioinformatics	1) Various bioinformatics tools and techniques and how to use that for the analysis of the biological experimental data. 2) Concepts of various databases and various methods for the data retrieval, data storage, and data mining and use that data for the further analysis. 3) In- Silico approach for the protein modeling and drug discovery process.
BT-403: Industrial and Business Biotechnology	1) Get the knowledge of quality assurance and quality control in the field of biotechnology 2) Get an idea of biosafety guidelines, regulatory laws for transgenic organisms 3) Aware of effects of release of GMOs, environmental impact assessment
BT- 404: Methods in Biotechnology	1) Understanding Aflatoxin testing 2) Understanding estimation of alkaline protease 3) Understanding Multiple sequence alignment of DNA
BT-405: Biotechnology Practical (Project Dissertation Work)	It is expected that the students will design experiments and collect experimental data to deduce conclusions. At the end, they will submit a detailed thesis for evaluation. The students should be introduced to research methodology in the beginning through few lectures.

DEPARTMENT OF CHEMISTRY

B. SC. IN CHEMISTRY

AIMS AND OBJECTIVES OF COURSE STRUCTURE OF B.SC. CHEMISTRY

- ❖ To promote understanding of basic facts and concepts in Chemistry while retaining the excitement of Chemistry.
- ❖ To make students capable of studying Chemistry in academic and Industrial courses.
- ❖ To expose the students to various emerging new areas of Chemistry and apprise them with their prevalent in their future studies and their applications in various spheres of chemical sciences.
- ❖ To develop problem solving skills in students.
- ❖ To expose the students to different processes used in Industries and their applications.
- ❖ To develop ability and to acquire the knowledge of terms, facts, concepts, processes, techniques and principles of subjects,
- ❖ To develop ability to apply the knowledge of contents of principles of chemistry.
- ❖ To inquire of new knowledge of chemistry and developments therein.
- ❖ To expose and to develop interest in the fields of chemistry
- ❖ To develop proper aptitude towards the subjects.
- ❖ To develop the power of appreciations, the achievements in Chemistry and role in nature and society.
- ❖ To develop skills required in chemistry such as the proper handling of apparatus and chemicals.

After successful completion of Under Graduate Degree Program in Chemistry student should be able to understand…	
Sr. No.	**Program outcomes (POs)**	**Program specific outcomes (PSOs)**

Sr. No.	Program outcomes (POs)	Program specific outcomes (PSOs)
1	Provide students an excellent academic experience and equip them with ability to solve a broad range of problems in our rapidly-changing technological environment.	Understand Basic Fundamentals of Chemical Sciences.
2	Strong foundation and knowledge in scientific fundamentals with a capacity to know how, when and where to use the knowledge in specific ways.	Build a strong knowledge of Basics concepts of Chemistry in particular Physical, Inorganic, Organic and Analytical Chemistry
3	Gain comprehensive understanding of the principles and practices of Chemical Sciences and broad-based concepts in an interdisciplinary structure	Comprehend Importance of Industrial and medical application of Chemistry and some applied aspects of Chemistry in Industries.
4	To gain the experimental skills, should Perform Experiments, Analyze and interpret data for investigating basic problems in Chemical Sciences and related fields.	Learn principal techniques of chemical analysis required to work in a Chemistry Laboratory and Industry.

Semester-I and II F. Y. B. Sc. [Chemistry]

After successful completion of the course students should able to	
Course	**Outcomes**
CH-101 Physical and Inorganic Chemistry	- Students should be able to define and explain the equivalent conductance - Students should able to differentiate, integrates the given functions. - Students can compare the elements on the basis of periodic properties. - Students are able to correlate the theoretical concepts of chemistry with practical approach.
CH-102 Organic and Inorganic Chemistry	- Students should able to define alkanes, alkenes and alkynes, and their reactions. - Students should able to write nomenclature common and IUPAC. - Students should able to explain geometry of molecules using VSEPR theory.
CH-103 Practical Chemistry	- Students should calibrate volumetric apparatus. - Students should able to prepare the solutions of different concentrations. - They can analyze the inorganic compounds
CH-201 Physical and Inorganic Chemistry	- Students should be able to define and explain laws and principles of physical chemistry. - Students can explain surface tension and its applications.

	• Students should able to explain different steps in metallurgical process. • Students are able writ electron configuration of P-block elements and understand bonding and shapes of different molecules.
CH-202 Organic and Inorganic Chemistry	• Students should able to write common and IUPAC names of aldehyde and ketones, and can prepare using different reactions. • should able to write nomenclature common and IUPAC system, of carboxylic acid and their derivatives. Preparation using different methods. • Students should able to explain ionic, covalent, coordinate bonds, metallic bond.
CH-203 Practical Chemistry	• Students should able to determine heat of solution, viscosity of different solution. • They can determine normality and strength of given acids. • Able to determine percentage composition of organic solutions.

Semester-V (TY B.Sc. Chemistry)

After completion of this course students should able to	
Course Objectives	**Course Outcomes**
CH-501: Principals of Physical Chemistry • To orient and acquaint the students towards the basic concepts Quantum Chemistry • To acquire knowledge about rates of chemical reactions and distinguishing the reaction of different order and their characteristics. • To understand the basic principles of phase rules and phase diagrams. • To learn the underlying principles of electrode reactions, electrochemical cells and applications of EMF.	Students are expected to: • Understand the significance of wave function and postulates of quantum mechanics. • Deduce rate equations and half-life equations for first and second order reactions • Draw and explain the one and two component system phase diagrams. • Explain the principles of electrode processes and apply them during Practicals.
CH-502: Inorganic Chemistry • To describe the VSEPR theory to predict shape of molecules from electron pairs. • To describe the bonding in simple compounds using VBT. • To describe the principles of VBT to predict hybridization of orbitals. • To understand how CFT explains electronic structure, colour and magnetic properties of co-ordination compounds. • To introduce the basic principles of MOT and electronic geometry of molecules.	• Learn about the VSEPR theory and how it can be used to explain molecular shapes. • Learn about the VBT to describe the formation of covalent bonds in terms of atomic orbital overlap. • Learn about stability of complexes using CFSE. • Learn about MOT to draw energy diagrams and to predict bond order.
CH-503: Organic Reaction Mechanism • To study different types of organic reactions. • To understand the mechanisms of different types of reactions. • To distinguish between types of substrates and types of reagents. • To understand ways of attack of reagent, breaking and formation of bonds in different reaction mechanisms. • To study kinetics, evidences and factors affecting different types of reactions. • To study stereochemistry of different reactions.	• Students will learn organic reactions like nucleophilic substitution, electrophilic substitution, nucleophilic addition, electrophilic addition and elimination. • Students will be able to write/ explain mechanisms of those types of reactions. • Students will understand how a reaction takes place in one or more steps. • Students will understand the types of intermediates formed in different reactions.

• To understand role of different reagents in different reactions.	• Students will learn how reagent attacks the substrate molecule and accordingly how bonds break and formed. • Students will learn how change in structure of substrate, reagent and solvent changes the product formed and its stereochemistry. • Students will be able to predict the products and to suggest the mechanisms.
CH-504: Industrial Chemistry • To produce graduates with enhanced skills, applied knowledge, aptitude to carry out higher studies or research and development in the various industrial areas. • To make the student cognizant about important aspects of Chemical Industries, Industrial work culture and environment. • To prepare the students for immediate entry to the workplace with sound theoretical knowledge and some basic experimental concepts in the area of various industries viz. Sugar Industry, Fermentation Industry, Petroleum and Petrochemicals. • To offers the synergism between basic concepts of Chemistry with Industrial applications. • To equip the students with knowledge of some industrial organic synthesis as requirement of diverse chemical industries. • Empower the students to understand the concepts in chemical processing, engineering and industrial development.	• Basic requirements of Chemical Industry, different terms, operations and processes involved in chemical Industry. • Describe Copy Right Act, Patent Act and Trade Marks, Bureau of Indian Standards (BIS) and International Organization for Standardization (ISO). • Basic requirements, raw materials, different processes and operations involved in Sugar Industry and also different grades of sugar and uses of by-products of sugar industry. • Importance of fermented products, basic requirements, theory and process of alcohol making, fractional distillation and various terms involved in Fermentation Industry. • Understand Occurrence of Petroleum, theories of formation of Petroleum and different terms Viz. Knocking, Anti-Knock Compounds, Octane number, Cetane number, Gasohol and Power alcohol etc. • Manufacturing processes involved in Industrial Organic Synthesis such as Methanol, Isopropanol, Glycerol, Acetylene and Aromatic hydrocarbon i.e. Toluene from petroleum with their uses.
CH-505: Analytical Chemistry • To develop an understanding of the range and uses of analytical methods in chemistry. • To understand and establish the role of chemistry in quantitative analysis. • To enhance the Analytical instrumental skill of the students.	• Explain the fundamentals of analytical methods and instruments for qualitative and quantitative Analysis. • Express the role of analytical chemistry in science. • Students will be able to function as a member of an interdisciplinary problem solving team.

CH-506(B): Green Chemistry • There is rising concern since 1970 about environmental pollution, depleting resources, climate change, ozone depletion, legislation which is getting stringent with strict environmental laws, rising cost of waste deposits, health concern and so on. • We are facing the challenge to work towards sustainable development. Since 1990, today's society is moving towards becoming more and more environmentally conscious. • Green chemistry has been introduced in1990 for overall sustainable development against the environmental concerns. • Green chemistry is not a new branch of chemistry, but it is a new way chemistry, which should be practiced regularly. • Innovations and applications of green chemistry in education has helped companies not only to gain environmental benefits but at the same time to achieve economic and societal goals also. • This is possible because these undergraduate students are ultimate scientific community of tomorrow.	• With this course, the graduate students will be able to understand the twelve principles of green chemistry that will help to build the basic understanding of toxicity, hazards and risk of chemical substances. • The course will help to understand stoichiometric calculations and relate them to green chemistry metrics. The students will learn about atom economy and understand its importance over percentage yield. • The students will learn to design safer chemicals, products and processes that are less toxic than the conventional chemistry, understand significance of catalysis, use of renewable feed stock, renewable energy sources, importance of green solvents, etc. • The course will train the students to appreciate green chemistry and boost the students to think and develop the skills to innovate and search for the solutions to environmental problems. • Green chemistry is only way of future chemistry to ensure sustainability with absolute zero waste. The success stories and real-world cases will motivate the young generation to practice green chemistry.
CH-507 and 607 Practical Course: Physical Chemistry • To develop skills required in chemistry such as the appropriate handling of apparatus, instruments and chemicals. • The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research. • To expose the students to an extent of experimental techniques using modern instrumentation. • The student will develop the ability to effectively communicate scientific information and research results in written and oral formats.	• Students will get basic analytical and technical skills to work effectively in the various fields of chemistry. • Students will able to calibrate and handle instruments like conductometer, potentiometer, pH meter, colorimeter, spectrophotometer, polarimeter. • They have ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions. • They get skills required in chemistry such as the proper handling of apparatus and chemicals.

	• They will have ability to present scientific and technical information resulting from laboratory experimentation in both written and oral formats
CH-508: Practical Course: Inorganic Chemistry • To analyze the inorganic mixtures. • To determine metal from ore and alloy analysis. • Using colorimetric analysis to determine amount of metal.	• Student will able to determine cation & anion from inorganic mixtures by using qualitative analysis. • Student will able to determine metal from ore & alloys. • Students will be able to design & carry out scientific experiments as well as accurately record & analyze the results of experiments. • Students will be able to handle colorimeter for estimation of metal ions.
CH-509 and 609 Practical Course: Organic Chemistry • To develop skills required in chemistry such as the appropriate handling of apparatus and chemicals. • The student will learn the laboratory skills needed to design, safely conduct and interpret chemical research. • To expose the students to an extent of experimental techniques using modern instrumentation. • The student will develop the ability to effectively communicate scientific information and research results in written and oral formats.	• Separate and analyze binary water insoluble mixture. • Separate and analyze binary water soluble mixture. • Estimate - Acetamide, Glucose and Glycine by volumetric method, • Estimate basicity of various acids. • Synthesis of various organic compounds through greener alternatives. • Understand Thin Layer Chromatographic techniques and physical constant. • Understand the purification technique use in organic chemistry.

Semester-VI (TY B.Sc. Chemistry)

After completion of these courses students should able to	
Course	**Outcomes**

CH-601: Principals Physical Chemistry • To learn the basics of molecular spectroscopy and rotational spectra. • To understand the basic principles and applications of nuclear chemistry. • To learn the consequences of light absorption by atoms and molecules and photochemical reactions. • To learn the laws of crystallography and basics of crystal structure.	• Analyze the rotational spectra of diatomic molecules and determine the bond length. • Explain and apply the radioactivity principles for various chemical and biological investigations. • Describe the mechanism of fluorescence, phosphorescence and photochemical reactions. • Analyze the given crystal structure and determine the indices of planes, interplaner distances and type of crystal structure.
CH-602: Inorganic Chemistry • To describe basic principles of nanomaterials. • To describe basic synthesis of nanoparticles. • To describe composition and technological importance of inorganic solids. • To describe composition of cement, lime and alloys. • To describe manufacture of fertilizers.	• Learn about basic principles and synthesis of nanomaterials. • Learn about classification, composition and processing of cement. • Learn about classification and composition of alloys. • Learn about types manufacture and applications of fertilizers.
CH-603: Spectroscopic Methods of Structure Determination • To study principle of spectroscopy and to understand wave parameters and terms involved in spectroscopy. • To study different types of spectroscopy. • To understand principle, concept and the terms used in each type of spectroscopy. • Interpretation of UV, IR, NMR spectra. • Use of spectral data for determination of structure of unknown organic compounds. • To study different applications of each type of spectroscopy.	• Students will learn interaction of radiations with matter and different regions of electromagnetic radiations. They will know different wave parameters. • Will learn principle of mass spectroscopy, its instrumentation and nature of mass spectrum. • Students will understand principle of UV spectroscopy and nature of UV spectrum and will be able to calculate maximum wavelength for any conjugated system. • Students will understand principle of IR spectroscopy, types of vibrations and the nature of IR spectrum. will be able to find out IR frequencies of different functional groups. • Students will understand principle of NMR spectroscopy and terms used in NMR spectroscopy. They will learn measurement of chemical shift and coupling constants.

