Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Programme Outcome

Science Faculty

- After graduation student from Science Faculty should have
- Imbibed ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
- Developed Scientific outcome for upgrading the aspects related to life. They acquired the basic Knowledge of science subject i.e. Physics, Chemistry, Botany, Zoology,
- Mathematics, which are founder subject in applied sciences.
- Acquired skills in handling instruments, planning, and performing laboratory experiments.
- Analyzed the given data critically and systematically and drawing objective conclusion.
- Students proposed novel ideas in various subjects and providing solution to various problems
- Able to think creatively to propose novel ideas in explaining facts and figures or providing better solution and new ideas for the sustainable developments
- Students communicate scientific concepts, experimental, results, and analytical arguments clearly and concisely, both verbally and in writing.
- Sensitivity towards envir0nmental concerns.
- The developments of team work and leadership abilities are imbibed to give importance of safe laboratory skills.

Arts Faculty

- After competition of Art faculty of humanities
- Acquired knowledge with facts and figures related concerned with subjects such as History. Economics, Political science, languages.
- Recognize ways in which political, social and economic issues which affect their daily lives across time and space.
- Understand historical developments in different periods of Indian history.

- Imbibes the values of the Indian constitution and their significance in everyday life.
- Gains a sense of the working of Indian democracy, its institutions and processes at the local, State and union levels.
- Understands spatial distribution of resources and their conservation.
- Written articles, novels, stories, to spread the message of equality, nationality, harmony etc.
- Understand how issues in social science influence literature and how literature can provide solutions to the social issues.
- Participated in various social and cultural activities voluntarily.
- Developed communication skill such as reading, listing, speaking, help in expressing ideas and views clearly and effectively.

Commerce Faculty

- Advanced accounting is useful to clear the basic ideas of accounting which is applicable in Business.
- Business economics is useful to upgrade the knowledge of economy as well as the economical Concepts.
- Business and mathematical statistics is applicable to develop the knowledge in statistics and mathematical abilities.
- Deliver the Business regularity framework and Company law.
- Develop skill in Computer fundamental and operating system.
- The subject is useful to calcite the areas of Income tax and operating System.
- It is useful and applicable to maintain the Business Accounts as well as for Calculating the profit in the Commercial institutions.
- Study about Computer application in Business.
- To gain knowledge of E-commerce and legal security.
- It is useful to enhance the knowledge about Entrepreneurship as well as helpful to develop skills among students.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Electronics

Course Outcomes (CO)