	• Students will be able to interpret the NMR data and they will be able to use it for determination of structure of organic compound. • Students will be able to determine structure of simple organic compounds on the basis of spectral data such as λ max values, IR frequencies, chemical shift (δ values)
CH-604: Chemistry of Industrially Products • To make student perceptive about various commodity industries viz. Cosmetics and Perfumes, Dyes and Pharmaceuticals, Pesticides, Soaps and Detergents, related diversified and multidisciplinary fields of chemical industry. • To produce graduates with enhanced skills, knowledge and research aptitude to carry out higher studies or research and development in the various industrial areas. • To equip students with advance knowledge about various industrially important products. • To makes students ready for immediate entry to the workplace with sound theoretical and basic experimental knowledge in the areas of various industries. • To engender the substantial interest in the students to understand the concepts in chemical processing, engineering and industrial development of present era viz. Cosmetics and Perfumes Industry, Dyes and Pharmaceuticals, Pesticides, Soaps and Detergents, related multidisciplinary and diversified fields of chemical industry. • To describe the industrial production of a number of important organic and inorganic compounds / chemicals and products of end use. • To gain comprehensive knowledge of cutting-edge developments in a field of different chemical industries by discussions and exchange of experiences and knowledge. • To develop proficiency in application of current aspects of industrial chemistry.	• Describe the industrial production of a number of important organic and inorganic compounds / chemicals and products of end use. • Gain comprehensive knowledge of cutting-edge developments in a field of different chemical industries. • Importance of Cosmetics Industry and a general study including preparation and uses of the Hair dye, hair spray, shampoo, suntan lotions, lipsticks, talcum powder, nail enamel, creams (cold, and shaving creams). • Perfumes and identify the distinguishing features of its components and also an essential oils and their importance in cosmetic industries with reference to Eugenol, Geraniol, sandalwood oil, eucalyptus, rose oil, 2-phenyl ethyl alcohol, Jasmone, Civetone, Muscone etc. • Know about pesticides both natural and synthetic, benefits and adverse effects of it, also synthesis, manufacture and uses of pesticides viz. Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Anilides (Alachlor and Butachlor). • Definition, classification, raw material used in soaps and detergents, reaction involved in it, Manufacture of Soaps and cleansing action of soaps and detergents. • Definition, properties of good dyes, relation between colour and constitution, classification of dyes according to their mode of application and chemical constitution. • Importance's, definition and meaning of the different terms involved in Drugs and Pharmaceuticals Industry and also synthesis, uses, properties and industrial manufacture of Paracetamol, Aspirin, and Chloramphenicol

CH-605: Analytical Chemistry • To provide knowledge of instruments which are used in Chemical, Pharma, Petroleum, and insecticide and pesticide industry • To increase student technical skill as per industry need. • To develop an understanding of the range and uses of analytical methods in chemistry.	• Compare the Instrumental methods and non instrumental methods and there advantages. • Solve the problem of detection and separation using analytical instruments. • Students will be able to explore new areas of research in bothchemistry and allied fields of science and technology. • Students will be able to explain why chemistry is an integral activity for addressing social, economic, and environmental problems.
CH-606(A): Polymer Chemistry • The course offers the basic concepts of polymer, polymerization, classes of polymers, important properties, and poly(lactic acid) as a biodegradable polymer. • The course also offers to study preparation, properties, and applications of industrially important selected polymers. • The course will give chance to study various mechanisms of polymerization and learn different techniques of polymerization. • The student will be able to understand glass transition temperature and factors affecting on it and various ways to express molecular weight of polymers.	• Define terms like monomer, polymer, polymerization, polydispersity index, etc., classify polymers based on their origin, native backbone chain, and thermal response. • Know glass transition temperature and its determination, various ways to express molecular weights of polymers and polydispersity index. • Identify different mechanisms of polymerizations viz. free radical, ionic, and condensation polymerizations. • Distinguish techniques of polymerization based on physical conditions required for the preparation of polymers in laboratory or industry. • Familiar with preparation, properties, and applications of industrially important selected polymers
CH-608: Practical Course: Inorganic Chemistry • To determine metal from gravimetric estimations. • To determine amount of metal by volumetric analysis. • To determine preparation /synthesis of co-ordination compound. • To study separation techniques of metals. • To use colorimetric analysis of metal.	• Students will be able to prepare co-ordination compounds. • Students will be able to determine amount of metal by using quantitative analysis. • Students will be able to calculate Rf value of metal. • Students will be able to design & carry out scientific experiments as well as accurately record & analyze the results of experiments. • Students will be able to explain why chemistry is an integral activity for addressing social, economic & environmental problems.

POST GRADUATE (PG) Department of Chemistry
Course Outcomes
(M.Sc. in Organic Chemistry)

After completion of these Courses students should able to	
Course	**Outcomes**
CH-110: Physical Chemistry –I	• Apply the quantum mechanical principles to simple systems of chemical interest. • Differentiate between the nature of chemical bond concept from MOT and VBT. • To identify and write the different types of equilibriums in a given nuclear decay process. • To be able to calculate the ionic strength and activity coefficient by using the basic concepts underlying.
CH-130: Inorganic Chemistry –I	• Students will understand the Molecular term symbols. • Students will understand the different diatomic and triatomic molecule • Students will apply the fundamental concepts of molecular Symmetry and operation • Students will understand the importance and types of organic reactions and their applications • Students will understand the importance and types of organometallic compounds of transition metals. • Students will acquire knowledge of transition metal carbonyls and related compounds.
CH-150: Organic Chemistry –I	• Students will understand the reaction intermediates. • Students will understand the different classes, mechanism & stereochemistry of reactions. • Students will apply the fundamental concepts of organic reaction mechanism. • Students will understand the importance and types of organic reactions and their applications • Students will understand the importance and types of organic reactions and their applications • Students will acquire knowledge of important characteristics of organic compounds.
CH-190: Industrial Safety and Good Laboratory Practices	• Understand the importance of laboratory safety. • Aware and follow healthy laboratory practices. • Acquire the knowledge about personal protective equipment.
AC-101: Practicing Cleanliness	• Identify need of cleanliness at home/ office and other public places.

	• Plan and observe cleanliness programs at home and other places. • Practice cleanliness practices in day to day life.

After completion of these Courses students should able to	
Course	**Outcomes**
CH-210: Physical Chemistry –II	• Students will gain an understanding of joule- Thomson effect, third law of thermodynamics, absolute entropy, standard entropy and residual entropy and partial molar quantity and it's significance. • Students should understand the importance of statistical thermodynamics and concept of partition functions. • Students should able to understand study of chemical kinetics and spectroscopy.
CH-230: In-organic Chemistry –II	• Students will understand the reaction mechanism in transition metal complexes. • Students will understand the different structures of ionic solids like AX type (ZnS, NaCI, CsCI), AX2 and Layer structures. • Students will understand energy levels in an atom, coupling of orbital angular momenta, coupling of spin angular momenta and spin orbit coupling. • Students will understand the Laporte orbital selection rule and spin selection rule. • Students will understand the application of complexes in analytical, in metallurgy, in industry.
CH-250: Organic Chemistry –II	• Students will learn the basic name reactions and rearrangement reactions. • Students will understand the applications of reagents in organic synthesis. • Students will apply the basic knowledge about core study of spectroscopy and stereochemistry
CH-290: Instrumentation and Analysis	• Explain various theoretical concepts of analytical chemistry. • Build up ability to solve the numerical problems. • Apply theoretical principles, working of various classical and modern instrumentation techniques.
AC-201: Audit Course Soft Skills	• Grasp soft skills and communication skills. • Apply life skills to manage the situation.
CH-P-1 : Physical Chemistry Practical	• Students will understand the preparation for each experiment.

	• Setup and standardize the potentiometer, PH meter and conductometer. • Identify thermodynamics and kinetics of simple systems. • To know safety requirements and lab skills to perform physico-chemical experiments. • To Apply the principles and techniques to different systems.
CH-I-1 : Inorganic Chemistry Practical	• Students will understand the process of ore analysis. • Students are able to apply their knowledge for binary mixture separation of inorganic compounds using quantitative analysis. • Students can analyze content s present in drug. • Students are able to synthesize and evaluate the complex and also able to determination of complex purity. • Students are able to evaluate lattice energy of binary salt. • Students understand the the techniques of chromatography and its application in analysis. • Students are able to handle and perform the instrumental analysis techniques.
CH-O-1 : Organic Chemistry Practical.	• Students understand the importance of safety techniques and handling of chemicals. • Students are made aware of carrying out different types of reactions and their workup methods. • Students are able to perform purification techniques in organic chemistry like recrystallization, distillation and extraction. • This practical course is designed to make students aware of green chemistry and role of green chemistry in pollution reduction. • Students are able to aplly their knowledge for development of experiment involve green chemistry.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: F.Y.B.Sc.

Course Code: CS-101

Pattern: 60-40

Name of the Subject Teacher: Prof.Amit.D.Umbre

Sr. No.	Objective / Outcomes
1	To aware of Computer.
2	Students know Operating System, viruses and Networking.
3	Give Students in-depth understanding of why computers are essential components in business
4	Introduce Fundamental of Computing DevicesAnd computer vocabulary.
5	Provide foundational or "computer literacy".

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: F.Y.B.Sc.

CourseCode: CS-102

Pattern: 60-40

Name of the Subject Teacher: Ms. Sayali S.Nandan

Sr. No.	Objective / Outcomes
1	Students can develop small project by using C Programming Language.
2	Understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options.
3	Use an integrated development environment.
4	The course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications.
5	By learning the basic programming constructs they can easily switch over to any other language in future.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: F.Y.B.Sc.

CourseCode: CS-201

Pattern: 60-40

Name of the Subject Teacher: Prof.Amit D.Umbre

Sr. No.	Objective / Outcomes
1	Students are able to develop own web page.
2	Applying foundational knowledge, graduates analyze and solve problems of both practical and theoretic nature.
3	To get familiar with basics of the Internet Programming.
4	Implement interactive web page(s) using HTML, CSS and JavaScript.
5	To acquire knowledge and skills for creation of web site considering both client and server side.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: F.Y.B.Sc.

CourseCode: CS-202

Pattern: 60-40

Name of the Subject Teacher: Ms. SayaliNandan

Sr. No.	Objective / Outcomes
1	Students can develop software by using C Programming Language with advanced features.
2	Students will be able to develop logics which will help them to create programs, applications in **C.**
3	By learning the basic programming constructs they can easily switch over to any other language in future.
4	This course involves a lab component which is designed to give the student hands-on experience with the concepts.
5	Identify situations where computational methods and computers would be useful.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS-211

Pattern: 60-40

Name of the Subject Teacher: Dr.S.P.Patil

Sr. No.	Objective / Outcomes
1	Students can Develop Knowledge of Application.
2	Also improve to ability to implement algorithm.
3	To Compute Complexity of various Algorithm
4	Develop Application using data structure Algorithm
5	Implement Appropriate sorting /searching technique

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS-212

Pattern: 60-40

Name of the Subject Teacher: Mr.Ashok .A.Pawar

Sr. No.	Objective / Outcomes
1	Students can develop greater understanding of issue involve in programming language
2	Students can develop small Projects.
3	Students implement projects requiring the implementation of the above data structures
4	The prime purpose of C++ programming was to add object orientation to the C programming language, which is in itself one of the most powerful programming language.
5	C++ programming developes the skill of students application skills.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS- SEC-I(Skill Enhancement Course-I)

Pattern: 60-40

Name of the Subject Teacher: Mr.Rahul.D.Chaaudhari

Sr. No.	Objective / Outcomes
1	To Develop Software/Hardware Installations Skills.
2	It is helpful for students for practical knowledge.
3	Effective knowledge get from various softwares.
4	It also developes students skill power.
5	Effective skill enhancement becomes more capable and confident in their performance.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS-221

Pattern: 60-40

Name of the Subject Teacher: Dr.S.P.Patil

Sr. No.	Objective / Outcomes
1	To Understand and Remember Algorithm and Analysis Procedure.
2	Student can use that for research.
3	Students develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.
4	Students develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
5	Students implement projects requiring the implementation of the data structures.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS-222

Pattern: 60-40

Name of the Subject Teacher: Mr.Ashok .A.Pawar

Sr. No.	Objective / Outcomes
1	To understand the advanced features of programming language c++.
2	Tounderstand the graphics and file system.
3	Students implement projects requiring the implementation of the above data structures.
4	Students can develop small Projects.
5	To learn the syntax and semantics of the C++ programming language.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: S.Y.B.Sc.

CourseCode: CS- SEC-II(Skill Enhancement Course-II)

Pattern: 60-40

Name of the Subject Teacher: Mr.Rahul.D.Chaaudhari

Sr. No.	Objective / Outcomes
1	To understand the Network Security Precautions.
2	Explain the concepts of confidentiality, availability, and integrity (CIA) in context of Information .
3	Explain key networking protocols, and their hierarchical relationship in the context of a conceptual model, such as the OSI and TCP/IP framework.
4	Build multiple host and network architectures, given business requirements and constraints; student will configure operating systems.
5	Developes basic understanding of cyptography technique.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 311

Pattern: 60-40

Name of the Subject Teacher: Dr.Rupali.P.Patil

Sr. No.	Objective
1	To understand use and development of software tools.
2	To understand the design structure of Assembler and macro preprocessor
3	To understand the design structure of compiler.
4	To understand the functions of linkers and loaders
	Outcomes
1	Understand details about system software
2	To do basic system program like development of editors lexical analyzers etc
3	Students are familiar with language processing activities- functions of translators, loader and linkers

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 312

Pattern: 60-40

Name of the Subject Teacher: Miss. Sayali.S. Nandan

Sr. No.	Objective
1	To understand the fundamental concepts of database.
2	To understand user requirements and frame it in data model
3	To understand creations, manipulation and querying of data in databases.
	Outcomes
1	On completion of the course, student will be able to– Solve real world problems using appropriate set, function, and relational models
2	Design E-R Model for given requirements and convert the same into database tables.
3	Use SQL.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 313

Pattern: 60-40

Name of the Subject Teacher: Dr.S.N.Kotkar.

Sr. No.	Objective
1	This paper helps to understand What is software and the process in development of software.
2	It gives detailed knowledge about various models and requirements needed in developing software. It also elaborates the concepts of designing
3	It also elaborates the concepts of designing
	Outcomes
1	After completion of the course: Students are able to perform the E-R Diagram, DFD, Data dictionary, Decision tree about software.
2	They can also design the software in learned language using the course content
3	Get the knowledge of types of testing & how testing is performed in industry.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 314

Pattern: 60-40

Name of the Subject Teacher: Dr.R.S.Deore.

Sr. No.	Objective
1	Understanding Graphics Concept
2	Study the various graphics techniques
3	Study the various graphics algorithms
	Outcomes
1	Differentiate between interactive and non-interactive graphics..
2	Study line Drawing and Circle Drawing techniques and algorithms.
3	Perform 2D and 3D transformation on different images.
4	Know about detail working of 2D and 3D clipping and windowing.
5	Understand raster graphics and hidden surface elimination.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 315

Pattern: 60-40

Name of the Subject Teacher: Mr.J.B.kapade.

Sr. No.	Objective
1	The course is designed to provide Basic knowledge of Python.
2	Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
3	To learn how to design and program Python applications.
4	To develop problem solving skills and their implementation through Python.
5	Master the fundamentals of writing Python scripts
	Outcomes
1	At the end of the course, the student will be able to Explain basic principles of Python programming language
2	Construct and apply various filters for a specific task.
3	Apply the best features of mathematics, engineering and natural sciences to program.real life problems.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 316

Pattern: 60-40

Name of the Subject Teacher: Mr.Amit.D.Umbre

Sr. No.	Objective
1	To learn Object Oriented Design with JAVA
2	Ability to write computer program to solve specific program
3	To handle abnormal termination of a program using exception handling
	Outcomes
1	Get knowledge of JDK environment
2	Explore polymorphism using method overloading and method overriding
3	Understand the different aspects of hierarchy of classes and their extensibility
4	Understands the concept of streams and files
5	Write programs for handling run time errors using exceptions

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 321

Pattern: 60-40

Name of the Subject Teacher: Dr.Rupali.P.Patil

Sr. No.	Objective
1	To understand Operating system concepts and services
2	To understand the concept of a CPU scheduling, memory management, Disk Drum.
3	Scheduling and deadlock.
	Outcomes
1	Students should familiar with Operating System Services.
2	Understand CPU scheduling algorithms, memory Management Techniques, Disk Drum Scheduling algorithms, Deadlock preventions and avoidance.
3	Introduction to android operating systems – its architecture, applications and uses.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 322

Pattern: 60-40

Name of the Subject Teacher: Miss. Sayali.S. Nandan

Sr. No.	Objective
1	To teach fundamental concepts of RDBMS (PL/PgSQL)
2	To teach database management operations
3	Be familiar with the basic issues of transaction processing and concurrency control
4	To teach data security and its importance
	Outcomes
1	On completion of the course, student will be able to– Design E-R Model for given requirements and convert the same into database tables.
2	Use database techniques such as SQL & PL/SQL.
3	Explain transaction Management in relational database System.
4	Use advanced database Programming concepts

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 323

Pattern: 60-40

Name of the Subject Teacher: Dr.S.N.Kotkar.

Sr. No.	Objective
1	This paper helps to understand How network works?• & types of networks & its applications.
2	It helps to understand the various models.
3	It helps to understand various layers & their functionality..
4	It get the idea of how cryptography works..
	Outcomes
1	After completion of the course: Students understand the information exchange done across the network with the help of OSI & TCP/IP models.
2	Student understands how errors are captured & handled in network.
3	Student understands various attack & its prevention techniques.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 324

Pattern: 60-40

Name of the Subject Teacher: Dr.R.S.Deore.

Sr. No.	Outcomes
1	Understanding the use of Sets, Relations and Graphs.
2	Understand Languages in TCS
3	Introduction of Regular Languages and Expressions.
4	Understanding Pumping Lemma and its applications.
5	Explore the knowledge of Pushdown Automata.
6	Understanding Normal Forms with Examples.
7	Understanding Turing Machine.

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 325

Pattern: 60-40

Name of the Subject Teacher: Mr.J.B.kapade.

Sr. No.	Objective
1	The course is designed to provide advance knowledge of Python
2	Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.
3	To learn how to design and program Python applications.
4	To develop problem solving skills and their implementation through Python.
5	Master the fundamentals of writing Python scripts
6	To develop the ability to write database applications in Python
	Outcomes
1	Explain basic principles of Python programming language
2	Implement object oriented concepts, database applications.
3	Construct regular expressions for pattern matching and apply them to various filters for a specific task.
4	Design and implement Database Application and Content providers
5	Apply the best features of mathematics, engineering and natural sciences to program real life problems.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: T.Y.B.Sc.

CourseCode: CS- 326

Pattern: 60-40

Name of the Subject Teacher: Mr.Amit.D.Umbre.

Sr. No.	Objective
1	To design User Interface using Swing and AWT
2	Learn the advanced concept of java
3	To aware about the applet programming
	. Outcome
1	Program using graphical user interface with Swing classes
2	Handle different kinds of events generated while handling GUI components
3	Create programs using menus and dialog boxes
4	Program to create applets
5	Understand advanced java concepts like JDBC, Java Beans

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-101

Pattern: 60-40

Name of the Subject Teacher:Mr.Kishore G.Desale

Sr. No.	Objective
1	The course emphasizes the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations.
2	To develop conceptual understanding of database management system
3	To understand how a real-world problem can be mapped to schemas
4	To educate students with different Database Languages.
5	Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access.
	Outcome
1	To analyze Database design methodology.
2	Acquire knowledge of fundamentals of Database Management System
3	Analyze the difference between traditional file system and DBMS.
4	To deal with different Database languages.
5	Draw various data models for Database, writing and executing queries to get expected results.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-102

Pattern: 60-40

Name of the Subject Teacher: Dr.Swati P. Patil

Sr. No.	Objective
1	To learn fundamentals of Grammars and Languages
2	To understand the relation between Regular Language and Finite Automata and machines.
3	To learn how to design Automata's and machines as Acceptors, Verifiers and Translators.
4	To understand the relation between Contexts free Languages, PDA and TM.
5	To learn how to design PDA as acceptor and TM as Calculators.
6	To understand the decidability and complexity measures.
	Outcomes
1	Understand, design, construct, analyse and interpret Regular languages, Expression and Grammars.
2	Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator
3	Understand, design, analyse and interpret languages, Expression and Grammars.
4	Design different types of Push down Automata and Turing Machine.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-103

Pattern: 60-40

Name of the Subject Teacher: Mr.Ashok A.Pawar

Sr. No.	Objective
1	understand different types of operating systems and the concepts that underlies operating systems.
2	learn the fundamental concepts and algorithms that will be used in existing commercial operating systems.
3	understand the issues related to protection and security.
	Outcomes
1	understand different types of operating systems.
2	gain extensive knowledge on principles and modules of the operating systems.
3	understand key mechanisms in the design of operating systems modules.
4	understand process management, thread management, memory management, file management and deadlock handling.
5	compare performance of different processor scheduling algorithms
6	produce algorithmic solutions to process synchronization problems
7	understand the issues related to protection and security.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-104

Pattern: 60-40

Name of the Subject Teacher: Mr.Jitendra B.Kapade

Sr. No.	Objective
1	To learn fundamentals of Java programming language and its constructs.
2	To understand concept of object-oriented programming concept using Java.
3	To study the concept of the Inheritance, Interfaces, Lambda Expressions, and Inner Classes.
4	To understand the concept of the Exceptions and Generic Programming
5	To learn about the Graphics Programming, Event Handling, Swing Components, and Database Programming
	Outcomes
1	To understands the fundamentals of Java programming language and its constructs.
2	To understand concept of object-oriented programming concept using Java.
3	To implement the applications using the concept of the Inheritance, Interfaces, Lambda Expressions, and Inner Classes.
4	To design and implement the real-world application using the concept of the Exceptions and Generic Programming
5	To understand how to use concept of the Graphics Programming, Event Handling, Swing Components, and JDBC in their application.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-301

Pattern: 60-40

Name of the Subject Teacher: Dr. Shamkant N. Kotkar

Sr. No.	Objective
1	The nature of software development and software life cycle process models.
2	Explain methods of capturing, specifying, visualizing and analyzing software requirements.
3	Understand concepts and principles of software design and user-centric approach and principles of effective user interfaces.
4	To know basics of testing and understanding concept of software quality assurance and software configuration management process.
5	Understand need of project management and project management life cycle.
6	Understand project scheduling concept and risk management associated to various type of projects
	Outcomes
1	Understand and demonstrate basic knowledge in software engineering
2	Define various software application domains and remember different process model used in software development.
3	Explain needs for software specifications also they can classify different types of software requirements and their gathering techniques.
4	Convert the requirements model into the design model and demonstrate use of software and user interface design principles.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-302

Pattern: 60-40

Name of the Subject Teacher: Dr. Rupali P.Patil

Sr. No.	Objective
1	To comprehend evolution of decision making, operational vs decision support system and the concept of data warehouse.
2	To understand transactional and analytical processing.
3	Significance of analytical processing and importance of data pre-processing.
4	Learn various data pre-processing techniques, methods..
5	Understand and apply various techniques/algorithms to obtain meaningful patterns from data (Association mining, classification and clustering)
	Outcomes
1	Explain organization of data warehousing and data marts.
2	Differentiate between OLTAP and OLAP
3	Apply data pre-processing techniques
4	Write basic algorithms for extracting patterns from data (association mining, classification and clustering)
5	Solve problems related with various aspects of data mining.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-303

Pattern: 60-40

Name of the Subject Teacher: Mr.Rahul D.Chaudhari

Sr. No.	Objective / Outcomes
1	Designing desktop And Web Application.
2	Implement Object Oriented For Designing.
3	To study the impact of Internet in facilitating a truly distributed, wide area and highly accessible computing environment.
4	To explore various web-related technologies and to gain appreciative knowledge of how these technologies synergize with one another to enable ubiquitous access of information.
5	To examine the analysis, design and implementation techniques required to develop the network, enterprise and Internet based information systems.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-304

Pattern: 60-40

Name of the Subject Teacher: Mr.Kishor G.Desale

Sr. No.	Objective / Outcomes
1	To develop windows presentation foundation.
2	To develop applications using tools like MS Visual Studio.
3	Design, develop and test software systems for world-wide network of computers to provide solutions to real world problems.
4	To develop programming attitude to serve as software developer in IT industry.
5	To provide advanced and in-depth knowledge of Information Technology and its applications.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-201

Pattern: 60-40

Name of the Subject Teacher: Mr.Rahul.D.Chaudhari

Sr. No.	Objective / Outcomes
1	To Understand Advance Concept in Data Management.
2	To Understand Data Base Concepts And Structures, query languages.
3	To Develop programs using java collection API as well as java Standard Library.
4	Create animation & events based upon advanced java concepts.
5	To inculcate knowledge on Java Programming concepts.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-202

Pattern: 60-40

Name of the Subject Teacher: Mr.Kishor .G.Desale

Sr. No.	Objective / Outcomes
1	Ability To Apply Knowledge, Representation, Reasoning And Machine Learning Technique To solve Real World Problem.
2	Design and evaluate various machine learning algorithm.
3	Use machine learning methods for multivariate data analysis in various scientific fields.
4	To Acquire fundamental knowledge of learning theory.
5	To apply appropriate Machine Learning Techniques for analysis, forecasting, categorization and clustering of the data.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-203

Pattern: 60-40

Name of the Subject Teacher: Dr.Swati.P.Patil

Sr. No.	Objective / Outcomes
1	To Learn Basic Data Structure Used In Compiler Construction.
2	To learn Software Tools Used In Compiler Construction Lexical Analyser.
3	Students will get the concepts of different Parsing techniques and Construction of syntax.
4	An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
5	An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-204

Pattern: 60-40

Name of the Subject Teacher: Mr.Ashok.A.Pawar.

Sr. No.	Objective / Outcomes
1	Ability To Analyze The Performance Of Algorithm.
2	Ability To Chose Algorithm Design For Solving Problems.
3	An ability to design, implement and evaluate computer-based systems, processes, components or programs to meet desired needs within realistic constraints of time and space.
4	A recognition of the need for and an ability to engage in life-long learning and continuing professional development.
5	An ability to analyze a problem and identify and define the computing requirements appropriate for its solution under given constraints.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-401

Pattern: 60-40

Name of the Subject Teacher: Mr.Jitendra B.Kapade

Sr. No.	Objective / Outcomes
1	To Understand current methods for statistical approaches to machine translation.
2	Understanding semantics and pragmatics of English language for processing.
3	Writing programs in Python to carry out natural language processing.
4	Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing.
5	The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course:M.Sc.

CourseCode: CS-402

Pattern: 60-40

Name of the Subject Teacher: Ms.Vaishali S. Patil

Sr. No.	Objective / Outcomes
1	To Understand basic network terminology.
2	To learn higher abstraction web services.
3	To study data link layer concepts design ,issues and protocols.
4	To classify the routing protocols and analyze how to assign the Ip address for given network.
5	Gain core knowledge of networking.

S.S.V.P.Sanstha's L. K. Dr. P. R. Ghogrey Science College, Dhule

Department: Computer Science

Name of Course: M.Sc.

CourseCode: CS-403

Pattern: 60-40

Name of the Subject Teacher: Dr.Rupali P.Patil

Sr. No.	Objective / Outcomes
1	To get Knowledge Data Processing and Data Quality.
2	Students can solve real world problems.
3	Understand the functionality of the various data mining components.
4	Describing different methodologies used in data mining.
5	Develop skill in selecting data mining algorithms for solving problems.

Department of Environment Science

B.Sc Environment Science Programme Outcome

Sr.No.	Subject Code/ Class	Course objective	Learning outcome	Programme Implemaented From
1	Envi-101 F.Y.B.Sc	To acquaint students with basic concepts of Environment & their components	Students will be able to: • Understand about the concept of environment, their structure & types, different components and their functions. • Understand about the evolution theories of universe, elements, origin of life and life forms. • Aware about social environment, understanding the relation between man & environment. • Aware about global environmental issues and possible solution associated for the same.	June 2018 CBCS pattern
2	Envi-102 F.Y.B.Sc	To acquaint students with basic concepts of Natural resources & their importance	• Understand the concepts of natural resources, their types and importance • Understand the detailed information about biogeochemical cycles, their role & function in the environment with a-biotic and biotic components. • Aware about mining activity and their impact on environment through some case studies. • Understand the role and function of O2& CO2 with complete mechanism through oxygen cycle, carbon cycle, photosynthesis, GHG and ozone layer depletion. • Understand the concepts of lithosphere, soil, soil formation,	June 2018 CBCS pattern

			soil profile, ecosystems. • Aware about soil erosion, importance of soil conservation, food chain, food web and productivity	
3	Envi-103 F.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand the concepts of water sampling with preservation techniques • Understand the physical, chemical and biological properties of water samples with water quality standards. • To determine the pH, electrical conductivity of water as well as soil which help to understand the nature of particular water and soil. • Estimate the solids from water to evaluate their effects on humans. • To determine Dissolved oxygen from water body which help to understand the • function of water body	June 2018 CBCS pattern
4	Envi-201 F.Y.B.Sc	To acquaint students with concepts of Earth formation & Environmental issues	Students are able to: • Understand the concepts Earth Process, classification and formation of rocks, their movements beneath the earth with tectonic plates and their effects on lithosphere. • Understand the concepts of environmental pollution, their sources and effects on biotic community. • Aware about environmental issues and their monitoring for minimizing the environmental pollution • Understand the concept of environmental education, its need and importance. • Aware about objectives and principles of environmental	June 2018 CBCS pattern

			education	
5	Envi-202 F.Y.B.Sc	To acquaint students with basic concepts of Renewable & Non-renewable resources	Students are able to: • Understand the concepts of Water, Land forest and Energy resources. • Aware about over utilization of surface & ground water, benefit and problem associated with water availability, conflicts over water. • Understand about the use and over exploitation of forest, causes and effects of forest, timber extraction and mining. • Aware about importance of natural resource through some case studies like "Chipko Movements" and "Sardar Sarovar Paoject" • Understand the concept of equitable use of natural resources for sustainable lifestyle	June 2018 CBCS pattern
6	Envi-203 F.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science for water & soil analysis	Students are able to: • To determine the chemical properties of water like acidity, alkalinity, turbidity, hardness to evaluate their impacts on biotic community. • Understand the physical, chemical and biological properties of water samples with water quality standards. • To determine the pH, electrical conductivity of water as well as soil which help to understand the nature of particular water and soil. • Estimate the solids from water to evaluate their effects on humans	June 2018 CBCS pattern
7	Envi-301 S.Y.B.Sc	To acquaint students with basic concepts of Ecology & Environment	Students are able to: • Understand about the concept of ecology, their structure & types, different	June 2019-20 CBCS pattern

			components and their functions. • Understand about the a-biotic, biotic factors & their relation to each other. • Aware about ecosystem, function & components of ecosystem and their stability. • Aware about human population and population ecology.	
8	Envi-302 S.Y.B.Sc	To acquaint students with basic concepts of environmental microbiology	Students are able to: • Understand the concepts of environmental microbiology, their types and importance • Understand the detailed information about microscopy and their application. • Acquired the skill of staining techniques for isolation and identification of microorganism. • Understand the Physical, Chemical and Biological Methods of isolating pure culture.	June 2019-20 CBCS pattern
9	Envi-303 S.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand the concepts of microscopy, aware about microbiological equipments. • Prepare microbial media with different proportion. • To prepare the slide using different staining techniques to identify microorganism from soil and curd • Aware about Ecological adaptations in Wetland plants & Mesophytes. • To determine temperature, wind profile & light intensity using environmental instruments. • To determine physical & chemical parameters of solid waste.	June 2019-20 CBCS pattern
10	Envi-401	To acquaint students with	Students are able to:	June 201-20

	S.Y.B.Sc	social environment & their conservation	• Understand the concepts of social environment & their importance. • Aware about environmental impact assessment process & its importance. • Understand about the forest resource and its conservation for sustainable development. • Aware about importance wild life conservation and its importance. • Understand the concept of environmental lawas.	CBCS pattern
11	Envi-402 S.Y.B.Sc	To acquaint students with basic concepts of Applied & Industrial Microbiology	Students are able to: • Understand the concepts of air and water microbiology. • Aware about food microbiology associated with food contamination, food infection and food poisoning. • Understand about the sewage waste water microbiology. • Aware about importance medical microbiology	June 2019-20 CBCS pattern
12	Envi-403 S.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science for water & soil analysis	Students are able to: • To determine the chemical properties of water like acidity, alkalinity, turbidity, hardness to evaluate their impacts on biotic community. • Understand the physical, chemical and biological properties of water samples with water quality standards. • To determine the pH, electrical conductivity of water as well as soil which help to understand the nature of particular water and soil. • Estimate the solids from water to evaluate their effects on humans	June 2019-20 CBCS pattern
13	Envi-501 T.Y.B.Sc	To acquaint students with basic concepts of pollution, pollutants, also about air,	Students are able to: • Understand the basic concept in pollution, pollutants, their	June 2020-21 CBCS pattern

		water and marine pollution	types and effects. • Understand air pollution with sources, causes and effects on biotic community. • Understand water pollution with sources, causes and effects on biotic community. • Understand Marine pollution with sources, causes and effects on biotic community • Aware about their control strategies of different types of pollutions	
14	Envi-502 T.Y.B.Sc	To acquaint students with basic concepts of bioethics and importance of biodiversity, information about different species and environmental movements	Students are able to: • Understand the concept of biodiversity, their types, classification and their social, ethical and optional values. • Aware about bioethics, habitat destruction, fragmentation, degradation and pollution. • Aware about endangered and endemic species in the world and in the India. • Aware for the conservation of biodiversity through In-situ and Ex-situ. • Study of major environmental movements (case study) associated with environment and biodiversity conservation.	June 2020-21 CBCS pattern
15	Envi-503 T.Y.B.Sc	To acquaint students with basic concepts of basics in environmental toxicology	Students are able to: • Understands the concept of toxicology, toxicants, their exposure with time and dose, concept of carcinogen and mutagen. • Study the mechanism of bioaccumulation, biomagnifications, acute and chronic toxicity. • Understand the factors affecting the toxicity • Study the toxicity of gaseous pollutants like CO, NOx, SOx and petroleum solvents	June 2020-21 CBCS pattern

16	Envi-504 T.Y.B.Sc	To acquaint students with basic concepts of fundamental of RS, sensors, satellite and GIS	Students are able to: • Understand the fundamental of remote sensing and their use in environment segments. • Study of different sensors with their principles and working. • Understand the construction and working of satellites with different resolution. • Interpreted the image using different visual and digital recognition elements. • Understand the concept of GIS, data using in GIS, scanning, digitization and use of GPS.	June 2020-21 CBCS pattern
17	Envi-505 T.Y.B.Sc	To acquaint students with basic concepts of Air quality and its monitoring techniques	Students are able to: • Understand the fundamental of air quality monitoring. • Sound knowledge of air pollutants and its adverse effects on biotic community. • Preparation of chemicals and reagent for the analysis of NOx and SOx. • Knowledge about instruments used in air quality monitoring	June 2020-21 CBCS pattern
18	Envi-506 T.Y.B.Sc	To acquaint students with basic concepts of environmental biotechnology, biomass, biomass energy and bioremediation	Students are able to: • Understanding the concept of environmental biotechnology and its global impacts on different field like agriculture, health care and environment. • Study the composition of biomass and its types. • Study the biomass energy gain from petroleum plants, hydrocarbon, liquid fuel and biogas. • Understand the concept of bioremediation with different micro-organisms	June 2020-21 CBCS pattern
19	Envi-507 T.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental	Students are able to: • Understanding the concept of sampling and its preservations	June 2020-21 CBCS pattern

		Science	• Demonstrate on pH and EC meter for monitoring the pH and electrical conductivity of water and soil samples. • Analyse the water with different parameters like solids, available & residual chlorine, and phosphate for determining its quality. • Understand and study of water quality criteria for drinking as well as for waste water.	
20	Envi-508 T.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand and study of Air and Noise quality criteria for determining the pollution level. • Demonstrate on RDS sampler for monitoring of oxides of nitrogen, oxides of sulphur, SPM and RSPM. • Analyse the chlorophyll contents for estimation of pollution load. • Understand and study of adaptations of some plants as a pollution resistant	June 2020-21 CBCS pattern
21	Envi-509 T.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand and study of metal digestion and analysis. • Demonstrate on instruments which are used in environmental analysis like Spectrophotometer, flame photometer, gas chromatography. • Analyse the selected metal for estimation of pollution load. • Understand and study of construction and working of ETP for waste water treatment.	June 2020-21 CBCS pattern
22	Envi-601 T.Y.B.Sc	To acquaint students with basic concepts of noise, solid waste, thermal and radioactive pollution	Students are able to: • Understand Noise pollution with sources, causes and effects on biotic community. • Understand Solid waste	June 2020-21 CBCS pattern

			pollution with sources, causes and effects on biotic community. • Understand Thermal pollution with sources, causes and effects on biotic community. • Understand Radioactive pollution with sources, causes and effects on biotic community. • Aware about their control strategies of different types of pollutions	
23	Envi-602 T.Y.B.Sc	To acquaint students with basic concepts of importance of biodiversity conservation through forest and wild life protection	Students are able to: • Understand the international agreements associated with environmental awareness. • Understand and study of forest and their types, relation between forest and global warming, carbon sink, nature pollution indicators. • Understand and study the forest conservation through laws. • Concept of forest fire, forest population heavy loss of green beelt and forest research in India. • Understand the strategies for wildlife conservation through study of depletion of wildlife and their effects	June 2020-21 CBCS pattern
24	Envi-603 T.Y.B.Sc	To acquaint students with basic concepts of soil , air, water toxicology with biotransformation	Students are able to: • Understand the basics of soil toxicology. • Study of toxic elements of air and water like Lead, Mercury, Arsenic, Chromium, Cadmium, Nickel, Bismuth, Zinc, Copper, Manganese, etc. • Aware about toxicity of pesticides and their effects. • Understand the concept of eco-toxicology, public health, animals in relation to human	June 2020-21 CBCS pattern

			health.	
25	Envi-604 T.Y.B.Sc	To acquaint students with basic concepts of Vector and raster data use in RS & GIS, applications of RS & GIS in different field	Students are able to: • Understand the analysis of vector data using buffering. • Study the analysis of raster data using overlay features. • Understand and study of applications of RS and GIS in agriculture field. • Understand and study of applications of RS and GIS in social science & Geo- disaster management field. • Understand and study of applications of RS and GIS in forestry, ecology, and watershed & water resource management	June 2020-21 CBCS pattern
26	Envi-605 T.Y.B.Sc	To acquaint students with basic concepts of Water quality and its monitoring techniques.	Students are able to: • Understand the fundamental of water quality monitoring. • Sound knowledge of water pollutants and its adverse effects on biotic community. • Knowledge and skill about water quality standards. • Knowledge about standard methods used in water quality monitoring.	June 2020-21 CBCS pattern
27	Envi-606 T.Y.B.Sc	To acquaint students with basic concepts of bioremediation, bioleaching and hazards of environmental engineering	Students are able to: • Understanding the concept of toxicity of bioremediation through metal and dyes. • Study the concepts of xenobiotics. • Study the process of bioleaching using different micro-organisms • Understand the hazards in environmental engineering through growth inhibition and replacement of natural strains	June 2020-21 CBCS pattern
28	Envi-607	To acquaint with various laboratory techniques used in	Students are able to: • Determine different	June 2020-21

			parameters like ammonia, nitrates and sulphate from water samples to describe its quality. • Demonstrate on turbidity meter to determine the water turbidity. • Analyse the soil for measuring the chlorides for determining its quality. • Understand and study of water quality criteria for drinking as well as for sewage waste water through BOD and COD.	CBCS pattern
	T.Y.B.Sc	Environmental Science		
29	Envi-608 T.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand and study of physical characteristics of soil like bulk density, water holding capacity, organic carbon, organic matter etc. • Study and determining the atmospheric fungi for its effects on human • Analyse the chlorophyll contents for estimation of pollution load. • Understand and study of adaptations of different plant and animal species for survival in the environment.	June 2020-21 CBCS pattern
30	Envi-609 T.Y.B.Sc	To acquaint with various laboratory techniques used in Environmental Science	Students are able to: • Understand and study of satellite images using different characteristic like tone, texture, pattern, shape and size. • Demonstrate on instruments which are used in environmental analysis like Bomb calorimeter and HPLC. • Computation of environmental statistics through mean, mode, median and variance. • Understand and study of determination of selected metal for their toxicological effects.	June 2020-21 CBCS pattern
31				

Department of Geography

B.Sc. Geography Programme outcome

Sr.No.	Programme Outcome	Programme Specific Outcome
1	To Promote understanding of basic facts and concepts in Geography	1)To develop ability And To Acquiesce the knowledge of terms facts, concepts, Processes, techniques and Principles of Subject.
2	To Prepare the Students for seef earning as well as competitive examinateons.	2) To develop ability to apply the knowledge of geography in duff recent field
3	To develop Problem solving skills in students.	3)To Expose and to develop interest in the field of geography.
4	To develop preper aptitude towards the subjects.	4) To develop. the skills requiredin the subject for the application. in society for different purposes.
5	To develop the students for the problem solving selated global issues.	TO develop the interest of students in relation to global warming sudden climate changes events.

Course	Outcomes
Gg101: Physical Geography-I (Lithosphere) (Part-I)	1) To understand the surface of the earth & The Processes by which it is shaped both at the present as well as in the past. 2)To acquaint the students with utility & application of physical Geography in different areas & environment.
Gg102 physical Geography –II (Atmosphere) (part-I)	1) To understand different charaeteristies & processes of Atmosphere 2) To understand various applications of climatology 3) To acquaint the basic knowledge of elements of processes in atmosphere.
Gg103 Practical Geography (cartographiTechniques) (part-I)	1) To understand the concept of scale at the initial stage 2) To know how to draw the maps on various scale 3) particularly the Techniques of drawing cartograms showing physical climatic & scientific attributes of the region.
Gg201 Physical Geography (lithosphere) (part-II)	1)To understand impaet of human activities on the environment. 2) To study external forces operating on the earth surface. 3) To enable students to aquire knowledge of their physical environment.
Gg201 Physical Geography (Hydrosphere) (part-II)	1) To understanding properties & movement of ocean water 2) To introduce the students to the basic concepts of oceanography 3) To make the student aware about the application of oceanography in different areas.
Gg201 Physical Geography (map projection) (part-II)	1) To enable the students to use various projection. 2) A cquaint the students with basic projection & preparation of maps. 3) To aequaint the students with the principles of classification & choice of map projection.
Gg301 Environmental Geography	1) To acquaint the students with fundamental concepts of environmental Geography 2) To aware the student about the processes & pattern in the nodural environment 3) To make aware the students about the judicious use of resources.

Gg302 Physical Geography of Maharashtra	1)To Understanding the border of administrative divisions of Maharashtra 2)To understanding the properties of soils & natural vegetation of Maharashtra in different regions. 3) To make aware the students about the judicious use of water resources.
Gg303 Interpretation of Topographical, weather maps & weather dada analysis	1)To develop the interpretation skill among the students 2)To introduce the students about the information recorded on topographical & weather maps. 3) To aquire various informations from the maps.
Gg304 Regional Planning & Development.	1) To introduce general problems of regional development & their application to rural areas. 2) The student is able to explain the role of regional policy & desire the tools used to regional development support. 3) To understanding of social & regional relation of the rural development.
Gg 401 Human Geography	1) To adopt & modify the environment under it's varied conditions from primitive life style to the modern living. 2) To identify & understand environment & population in terms of their quality & spatial distribution pattern 3) To comperehend the contemporary issues faeing the global community.
Gg402 socio-Economic Geography of Maharashtra by Gps.	1) To acquaint the student with basic knowledge of maharastra state. 2) To acquaint the student with prospects & problems of agriculture, industries, trade & transport of Maharashtra.
Gg403 surveying & area measurement by Gps.	1) To develop the surveying skill among the students. 2) To introduce the students about working & practical utility of Gps. 3) To acquaint the student about the filed survey.
Gg404 Field Technique & survey base Project report	1) To aware students that how dose a field work form an important part of geographical learning 2) To develop the skill of selection of appropriate technique for field study 3) To develop the ability of analysis interpretation & report writing based upon the data collected during a field study.
Gg501 Geomorphology	1)To understand the origin of various landforms

	2)To study the process of landforms development 3) To help the students for preparation of competitive examination.
Gg 502 Climatology	1) To acquaint the students with basic knowledge of atmosphere, weather & climate. 2) To understand various weather phenomena 3) To identify climatic differentiation on the earth 4) To acquire the knowledge of weather forecasting.
Gg503 Oceanography	1) To introduce students to basic concepts of oceanography 2) To understanding the chemical, physical geological & biological processes which aet on the oceans surface & to recognize the submarine forms, the seawater composition & properties
Gg 504 Water Resource management	1)To Judge surface & ground water resources. 2) To understand signi ficance of water resources for human development. 3) To condude the water resource management through scientific planning.
Gg 505 Remote Sensing & Gps	1) To introduce the fundamentals of Remote sensing. 2) To aware about the application of remote sensing in various field. 3) To develop Gps usage skill in students.
Gg 506 Disaster management	1) To understand impacts of disaster. 2) To know the fundamental concepts of disaster management 3) To acquire the knowledge of preparedness & mitigation 4) To understand manifesting the mitigation.
Gg506 Disaster management	1) To understand impacts of disaster. 2) To know the fundamental concepts of disaster management. 3) To aquire the knowledge of preparedness & mitigation. 4) To understand manifesting the mitigation. 1)Students will learn basic theories of aerial photography & common applications for remote sensing using vertical aerial photography G2) Students will be able to demonstrate the understanding of properties & characteristics of aerial

	photography.
Gg508 Practical in morph metric analysis.	1) To understand the concept of drainage system & it's morphology practically. 2) To conclude the morphometric analysis by scientific methods. 3) To encourage the students for morphometric research.
Gg509. practical in statical Techniques	1)To familiarize the students with statistical analysis & it's applications in Geography.
Gg 601 :Soil Geography	1)Student will able to know the relationship between physical factors and soil. 2)Student should know the various soil forming processes. 3) Student learn the measures of soil conservation.
Gg. 602–Biogeography.	To aware biogeographical issue among the student. ☐ To acquaint the students with fundamental concept of biogeography. ☐ To aware the student about the processes and development of plant and animals. ☐ To make aware the student about use of resources with prudence.
Gg. 603–Population Geography.	To know the problems of population • To learn the population policies in India resource. ☐ To understand the recent problems of population in the world as well as nation. ☐ To study the demographic structure of population in India. ☐ To know the methods in present the population data.
Gg. 604 (DSC Core IV) –Agricultural Geography.	To introduce Agricultural systems. ☐ To make able the student to understand an influence of different physical and manmade factors on agriculture. ☐ To introduce Agricultural region and agro-climatic regions of India. ☐ To provide information about the worlds agricultural types. ☐ To make students aware about the importance of agricultural revolutions in Indian context. ☐ To know place of agriculture in economy of India.
Gg. 605 (DSC SEC) –Geographical Information System.	Το ιντροδυχε τηε στυδεντσ αβουτ νεω αδπανχεδ φιελδ ιν Γεογραπηψ. • To develop the skill of new technique in the field GIS. ☐ To acquaint the students to components of GIS.

	☐ To familiarize with the tools and application of GIS

Department of Mathematics

B.Sc. Mathematics Programme outcomes

Sr. No.	General Objectives of the Course	Learning Outcomes	Program Implemented From
1	MTH-101 "Matrix Algebra" A primary need for the establishment of this course is to understand the basic knowledge and applications of matrices in various fields.So, the main objective is to teach mathematical approaches and modeles to grow mathematical skill, to improve mathematical thinking and to impove choice making power of the students.	Upon successful completion of this course the student will be able to : a) understand concepts on matrix operations and rank of the matrix. b) understand use of the matrix for solving the system of linear equations. c) understand basic knowledge of the eigen values and eigen vectors . d) apply Cayley-Hamiton theorem to find the inverse of the matrix. e) know the matrix transformation and its applications in rotations, reflection ,translation.	Jun-2018
2	MTH-102 " Calculus" The basic need of this course is to understand the concepts and applications of calculus. Also, this course will improve problem solving and logical thinking abilities of the students. By learning this course students can use the	Upon successful completion of this course the student will be able to: a) understand basic concepts on limits and continuity. b) understand use of differentiations in various theorems. c) know the mean value	Jun-2018

		concept of calculus to develop different mathematical models.	theorems and its applications. d) make the applications of Taylor's, Maclaurin's theorem. e) know the applications of calculus.	
3	MTH-103(A) " Coordinate Geometry" General objectives are to study two-dimensional geometry, translation and rotation of axes and it's used to convert in standard 2-d forms. Also, to study three-dimensional geometry, sphere, cone and cylinder along with their properties and interpretations.	Students can visualize geometrical concept and draw two dimensional figures and can find their standard forms of shifting and rotation of axes. Students also can draw three dimensional figures and their equations particularly sphere, Cone and cylinder.	Jun-2018
4	MTH-103(B) " Graph Theory" To introduce the concept of graphs, directed graphs and trees the students and introduce their applications in computer science.	a) students can visualize the concept of graphs by means of diagrams. b) students can make use of graphs in network problem etc. c) students can solve the complicated network problems by using spanning trees. d) students can able to run the different algorithms and flowcharts diagrams.	Jun-2018
5	MTH-201 " Ordinary Differential Equations" The basic need of this course is to understand the different methods of solving differential equations and their applications to solve problems arrives in engineering and technology.	Upon successful completion of this course the student will be able to: a) understand basic concepts in differential equations. b) understand method of solving differential equations. c) understand use of differential equations in various fields.	Jun-2018

6	MTH-202 "Theory of Equations" To study 1. Divisibility of numbers and roots of polynomial equations. 2. Relations between roots and coefficients of polynomials of degree ≤ 4. 3. Roots of cubic equations by using Cardon's method, biquadratic equations by Descarte's method and roots of polynomial equations by Newton's method.	Students can find out roots of an equation of degree less than or equal to five. Theory of equations is highly useful in various subjects like algebra, linear algebra, calculus, ordinary and partial differential equations etc.	Jun-2018
7	MTH-203(A) " Laplace Transform" The basic need of this course is to understand the concepts and applications Laplace transforms. The concepts and methods are useful for solving differential equations.	Upon successful completion of this course the student will be able to: a) understand basic concepts on Laplace and universe Laplace transforms. b) understand convolution theorem. c) understand use of Laplace transform in solving differential equations.	Jun-2018
8	MTH-203(B) " Numerical Analysis" The students will be able to understand the basic numerical analysis which is applicable to problems like finding zeros of algebraic equations, interpellation, curve fitting and solution of first order differential equations. Students will also understand that when exact solutions are difficult to obtain, then approximate	Student will be able to: a) understand basic concepts of methods of solutions of equations viz. Bisection, iteration, Newton-Raphson methods and method of false position. b) understand methods of curve fitting viz. Gauss's forward and backward difference formulae and Lagrange's interpolation formula. c) use of curve fitting such as	Jun-2018

		least square, polynomial and exponential fitting for set of given data. d) use Taylor's series. Euler's method. Modified Euler's method., Runge kutta methods for solving ordinary differential equations.	
9	MTH-301 " Calculus of Several Variables " This is the second course in the calculus series after a course of Calculus in F.Y.B.Sc. for science students. In this course we discuss functions of two and more variables along with their series expansions and extreme values. We also discuss integration techniques as well as applications of integrals.	Upon successful completion of this course the student will be able to understand: a) limit and continuity of functions of several variables. b) fundamental concepts of multivariable Calculus. c) series expansion of functions. d) extreme points of function and their maximum, minimum values at those points. e) meaning of definite integral as limit as sums. h) how to solve double and triple integration and use them to find area by double integration and volume by triple integration.	Jun-2019
10	MTH-302(A) "Group Theory" A primary objective of this course is to understand algebraic structures and their properties. Doing this one can use these structures to solve problems arises in many branches of Mathematics such as theory of equations, theory of numbers, Geometry etc. This enable students to grow their mathematical skill and used them to apply in	Upon successful completion of this course the student will be able to: a) understand group and their types which is one of the building blocks of pure and applied mathematics. b) understand Lagarnge, Euler and Fermat theorem. c) understand concept of automorphism of groups. d) understand concepts of homomorphism and	Jun-2019

		isomorphism. e) understand basic properties of rings and their types such as integral domain and field.	
11	MTH-302(B) " Theory of Groups and Codes " A primary need for the establishment of this course is to understand algebraic structures and their properties. Upon studying this one can use these sutures to solve problems arises in many branches of Mathematics and computer science such as theory of equations, theory of numbers, Geometry, theory of computations, cryptography etc. This enable students to grow their mathematical skill and used them to apply in many other branches of science and technology.	Upon successful completion of this course the student will be able to: a) understand group structures which is useful to understanding ideas of modern mathematics. b) understand solutions to polynomial equations. c) understand permutation groups. d) understand concepts of homomorphism and isomorphism. e) Students will understand basic concepts in coding theory.	Jun-2019
12	MTH-401 " Comlex Variables" A primary objective of this course is to make students aware of generalization of real number system and calculus. Analyticity and complex integrations are useful for applications. This course improves mathematical skill and ability to solve various integrations.	a) The course is aimed to introduce the theory for functions of complex variables. b) Students will understand the concept of analytic function. c) Students will understand the Cauchy Riemann Equations. d) Students will understand harmonic functions. e) Students will understand complex integrations. f) Students will understand	Jun-2019

		calculus of residues. g) Students will acquire the skill of contour integrations.	
13	MTH-402(A) "Differential Equations" The main objective of this program is to cultivate mathematical aptitude among students and nurture their interest towards problem solving aptitude by introducing methods of solution of differential equations.	a) Students will aware of formation of differential equations and their solutions. b) Students will understand the concept of Lipschitz condition. c) Students will understand method of variation of parameters for second order L.D.E. d) Students will understand simultaneous linear differential equations and method of their solutions. e) Students will understand Pfaffian differential equations and method of their solutions f) Students will understand difference equations and their solutions.	Jun-2019
14	MTH-402(B) "Differential Equations and Numerical Methods " The main objective of this program is to cultivate mathematical aptitude among students and nurture their interest towards problem solving aptitude by introducing methods of solution of differential equations.	a) Students will aware of formation of differential equations and their solutions. b) Students will understand the concept of Lipschitz condition. b) Students will understand method of variation of parameters for second order L.D.E. d) Students will understand simultaneous linear differential equations and method of their solutions. e) Students will understand Pfaffian differential equations and method of their solutions.	Jun-2019

		g) Students will understand difference equations and their solutions	
15	MTH-404 "Vector Calculus" The general objectives are to acquire skills of vector algebra, vector valued functions, operators like del and curl and line and surface integrals.	a) understand scalar and vector products. b) understand vector valued functions and their limits and continuity and use them to estimate velocity and acceleration of partials. c) Calculate the curl and divergence of a vector field. d) Set up and evaluate line integrals of functions along curves.	Jun-2019
16	MTH-501 " Metric Spaces" 1. Introduction of metric as a generalization of distance function and basic concepts in metric spaces. 2. To explain the concept of sequence and complete metric space with their properties. 3. To discuss compactness, and sequential compact spaces and their properties along with continuity.	After studying this course, student should be able to: 1. Understand the Euclidean distance function on R" and appreciate its properties, and state and use the Triangle and Reverse Triangle Inequalities for the Euclidean distance function on R". 2. Explain the definition of continuity for functions from R" to IR" and determine whether a given function from R" to R"is continuous. 3. Explain geometric meaning of each of the metric space properties (M1) - (M3) and be able to verify whether a given distance function is a metric 4. Distinguish between open and closed balls in a metric space and be able to determine them for given metric spaces. 5. Define convergence for	Jun-2020

		sequences in a metric space and determine whether a given sequence in a metric space converges. 6. State the definition of continuity of a function between two metric spaces.	
17	MTH-502 " Real Analysis-I" 1. To study the Riemann Integration. 2. To study the Mean value theorems of integral calculus 3. To study Improper integrals with finite limit and infinite limit. 4. To study the concept of Riemann integration and its properties. 5. To study Beta and Gamma Integrals	After successful completion of this course, students are expected to: 1. Understand the structure of Riemann Integration. 2. Represent lattice in diagrammatic form. 3. Understand the Improper integrals with finite limit infinite limit their properties. 4. Learn the concepts of Beta and Gamma Integrals.	Jun-2020
18	MTH-503 " Algebra" 1)To gain the basic concepts of groups like subgroups, normal, isomorphism of groups. 2)To understand basic concepts of rings like ideals, isomorphism of rings and polynomial rings.	After successful completion of this course, students are expected to: 1) know the use Permutation Groups. 2) know normal Subgroups and group isomorphisms. 3) Know Ideals in rings, Quotient Rings and Isomorphism of Rings. 4) Know polynomial Rings and irreducibility of polynomials	Jun-2020
19	MTH-504 " Lattice Theory" 1) To study the structure of poset and lattice. 2) To study the diagrammatic representation of lattice. 3) To study the terms Maximal element, Minimal	After completing this syllabus students will able to: 1) Understand the structure of poset and lattice. 2) Represent lattice in diagrammatic form. 3) Understand the terms	Jun-2020

		element, Greatest element, Least elements. 4) To study the concept of ideals and its properties. 5) To study homomorphism of lattices. 6) To study modular and distributive lattice and their inter-relation. 7) To study complemented and relatively complemented lattice.	Maximal element, Minimal element, Greatest element, Least elements. 4) Learn the concepts of ideals and their properties. 5) Learn the concepts of homomorphism. 6) Understand modular and distributive lattice and their inter- relation. 7) Understand complemented and relatively complemented lattice	
20	MTH-505 " Integral Transforms" The goals for the course are 1. To gain a facility with using the transform, both specific techniques and general principles, and learning to recognize when, why, and how it is used. 2. Together with a great variety, the subject also has a great coherence, and the hope is students come to appreciate both.	Learning After successful completion of this course, students are expected to: 1. Know the use of Fourier transform in Wave equation, 2. Solve Boundary Value Problems, also problem on Heat-flow in semi-infinite bar. 3. Use Fourier transform in communication theory and signal analysis, image processing and filters, data processing and analysis, solving partial differential equations for problems on gravity. 4. Students will be able to use Z-transform in the characterization of Linear Time-Invariant system (LTI), in development of scientific simulation algorithms		Jun-2020
21	MTH-506(B) " Number Theory" To study prime numbers and Diophantine equations, Theory of congruence's,	After successful completion of this course, students are expected to: 1) solve Diophantine equations.		Jun-2020

	Perfect numbers, Fibonacci sequence and finite continued fractions.	2) use Fermat's theorem, Euler's theorem and Wilson's theorem for finding remainders. 3) understand perfect, Mersenne and Fermat's numbers. 4) understand Fibonacci sequence. 5) solve Diophantine equations by using finite continued fractions.	
22	MTH-601 "Measure Theory" The aim of this course is to learn the basic elements of Measure Theory. It is useful as it provides a foundation for many branches of mathematics such as harmonic analysis, theory of partial differential equations and probability theory.	1) Learn measurable sets. Learn the concept of Sets of measure zero. 2) Understand why a more sophisticated theory of integration and measure is needed. 3) Show that certain functions are measurable. 4) Understand properties of the Lebesgue integrals.	Jun-2020
23	MTH-602 "Real Analysis-II" 1. To study Sequence of real numbers, series function. 2. To study of Fourier series. Theory of Uniform convergence of sequence of functions and Cauchy's criteria for uniform con. of sequence of function.	After successful completion of this course, students are expected to: 1. solve Convergence and divergence. 2. use Test for absolute convergence. 3. understand Fourier series for even and odd functions t, A understand Sine and cosine series in half range	Jun-2020
24	MTH-603 " Linear Algebra" 1) To study vector spaces, basis and dimensions. 2) To study Linear transformation also Eigen value and eigen values.	After successful completion of this course, students are expected to: 1) solve Rank and nullity theorem. 2) use Cayley Hamilton	Jun-2020

	3) To study diagonalization of matrices, congruences, Perfect numbers,	theorem, Euler's theorem and finding Eigen values and Eigen vectors of linear transformation. 3) understand Kernel and image of linear transformations. 4) understand Singular and non-singular linear transformations	
25	MTH-604 " Ordinary and Partial Differential Equation" The main objective of this course is to provide the student with an understanding of the solutions and applications of ordinary differential equations. By using this theory and models students can apply their knowledge in real world. Prerequisite: F.Y.B.Sc. and S.Y.B.Sc. Mathematics.	1) Know the exact differential equation and its solution. 2) Solve the exact differential equations by using integrating factor. 3) Solve the linear differential equation of second order by using various methods.	Jun-2020
26	MTH-605 " Graph Theory" 1. The course is oriented to those who want to advance structured and procedural programming understating and to improve operation on graphs. 2. The major objective is to provide students with understanding of graph, Trees. Matrix representation of graphs.	After successful completion of this course, students are expected to: 1. Understanding a functional hierarchical code organization. Ability to define and manage graphs, connected graphs. 2. Understanding a concept of Cut set and cut vertices.	Jun-2020
27	MTH-606(B) " Operations Research" 1. To study linear programming problem (LPP).	After successful completion of this course, students are expected to: 1. solve the linear	Jun-2020

2. To study the simplex method to solve línear programming problem. 3. To study the simplex method for unbounded, alternative and infeasible solutions of LPP. 4. To study the initial basic feasible solution of transportation problem (TP). 5. To study the saddle point, maximin-minimax principal, two person zero sum game. 6. To study 2 x 2 games without saddle point. 7. To study graphical method to solve m x 2 and 2 x n games. 8. To study dominance property.	programming problem by graphical method and simplex method. 2. learn the unbounded, alternative and infeasible solutions of LPP by graphical and simplex method. 3. understand the standard and canonical form of LPP. 4. find the optimal solution of TP by MODI method. 5. solve the solution of assignment problems by Hungerian Method. 6. Understand the unbalanced, balanced, maximization, restricted AP and alternative solution of AP. 7. understand the saddle point, maximin-miìnimax principal, two person zero sum game. 8. use of dominance property to find the solution games	

Department of Mathematics

M.Sc Mathematics Programme outcomes

Sr. No.	General Objectives of the Course	Learning Outcomes	Program Implemented From
1	**MT-101 Advanced Real Analysis** . Countable and uncountable sets, Infinite sets and the axioms of choice, Cardinal numbers and their arithmetic, Schroeder- Bernstein theorem, Cantors theorem and the continuum Hypothesis, Zorn's lemma, Well Ordering principle, Cantor set, Cantor like sets, The Lebesgue functions. 2. Measure on the real line: Lebesgue Outer measure, Measurable sets, Regularity, Measurable functions, Borel sets and Lebesgue measurability. 3. Integration of functions of a real variable: Integration of nonnegative function, The general integral, Integration of series, Riemann and Lebesgue integrals. 4. Differentiation: The four derivatives. Functions of bounded variation. Lebesgue differentiation theorem, Differentiation and Integration. 5. Differentiation of monotone function: Vitali covering theorem (lemma), Fundamental theorem for integral calculus for Lebesgue integral, Absolutely continuous functions.	After successful completion of this course the student will be able to : a) understand concepts of Countability and countable sets b) understand the lebesgue measure and measurebale sets . c) understand the differntiablity and integrability of measurable functions .	June 2017
2	**MT-102 Topology** 1. Topological spaces and continuous functions: Topological spaces, Basis for topology. The order topology, subspace topology, closed sets and limit points, continuous functions, The product topology, Continuous functions, Metric topology, The quotient topology. 2. Connectedness and compactness: Connected spaces, connected sets in	After successful completion of this course the student will be able to: a) understand basic concept of topology. b) understand the concept of open and claosed sets. c) understand the continuity and separation axioms.	June 2017

	the real line, components and path components, local connectedness compact spaces, Limit point compactness. 3. Countability and separation axioms: The countability axioms, The separation axioms, The Urysohn Lemma, Urysohn Metrization theorem. 4. The Tychonoff Theorem, Completely regular spaces.		
3	**MT-103: Abstract Algebra** 1. Direct product of subgroups, Class equation, Cauchy's Theorem, Solvable groups, Sylow's Theorem, Jordan - Holder Theorem. 2. Factorization, Euclidean domains, principal ideal domains, Unique Factorization domains, Polynomial rings, Roots of polynomials, factorization of polynomials. 3. Noetherian rings, Hilbert basis Theorem. (10 H	Students can visualize Group and subgroup ,Cauchy theorem. Understand the concept of polynomial ring and root of polynomials,factorization of polynomials.	June 2017
4	**MT-104: Ordinary and Partial Differential Equations** 1. Second Order L.D.E. with constant Coefficients: Basic theory of linear differential equations (L.D.E), the homogeneous and non-homogeneous L.D.E. with constant coefficients; finding C.F. and P.I. the method of undermined coefficients, Variation of Parameters, The Cauchy-Euler equation; Theorems on second order homogeneous L.D.E. 2. Linear PDE order one: Introduction, origin, derivation of PDE by removing arbitrary constant and function; Lagrange's method of solving $Pp + Qq = R$; Type-I, II, III, IV for solving $dx\,P = dy\,Q = d$; Integral surfaces passing through a given curve. 3. Non-Linear PDE of order one : Complete integral, P.I., singular integral, general integral for PDE of first order; general method for solving PDE of order one and any degree, Charpit's method; Standard form when p and q are present. Clairaut's equation $z = px + qy + (, q)$; standard form when only p, q and z are	a) students can visualize the concept order and degree of differential equations. b) understand the concept of linear pde of order one. c) students can solve linear pde with constant and variable coefficient .	Jun-2017

	present; Jacobi's method. 4. Linear PDE with constant coefficients: Homogeneous and non-homogeneous linear PDE with constant coefficients. Methods of finding C.F. and P.I. for non-homogeneous. Linear PDE. 5. PDE with variable coefficients: Introduction to PDE with variable coefficients and various types of solution; Laplace transformation, canonical forms, linear parabolic, hyperbolic and elliptic equations. Monge's method of integrating PDE.		
5	**MT-105: Theory of Fuzzy sets** 1. Fuzzy set theory: Introduction, Fuzzy versus Crisp, Fuzzy sets: Definition, different types, fuzzy -cuts and their properties, decomposition theorems. αset basic concepts, 2. Operations on Fuzzy sets: Extension principle for fuzzy sets, fuzzy compliments, t-norms and t-conorms, Definition of intersection and union by Hamacher, Yager's union and intersection of two fuzzy sets, intersection and union of two fuzzy sets as defined by Dubois and Prade, Combination of operations, Aggregation operations. 3. Fuzzy numbers and arithmetic: Introduction, Fuzzy numbers, Interval analysis, Fuzzy Arithmetic, Arithmetic operations on fuzzy numbers, lattice of fuzzy numbers. 4. Fuzzy relations: Introduction, Projections and cylindrical fuzzy relations, Composition, properties of Min-max composition, binary relations and their compositions, compatibility relation, Fuzzy equivalence relations, fuzzy ordering relation, Fuzzy morphisms. 5. Fuzzy logic: Fuzzy propositions, fuzzy quantifiers, Fuzzy hedges, Fuzzy implications, Inference from conditional fuzzy propositions. Generalization of hypothetical syllogism, Inference from conditional and qualified propositions.	Upon successful completion of this course the student will be able to: a) understand basic concepts Fuzzy set theory. b) understand method of operations on fuzzy set,fuzzy number and arithmatics . c) understand use of fuzzy propositions and fuzzy quantifiers.	Jun-2017
6	**MT-201: General Measure Theory**	Understand the concept of	Jun-2017

	1. Abstract Measure Space: Measures and outer measure, Extension of a measure, Uniqueness of extension, Completion of a measure, Measure spaces, Integration w.r.t. a measure. 2. Integration and Lp-spaces: The Lp-spaces, Convex functions, Jensen's inequality, the inequalities of Holders and Minkowski. Completeness of Lp (μ) (Reisz Fisher Theorem) 3. Convergence: Convergence in measure, almost uniform convergence, Egoroffs theorem, Lusin's theorem, Convergence diagram, Counter examples. 4. Signed measure and their derivatives: Signed measures and The Hahn Decomposition, The Jordan Decomposition, The Radon-Nikodym theorem, Some applications of the radon theorem, bounded linear functional on Lp. 5. Measure and integration in a product spaces: Measurability in a product spaces, The product measure and Fubini's theorem, Lebesgue measure in Euclidean space.	abstract measure space and convergence in measure,almost uniform convergence,signed measure and their derivatives,and measure and integration in a product space.	
7	**MT-202: Complex Analysis** 1. Power series, Analytic functions, Branch of a logarithm, Mobius (Bilinear) Transformations and Conformal Mappings. 2. Riemann-Stieltjes Integrals, Power Series representation of analytic functions, Taylor's Theorem, Cauchy's Estimate, Zeros of an analytic function, Liouville's theorem, Fundamental Theorem of Algebra, Maximum Modulus Theorem. 3. Index of a closed curve, Cauchy's theorem, Cauchy's Integral Formula, Higher Order derivatives, Morera's Theorem, The Homotopic version of Cauchy's Theorem and simple connectivity, Counting of Zeros, The Open mapping theorem, Goursat's theorem. 4. Singularities, Classification of Singularities, Laurent's series, Casorati-Weierstrass theorem,	Upon successful completion of this course the student will be able to: a) understand basic concepts on power series ,analytic functions. b) understand index of closed curve. c) understand concept of singularities and classification of singularities.	Jun-2017

	Residues, Cauchy's residue theorem, Evaluation of integrals, Meromorphic functions, The Argument principle, Rouche' theorem, Schwartz lemma. 5. Convex functions and Hadamard's three circles theorem, The space of continuous functions, Spaces of analytic functions, The Riemann mapping theorem. (10 Hours)		
8	**MT-203: Linear Algebra** 1. Modules, Submodules, R-homomorphism, Isomorphism, Direct sum of modules, free modules, Rank, Structure theorem for finitely generated modules over PID, Application to group Theorem. 2. Jordan and Rational canonical forms. 3. Localization of rings, Local rings and modules, Noetherian modules, Primary decomposition for modules.	Student will be able to: a) understand basic concepts of module and submodule. b) understand method of free module,rank and structure theorem. c) understand the localization of rings.	Jun-2017
9	**MT-204: Mathematical Methods** 1. Linear boundary value problems: Introduction, derivation of wave equation, heat equation and Laplace's equation in Cartesian, cylindrical and spherical co-ordinates. Principle of superposition, series solutions, separation of variables, types of initial value problems and general solution of partial differential equation. 2. Orthogonality: Orthogonality of sets of functions in the space of piecewise continuous functions on (a,b) generalized Fourier Series, approximation in the mean, closed and complete orthonormal sets. Fourier series and half range Fourier series, Sturm-Liouville problems, orthogonality of the eigen functions and their uniqueness. 3. Boundary value problems: Boundary value problems involving the wave equation, heat equation and Dirichlet's problems. Solution by the method of separation of variables, temperature in a long Cylinder, heat transfer at the surface of the cylinder and vibrations of the circular membrane. 4. Bessel's functions: Bessel's	Upon successful completion of this course the student will be able to understand: a) understand the concept of linear boundary value problem. b) fundamental concepts orthogonality of sets of function in the space of continuous function. d)understand boundary value problem involving wave equations.	Jun-2017

	differential equation and its solution, Bessel function of first kind, second kind, Bessel functions of order zero and one, recurrence relations, generating function, orthogonality of Bessel functions, Fourier Bessel Series.		
10	**MT-205: Number Theory** 1. Arithmetic functions: The Mobius function (n), The Euler totient function (n), Dirichlet product of arithmetic functions, Dirichlet inverses and the Mobius inversion formula. The Mangolt function $\Lambda(n)$, Multiplicative functions, Dirichlet multiplication, The inverse of a completely, multiplicative function, Liouvilles function $\lambda(n)$, The divisor function $\sigma(n)$, Generalized convolutions. Formal power series, Bell series of an arithmetical function, Bell series and Dirichlet multiplication, Derivatives of arithmetical functions, The Selberg identity. 2. Congruences: Residue classes, Complete and reduced residue systems and Euler-Fermat's theorem, Polynomial congruences $mod\ p$. Lagranges theorem and its applications, Polynomial congruences with prime power moduli. The principle of cross classification. 3. Quadratic residues and Quadratic Reciprocity law: Quadratic residues, Legenre's symbol and its properties, Evaluation of $(-1\mid p)$ and $(2\mid p)$, Gauss lemma, The Quadratic Reciprocity law and its applications, The Jacobi Symbol. Applications to Diophantine equations. 4. Primitive roots: The exponent of a number modulo m, Primitive roots, Primitive roots and reduced residue systems, The non-existence of primitive roots $mod\ p\ n$ and $p\ 2n$ for odd primes p and $n \geq 1$. The non-existence of primitive roots in the remaining cases. The number of primitive roots $mod\ m$. the primitive roots and quadratic residues. The index calculus.	Upon successful completion of this course the student will be able to: a) understand arithmetic functions and mobious function. b) understand congruence and residue classes. c) understand concept of automorphism of groups. d) understand concepts of quadratic residue. e) understand basic concept primitive roots.	Jun-2017
11	**MT-301: Topics in Functional Analysis** 1. Normed linear spaces, Banach	Upon successful completion of this course the student will	Jun-2018

		be able to: a) understand normed linear space ,banach space,quotient spaces. b) understand inner product space. c) understanfinite dimensional spectral theory.	
	Spaces, Quotient spaces, Continuous linear Transformations. The Hahn-Banach theorem and its consequences, conjugate space and separability, Second conjugate space. The natural embedding of normed linear space and its second conjugate space, Weak *Topology on conjugate space. The open mapping theorem, Projection on Banach space, The closed graph theorem, the conjugate of an operations, The uniform boundedness theorem (BanachSteinhauss theorem). 2. Inner Product spaces, Hilbert space: Definition, examples and simple properties, Schwartz's inequality, Orthogonal complements, Projection theorem, Orthogonal sets, The Bessel's inequality, Fourier expansion and Parseval's equations, Gram-Schmidt orthogonalization process, Separable Hilbert space, The conjugate space, Riesz Theorem, Operations and their adjoints on a Hilbert space, self adjoint operators, Normal and unitary operators projections. 3. Finite dimensional spectral theory, Determinants and spectrum of an operator, The spectral theorem, Fixed points, Definition and examples, Banach contraction mapping theorem, Brouwer's fixed point theorem, Schauder's fixed point theorem.		
12	**MT-302: Statistical Techniques** 1. Revision of Basic concepts: Discrete and Continuous series, Arithmetic Mean, Geometric Mean, Harmonic Mean, Median and Mode. Range, Quartile deviation, Mean deviation, Standard deviation, Variance and coefficient of variation. 2. Probability: Sample space, discrete probability, Mathematical theory of probability, independent events, Addition and Multiplication theorems of probability, conditional probability and Baye's theorem. 3. Theoretical distributions: Random variable, probability distribution of a	a) The course is aimed to introduce stastical techniques. b) Students will understand arithmatic and geometric mean. c) Students will understand the sample space and discrete probability. d) Students will understand random variable poisson & normal distribution. e) Students will understand	Jun-2018

	discrete and continuous random variable. Probability density function, mathematical expectation. Binomial, Poisson and Normal distributions and their properties. 4. Correlation: Definition, meaning, scatter diagram method, Karl Pearson's method, Probable error, Standard error and Rank correlation and concurrent deviations. 5. Regression: Definition, meaning, two lines of regression, regression coefficients, standard error and relation between correlation and regression. 6. Sampling and Large sample tests: Introduction to sampling, Simple random sampling, stratified sampling and systematic sampling. Testing of hypothesis, level of significance, tests of significance for large samples. Tests for single proportion, difference of proportion, single mean, difference of means, difference of S.D. 7. Exact sampling distributions: Chi-Square variate and Chi-Square distribution, conditions of validity of Chi-Square test, applications of Chi-square distribution, Chi –Square test for population variance, Chi-square test for Goodness of fit and Independence of Attributes. Definition of student's 't' distribution and derivation, Fisher's 't' distribution constants of t-distribution, graph of t-distribution, application, test for single mean, test for difference of means, paired t-test testing significance of observed sample. Definition of F statistic, F-distribution, applications, F-test for equality of population variances.	sampling and large sample test	
13	**MT-303: Topics in Field Theory** 1. Algebraic extensions, Splitting field, Algebraic closure, Separable and Inseparable extensions. Normal extension, Perfect fields of finite fields. 2. Galois extensions, Fundamental theorem of Galois theory, Roots of unity, Solvability by radicals,	a) Students will aware of formation of field theory. b) Students will understand the concept of splitting field seperable and inseperable extension. c) Students will understand of	Jun-2018

		fundamental theorem of galois theory,solvability of radicals.	
14	**MT-306: Theory of Lattices** 1. Introduction to Posets, Semi-lattice, Two definitions of lattices, Congruence relations, Congruence lattice, The homomorphism theorem, Product of lattices, complete lattices, ideal lattice, Distributive and Modular Inequalities and Identities, Complements, Pseudocomplements, Boolean lattices, Boolean lattices of pseudo complements in a meet semi lattice. Atoms, Irreducibility of elements. 2. Characterization theorem for modular and distributive lattice, Dedekind's characterization of modular lattice, Birkhoff's characterization of distributive lattices. Representation of distributive lattices, Stone theorem, Nabchin theorem, Hashimoto's theorem, Distributive lattice with pseudocomplementation, Stone lattice, characterization of Stone lattice. Stone algebra, characterization of Stone algebra. 3. Distributive, Standard and Neutral elements 4. Semimodular lattices and Modular pairs .	a) Students will aware of formation of lattice theory. b) Students will understand the concept of Characterization theorem for modular and distributive lattice. b) Students will understand Semimodular lattices and Modular pairs .	Jun-2018
15	**MT-307: Elements of Graph Theory** 1. Graphs: Definitions and examples, graphs as models, subgraphs, Operations on graphs, Matrix representation of graphs, walks, Trails, Paths, and Cycles. Connectedness and connectedness algorithm. 2. Trees and Connectivity: definition and simple properties of a tree, Bridges, Spanning Trees, Cayley's Theorem, Kruskal's Algorithm, Prim's Algorithm, Shortest path problems, The Breadth First Search (BFS)algorithm, The Backtracing algorithm, Dijkstra's Algorithm, Cut vertices, Connectivity. 3. Eulerian and Hamiltonian Graphs:	a) understand elements of graph theory. b) understand Trees and Connectivity: definition and simple properties of a tree, Bridges, Spanning Trees, Cayley's Theorem, Kruskal's Algorithm, Prim's. c) Matching: matching and augmenting paths, Berge theorem, The Hall's marriage problem, the personnel assignment problem.	Jun-2018

	Eulerian trails, Eulerian and semi Eulerian graphs, Fleury's algorithm, Hierholzer's algorithm, The Chinese Postman Problem, Hamiltonian graphs, Dirac theorem, Closure of a graph, Bondy and Chavatal theorem, Travelling salesman problem (optimal algorithms and the closest intersection algorithm are not expected). 4. Matching: matching and augmenting paths, Berge theorem, The Hall's marriage problem, the personnel assignment problem and matching algorithm for bipartite graphs, The Hungarian algorithm. 5. Planar graphs and Coloring of graphs: Plane and Planar graphs, Euler's Formula, Vertex coloring,Critical graphs, Cliques and edge coloring of graphs . 6.Max- Flow, Min- Cut Theorem and Ramsey numbers: definition of Ramsey number, Relations among Ramsey numbers.		
16	**MT-401: Advanced Mathematical Methods** 1. Integral Equations: Introduction and classification of Linear Integral equations; Integrodifferential equations. Fredholm's equations, Degenerate kernels, Hermitian and Symmetric kernels. Volterra's equations and resolvent kernel; Convolution type of kernels. 2. Fourier Transforms: The Fourier Integral, complex form of Fourier Integrals and Fourier Integral theorem; Fourier transforms; properties, Fourier Cosine and Sine Transforms, finite Fourier transforms, convolution theorem, Parsvals Identity and relationship between Fourier transforms and Laplace transforms. 3. Calculus of Variations: A basic lemma, statement and formulation of several problems, the Euler-Laggrange equation, first integrals of Euler-Lagrange equation, Geodesics, Brachistochrome problem, Minimum surface of revolution, several	After studying this course, student should be able to: 1. Understand the Introduction and classification of Linear Integral equations,Integrodifferential equations,Fredholm's equations, Degenerate kernels, Hermitian and Symmetric kernels. 2. Explain the definition of The Fourier Integral, complex form of Fourier Integrals and Fourier Integral theorem; Fourier transforms; properties, Fourier Cosine and Sine Transforms, finite Fourier transforms, convolution theorem. 3. Explain definition, formulae, properties,	Jun-2018

	dependent variables, Parametric representation,Undetermined end points, Brachistochrome from a given curve to a fixed point and the simple Isoperimetric problem. 4. Z-transforms: Introduction, definition, formulae, properties, definition of inverse Z-transform, properties, application of z-transform to difference equations.	definition of inverse Z-transform, properties, application of z-transform to difference equations.	
17	**MT-402: Operations Research** 1. PERT AND CPM: Introduction, Phases of project management, Network diagrams, Fulkerson's rule, slack, forward pass, backward pass, critical path, project duration, various floats, tabular form, differences between PERT and CPM, Project cost and crashing the Network. 2. Queuing Models: Introduction, application of Queuing models, characteristics, arrival and service distribution, Kendall's notation for Queuing models, Single channel queuing theory, M/M/I model and generalization, M/M/I:SIRO/model, M/M/1: FCFS/N/Finite queue length model, M/M/1:FCFS/n/N Limited source model, M/M/C:FCFS/ / Multichannel queuing theory model. 3. Decision theory: Steps involved in Decision theory, decision making under uncertainty, Minimax, Maximin, Maximax, Hurwitz and Laplace criteria. Decision making under risk, Expected monetary value and Expected opportunity loss criteria and EVPI, Decision trees. 4. Replacement Models: Introduction, Replacement of Items that deteriorate with time with no changes in money value, with change in value of money, replacement of items that fail suddenly, individual replacement policy, group replacement policy and staffing problems. 5 Decision theory: Necessity and maintenance of Inventory, inventory costs, inventory control problems, inventory models with deterministic demand, with probabilistic demand,	After successful completion of this course, students are expected to: 1. Understand the structure : Introduction, Phases of project management, Network diagrams, Fulkerson's rule, slack, forward pass, backward pass, critical path, project duration, various floats, tabular form, differences between PERT and CPM, . 2. Understand the Replacement Models, Decision theory, Decision theory, . Simulation, Non-linear Programming.	Jun-2018

	with price breaks, multi-item deterministic models, forecasting of demand, forecasting methods, seasonal demand, when to order, : safety stock and how much to order. 6. Simulation Introduction, when to use simulation, advantages and limitations of simulation technique, Monte Carlo method, generation of random numbers, time flow mechanism, simulation languages. 7. Non-linear Programming: Quadratic program, Wolfe's algorithm, Beale's algorithm. Frank Wolfe's method, reduced gradient method, Kelly's cutting plane method, method of approximate programming, gradient projection method, Generalized Lagrange's multiplier technique, separable programming, linear fractional programming.		
18	**MT-403: Commutative Algebra** 1. Modules, Free modules, Projective modules, Tensor product and Flat modules 2. Noetherian modules, Primary decomposition, Artinian modules 3. Integral extensions: Integral elements, Integral extensions and Integrally closed domain. 4. Dedekind domain: Valuation rings, Discrete valuation rings and Dedekind domains	After successful completion of this course, students are expected to: 1) know the use module and free module. 2) know the noetherian module and primary decomposition. 3) Know Valuation rings, Discrete valuation rings and Dedekind domains.	Jun-2018
19	**MT-404: Advanced Abstract Algebra** 1. Basic concepts of maximal ideals, prime ideals and nil radical of an ideal, semiprime ideals, primary ideals, Prime avoidance theorem. 2. Jacobson radical of a ring, Semisimple ring, Prime radical of a ring, Quasi-regular element, Jradical, J-semisimple ring, Regular ring. 3. Direct sum of rings, Subdirectly reducible and irreducible rings. 4. Noetherian ring, irreducible ideals, irredundant primary representation, Cohen's theorem, Krull intersection	After completing this syllabus students will able to: 1) Understand the structure of ideals and prime ideals. 2) understand of direct sum of ring. 3) Understand the irreducible ideals, irredundant primary representation, Cohen's theorem, Krull intersection theorem.	Jun-2018

	theorem.		
20	**MT-406: Algebraic Topology** 1. Geometric complexes, polyhedron, orientation of Geometric complexes. 2. Chains, Cycles, Boundaries, Homology groups, Examples and structure of homology groups, The Euler-Poincare theorem, Euler's theorem, Pseudo manifolds, Fundamental group of Sn. 3. Simplicial approximation, Induced homomorphism on the homology groups, The Brouwer's fixed point theorem. 4. Homotopic paths and Fundamental groups, Covering homotopy property for $S1$, Examples of Fundamental groups, Relation between first homology group and fundamental group.	Learning After successful completion of this course, students are expected to: 1. Know the use polyhedron, orientation of Geometric complexes., 2. Solve , The Euler-Poincare theorem, Euler's theorem, Pseudo manifolds. 3. Use Homotopic paths and Fundamental groups, Covering homotopy property for $S1$, Examples of Fundamental groups, Relation between first homology group and fundamental group.	Jun-2018

DEPARTMENT OF MICROBIOLOGY

Under Graduate (UG)

After successful completion of three year degree program in B.Sc (Microbiology)a student should be able to:		
Sr. No	Program Outcomes(PO)	Program specific Outcomes(PSO)
1	Students will understand the concepts and significance in the field of Biochemistry / Biotechnology / Microbiology that can be used for solving the real time problem	Microbiology graduates will apply their knowledge and skills gained through the program to achieve success in their academic and/or professional development.
2	Students will acquire skills and ability in their field and find professional opportunities in industry, agriculture and higher studies.	Our candidates will develop a sense of societal and ethical responsibility pertaining to health, agriculture, dairy, genetic engineering, and fermentation industry.
3	Students will have improved personal qualities and transferable skills to help them to groom as responsible citizens.	Students will have a wide perspective on fermentation technology, GMP, GLP and IPR.
4	To develop problem solving skills in the students.	Students will understand contemporary environmental issues and shall be motivated to provide solutions for solving them.
5	To develop proper aptitude towards the subjects.	The knowledge shall promote our graduates to stand independently amidst the growing technological innovations in the subject.

DEPARTMENT OF MICROBIOLOGY

POST GRADUATE (PG)

After successful completion of three year degree program in M.Sc (Microbiology) a student should be able to:

Sr. No	Program Outcomes(PO)	Program specific Outcomes(PSO)
1	To impart the profound theoretical and practical knowledge of the specific science discipline along with the fundamental core concepts	Gain proficiency in laboratory techniques in both microbiology and molecular biology and be able to apply the scientific methods to the processes of experimentation and hypothesis testing
2	To make the student to develop the ability to think analytically, independently and draw logical conclusions to solve real-life problems.	Learn to work as a team as well as independently to retrieve information, carry out Research investigations and result interpretations
3	To utilize the skills and knowledge gained through the subject to deal with real life situations and problems related to society, environment, research and development etc.	Realize the impact of science in society and plan to pursue research
4	To groom the students for all-round development and mold them in a trained workforce to provide teaching-learning, research, business, professional supports in the various science disciplines.	Develop the ability to understand and practice the ethics surrounding scientific research.
5	To train the students to employ modern techniques, tools, methodologies, equipment, hardware/software etc. to perform objective oriented scientific and planned experiments	Acquire significant knowledge on various aspects related to microbiology including biochemical techniques, immunology, physiology, agriculture, environment, pharmaceutical, molecular biology, applied recombinant DNA technology and technical skills related to microbial metabolite

Department of Physics

Under Graduation (UG)

After Successful completion of three year degree programme in (**B.Sc. Physics**) a student should be able to…		
Sr. No.	**Programme Outcomes(PO's)**	**Programme Specific Outcome(PSO's)**
1	To promote understanding of basic facts and concept in physics while retaining the excitement of Physics	To develop ability and to acquire the knowledge of terms facts and concepts processes technique and principle of subject.
2	To make student capable of studying Physics in academic and Industrial courses	To develop the ability to apply the knowledge of content of principle of Physics
3	To expose the student to various emerging new areas of Physics and apprise them with their prevalent in their future studies and their applications in various spheres of Physical Sciences.	To enquire the new knowledge of Physics and development therein
4	To develop problem solving skills in students.	To expose and to develop interest in the field of Physics
5	To develop proper attitude towards the subject	To develop the power of appreciation the achievements in Physics and their role in nature and Society
6	To expose the student to different processes used in Industrial and their applications	To develop skills required in physics such as the proper handling of Apparatus and various instruments.

Course Outcomes

Semester-I (F.Y.B.Sc. Physics)

After Successful completion of these courses student should be able to……		
Sr. No.	**Courses**	**Outcomes**
1	PHY-101 Basics Mechanics	1. Define Scalar and Vector. 2. Explain Newton's laws of motion 3. Example of Linear and Rotational motion
2	PHY- 102 Dynamics And Elasticity	1. Know the term GPS and Kepler's law 2. Distinguish between S.H.M and S.M 3. Demonstrate the models of Elasticity.
3	PHY 103: LAB-I	1. Develop model for M.I

Semester-II (F.Y.B.Sc. Physics)

After Successful completion of these courses student should be able to………..		
Sr. No.	**Courses**	**Outcomes**
1	PHY 201: Electricity And Electrostatics	1. State Coulombs law and its application 2. Explain terms Gradient Curl etc. 3. Apply the concept of Electrostatics
2	PHY 202: Dielectrics, Magnetism And Electromagnetism	1. Differentiate Electrostatics and Magneto statics 2. Investigate Self and Mutual Inductance 3. Apply Maxwell equations.
3	PHY 203: LAB-I	1. Use Digital Multimeter.

Semester-III (S.Y.B.Sc. Physics)

	After Successful completion of these courses student should be able to………	
Sr. No.	**Courses**	**Outcomes**
1	PHY 301: Thermodynamics and Kinetic theory of gases	1. Explain Various Thermo-dynamical Processes. 2. Classify Second and Third Law of Thermodynamics and Entropy 3. Compute Efficiencies of all heat Engines.
2	PHY 302 (A): Electronics –I	1. Compare p and n type semiconductors. 2. Express Half-wave & Full-Wave Rectifiers 3. Apply the different Gates
3	PHY 302 (B): Instrumentation	1. Define Accuracy, Precision and Errors 2. Give examples of thermometers 3. Calculate Variation of intensity of sound with distance
4	PHY 303: Lab III	1. Use C.R.O
5	PHY 304: Skill Enhancement Course I (SEC-I) Renewable energy and Energy Harvesting	1. Know Solar energy and its importance 2. Distinguish Ocean, geothermal, Hydro and Biomass energy resources 3. Apply the concept of Harvesting

Semester-IV (S.Y.B.Sc. Physics)

	After Successful completion of these courses student should be able to	
Sr.No.	**Courses**	**Outcomes**
1	PHY 401: Waves, Oscillations and Acoustics	1. Define Plane waves, Spherical waves. 2. Recognise Resonance and its types 3. Investigate Parameters of Sound
2	PHY 402: Optics and LASERS	1. Explain Lenses and its types. 2. Distinguish Interference, Diffraction and Polarization. 3. Investigate types of LASER
3	PHY 403: Lab IV	1. Use Spectrometer.
4	PHY 404: Skill Enhancement Course II Electrical Circuits and Network Skills	1. Define Voltage, Current, Resistance, and Power 2. Distinguish KVL and KCL. 3. Give examples of Electric Motors

Semester-V (T.Y.B.Sc. Physics)

		After Successful completion of these courses student should be able to…………

Sr. No.	Courses	Outcomes
1	PHY 501 Mathematical Physics	1. State Gauss divergence theorem, Stokes' theorem 2. Express different co-ordinate systems 3. Explain Special Functions
2	PHY502 Solid State Physics	1. Classify solid and liquid. 2. Use X-Ray Diffraction 3. Explain Free electron theory of metals and Band theory of solids
3	PHY 503 Atomic and molecular Physics	1. Define Quantum numbers 2. Explain Two Valence Electron System 3. Apply X-ray spectra
4	PHY 504(A) Electronics-II	1. State Transistor biasing 2. Explain Semiconductor switching devices 3. Distinguish Flip-Flops and Counters
5	PHY 504(B) Instrumentation -II	1. Define Resolution, Threshold, Range and span 2. Explain Transducers 3. Use Display devices- LED, LCD, 7-segment display
6	PHY 505 Solar Energy andapplications	1. Define structure of the sun 2. Distinguish Flat plate collector 3. Use solar cell
7	PHY 506(B) :Refrigeration and Air conditioning- I	1. State Conduction ,Convection and Radiation 2. Distinguish condenser and evaporator 3. Explain Refrigerants.
8	PHY 507 Physics Practical I	1. Use Solar Cell
9	PHY 508 Physics Practical II	1. Study of different tools used in Refrigeration and Air Conditioning
10	PHY 509 Physics Practical III orProject	1. Use Literature Review

Semester-VI (T.Y.B.Sc. Physics)

	After Successful completion of these courses student should be able to…….	
Sr. No.	Courses	Outcomes
1	PHY 601 Quantum mechanics	1. State Schrodinger Equation 2. Distinguish Step potential and potential well. 3. Use Operators in Quantum Mechanics
2	PHY602 Material Science	1. Explain Properties of Materials 2. Study Atomic disorder in materials 3. Demonstrate types of Polymers
3	PHY 603 Nuclear Physics	1. Express features of nuclear forces 2. Differentiate Nuclear Models 3. Give example of Nuclear Reactor
4	PHY 604 Modern Physics	1. Define Wave particle duality of matter 2. Analyse Uncertainty principle 3. Design Fiber Optics
5	PHY 605 Basic Instrumentation Skills	1. Define Vernier calliper, Screw gauge, travelling microscope 2. Interprets Voltmeter, Ammeter ,Ohmmeter 3. Use C.R.O.
6	PHY 606 (B) Refrigeration and Air conditioning- II	1. State Psychrometry and psychrometic Properties. 2. Distinguish Air Conditioning equipment's. 3. Explain Solar Refrigeration System
7	PHY 607 Physics Practical I	1. Use Photocell
8	PHY 608 Physics Practical II	1. Use Op-Amp.
9	PHY 609 Physics Practical III or Project	1. To do Experimental work.

Post-Graduation (PG)

After Successful completion of three year degree programme in (**M.Sc. Physics**) a student should be able to…

Sr. No.	Programme Outcomes(PO's)	Programme Specific Outcome(PSO's)
1	Acquired substantial knowledge of different areas in physics, basic knowledge in mathematics with advanced knowledge in some specialized areas of physics.	Make them understand that acquiring knowledge and skills appropriate to their professional activities is a never-ending process.
2	Be able to apply theoretical and/or experimental methods, including the use of numerical methods and simulations.	Inspire them in such a way that they can demonstrate and maintain the highest standard on ethical issues in their professional lives.
3	Have some research experience within a specific field of physics, through a supervised project (Master's dissertation).	To analyze problems starting from first principles, evaluate and validate experimental results, and draw logical conclusions thereof.
4	Be familiar with contemporary research within various fields of physics and have the background and experience required to model, analyse, and solve advanced problems in physics.	To pursue research careers, careers in academics, in industries in physical science and in allied fields.
5	To recognize the need for continuous learning and develop throughout for the professional career.	Create an awareness among the students to be persons of integrity, to be responsible and enlightened citizens with a commitment to deliver good to the society within the scope of the bestowed rights and privileges.
6	To apply scientific and technical knowledge and skills to other disciplines and areas of study.	As technology exploits the rules of Physics, students properly trained in Physics can be good researchers in the field of technology too.

Course Outcomes

Semester-I (M.Sc. I Physics)

After Successful completion of these courses student should be able to……

Sr. No.	Courses	Outcomes
1	PHY-101 Mathematical Methods for Physics	1. To learn about special type of matrices that are relevant in physics. 2. Introduce Special functions like Gamma function, Beta function, Delta function Bessel functions and their recurrence relations 3. To Learn the fundamentals and applications of Fourier series, Fourier and Laplace transforms, their inverse transforms etc.
2	PHY- 102 Classical Mechanics	1. Define Lagrangian and Hamiltonian approaches in classical mechanics 2. Express Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion 3. Describe Theory of small oscillations in detail along with basis of free vibrations.
3	PHY 103 Quantum Mechanics	1. State Linear vector spaces, Hilbert space, concepts of basis and operators and bra and ket notation 2. Apply both Schrodinger and Heisenberg formulations of time development and their application
4	PHY-104 Solid State Physics	1. To know Bloch's theorem and what energy bands are and know the fundamental principles of semiconductors 2. Express the fundamentals of dielectric and ferroelectric properties of materials 3. Differentiate basic models of dia, para and ferro magnetism
5	PHY 105: Basic Physics Laboratory – I	1. To learn Op-amp 741 and its application

Semester-II (M.Sc. I Physics)

After Successful completion of these courses student should be able to………..		
Sr. No.	**Courses**	**Outcomes**
1	PHY 201: Statistical Mechanics	1. Define and discuss the concepts of microstate and macro -state of a model system 2. Apply techniques from statistical mechanics to a range of situations. 3. Identify and solve problems in statistical mechanics using ensemble theory
2	PHY 202: Classical Electrodynamics	1. Understand Maxwell's equations and electromagnetic boundary conditions. 2. Discuss electromagnetic wave propagation through wave guides and transmission lines. 3. Define special theory of relativity by including the relativistic electrodynamics
3	PHY 203: Material Science	1. Discuss types of solid solutions 2. Explain Iron-Carbon phase diagram and different phases of the system 3. Apply the concept of glass and ceramics
4	PHY 204 (B) : Electronic Instrumentation	1. State the term A.M., F.M., P.M. 2. Distinguish ECG and EEG 3. Apply the concept of Flow meter
5	PHY 205: Basic Physics Laboratory – II	1. To use dual power supply.

Semester-III (M.Sc. II Physics)

	After Successful completion of these courses student should be able to……	
Sr. No.	**Courses**	**Outcomes**
1	PHY 301 Atomic and Molecular Physics	1. Differentiate Zeeman effect and Paschen Back effect 2. Describe pure rotational spectra, Rotation-vibration spectra, visible and UV spectra 3. Explain Raman spectra of diatomic molecules
2	PHY 302 (A) Materials Synthesis Methods	1. State Thin Films Deposition Techniques 2. Discuss Chemical Bath Deposition Technique 3. Explain Chemical Spray Method
3	PHY 303 (A) Systematic Materials Analysis	1. Define Characterization Techniques 2. Distinguish UltraViolet&VisibleSpectroscopy 3. Explain X-Ray Diffraction
4	PHY -304 Special Laboratory-I	1.Use Modulation technique
5	PHY 305 Project Work-I	1. To do Literature survey

Semester-IV (M.Sc. II Physics)

	After Successful completion of these courses student should be able to………..	
Sr. No.	**Courses**	**Outcomes**
1	PHY 401 Nuclear Physics	1. Define Types of nuclear models 2. Explain Nucleon – Nucleon Interaction
2	PHY 402 (B) LASER and it's Applications	1. Discuss LASER and its Operations 2. Explain Laser Systems and Types
3	PHY 403 (A) Renewable Energy Sources	1. Explain Biomass Energy Conversion Technologies 2. Distinguishes Wind Energy and Ocean energy
4	PHY -404 Special Laboratory-II	1. Use LASER
5	PHY 405 Project Work-II	1. To do experimental work.

Department of Electronics
Under Graduation (UG)

After Successful completion of three year degree programme in (B.Sc. Electronics) a student should be able to…		
Sr. No	**Programme Outcomes(PO's)**	**Programme Specific Outcome(PSO's)**
1	To make student capable of studying Electronics in academic and Industrial courses.	To develop the ability to apply the knowledge of content of principle of Electronics.
2	To promote understanding of basic facts and concept in Electronics while retaining the excitement of Electronics.	To develop ability and to acquire the knowledge of terms facts and concepts processes technique and principle of subject.
3	To expose the student to various emerging new areas of Electronics	To enquire the new knowledge of Electronics and development therein.
4	To develop problem solving skills in students.	To develop ability of students and motivate them to apply advanced concepts of Electronics to solve real life problems.
5	To expose the student to different processes used in Industrial and their applications.	To prepare the students for successful career in industry and motivate them for higher education.
6	To develop proper attitude towards the subject.	To provide exposure to the students for analyzing electronics problems.
7	To develop software skills in students.	To provide necessary foundation on computational platforms and software simulation tools.

Course Outcomes

Semester-I (F.Y.B.Sc. Electronics)

	After Successful completion of these courses student should be able to……	
Sr. No	Courses	Outcomes
1	ELE-101:- Network Analysis and Semiconductor Diode	1. Know the characteristics of basic electronics components. 2. Apply knowledge to develop circuits using electronic devices. 3. Understand and analyze linear electronic circuits.
2	ELE-102:- Digital Integrated Circuits	1. Understand various codes used in data processing 2. Use of logic gate and Boolean algebra for minimize the circuit. 3. Understand the function and need of sequential circuits in digital design.
3	ELE-103:- ELECTRONICS LAB -I	1 Identify the of basic electronics components. 2 Apply the concept and knowledge of electronics devices to real life problems. 3 Review, prepare and present technological developments.

Course Outcomes

Semester-II (F.Y.B.Sc. Electronics)

	After Successful completion of these courses student should be able to……	
Sr. No	Courses	Outcomes
1	ELE-201:- Analog Electronics	1. Know the characteristics transistor 2.Understand the function and need of Amplifiers. 3. Understand the function and need of feedback in oscillators.
2	ELE-202:- Linear Integrated Circuits	1. Understand function of operational amplifiers 2. Use of operational amplifiers 3. Understand the function digital and analog converters
3	ELE-203:- ELECTRONICS LAB -II	1. Apply the concept and knowledge of integrated circuit chips to develop new systems. 2. Model complex circuits and simulate them. 3. Handle simulation software to analyze electronics circuits.

Course Outcomes

Semester-III (S.Y.B.Sc. Electronics)

After Successful completion of these courses student should be able to……		
Sr. No	Courses	Outcomes
1	ELE-301:- Analog Communication	1. Understand and identify the fundamental concepts and various components of analog communication systems. 2. Apply knowledge to develop circuits of analog modulation and demodulation. 3. Analyze modulation circuits and understand the behavior of the systems.
2	ELE-302:-Microprocessors and Applications	1. Understand and analyze 8085 microprocessor and its programming. 2. Apply the concept and knowledge of microprocessors to real life problems. 3. Develop interfacing to real world devices.
3	ELE-303:- ELECTRONICS LAB –III	1. Identify and describe different analog modulation techniques. 2. Analyze AM radio receiver. 3. Learn use of hardware & software tools.
4	ELE-304:- Electrical Circuits and Network Skills	1 Measurement of R,L,C, Voltage, Current, Power Factor, Power. 2. Measure frequency, phase with Oscilloscope 3. Use Digital voltmeters

Course Outcomes

Semester-IV (S.Y.B.Sc. Electronics)

After Successful completion of these courses student should be able to……		
Sr. **No**	Courses	Outcomes
1	ELE-401:- Digital Communication	1. Understand and identify the fundamental concepts and various components of digital Communication systems. 2. Apply the concept and knowledge of digital communication to develop new systems. 3. To understand Multiple Access and Spread Spectrum Techniques for mobile and cellular communication system.
2	ELE-402:-Microcontrollers and Applications	1. Learn importance of Microcontroller in designing real time applications 2. Gain knowledge of microcontroller programming. 3. Apply practical knowledge of microcontrollers to solve real life problems of the society.
3	ELE-403:- ELECTRONICS LAB -IV	1. Identify and describe different digital modulation techniques. 2. Develop interfacing to real world devices using microcontroller. 3. Learn use of hardware & software tools.
4	ELE-404:- Computational Techniques in Electronics	1. Evaluate the True roots using Bisection method. 2. To understand the Gauss Elimination Method. 3.Write numerical programs, such as C Language programs, to solve the problems;

Course Outcomes

Semester-V (T.Y.B.Sc. Electronics)

	After Successful completion of these courses student should be able to……	
Sr. No	Courses	Outcomes
1	ELE-501:- Semiconductor Electronics	1. Estimate the number of carriers at a given temperature for a semiconductor. 2. Understand the importance of doping to change carrier density.
2	ELE-502:- Advanced Digital System Design using VHDL	1. Students will able to design digital circuits according to requirements. 2. Student will able to write VHDL code for digital circuit with the help of different modeling style.
3	ELE-503:- Advanced Microprocessors	1. Student will be able to Aware about the microprocessor and its architecture considerations & Capable to analyze the operating modes. 2. To gain the Knowledge about the Pentium series processor.
4	ELE-504:- Electronic Instrumentation	1. Understand the concept of measurement systems and its various characteristics. 2. Aquent the knowledge of testing instruments.
5	ELE-505 Medical Electronics	1. Understand the working principles of various therapeutic and monitoring systems. 2. Understand the measurement and analysis techniques for physiological parameters.
6	ELE-506(A):- Embedded C	1. Learn structure oriented programming concepts required in all other languages. 2. After completion of this course students are able to built real world applications based on embedded system and automation.
7	ELE-506(B):- Basics Fiber Optic Communication	1. Recognize and classify the structures of Optical fiber and types. 2. Awareness of analog and digital links.
8	ELE-507:- Practical Lab I	1. Simulate using MATLAB. 2. Operate and familiarize with BP apparatus, ECG machine, ventilator, incubator, Boyle's apparatus, pulse oxymeter.
9	ELE-508:- Practical Lab II	1. Simulate using VHDL. 2. Program microprocessor.
10	ELE-5039- Project Part I	1. Do literature survey for project. 2. To preset project progress report.

	After Successful completion of these courses student should be able to……	
Sr. No	Courses	Outcomes
1	ELE-601:- Power Electronics	1. Have fundamental knowledge of semiconductor power electronic device. 2. Apply this knowledge for designing power electronic circuits.
2	ELE-602:- Consumer Electronics	1. To identify the various digital and analog signal. 2. Understand the various types of consumer goods and acquaint the skill of fault findings.
3	ELE-603:- Microprocessor Interfacing Techniques	1. Aware about the concept of microprocessor and its interfacing & Capable to analyze the operation and priorities of Interrupt 2. Program interval timer and communication interface 8251 & analyze the operating modes.
4	ELE-604:- Computer Network	1. Recognize the technological trends of Computer Networking. 2. Understand computer networking basics.
5	ELE-605:- Embedded Systems	1. Programming 8051-microcontroller such as timer & counter and serial port programming. 2. Able to interface with Stepper motor and temperature sensor.
6	ELE-606(A):- Electrodynamics	1.Apply Gauss Law, Amperes Force Law, Lorentz's force, Biot-Savarts Law, Faraday's Law for solving the problems in Electrostatic and Electromagnetic Fields. 2. Understand the concept of Faradays law, Lenz's Law and Maxwell Equation
7	ELE-606(B):- Antenna & Wave Propagation	1. Understand how the electromagnetic wave propagate from an antenna 2. Calculate the various parameters of antenna to know its efficiency.
8	ELE-607:- Practical Lab I	1. Identify blocks of computer system and tracing the system. 2. Computer Assembling/Disassembling
9	ELE-608:- Practical Lab II	1. Simulate using MATLAB. 2. Program microcontroller and interfacing.
10	ELE-6039- Project Part II	1. Fabricate and test circuit 2. Prepare project report.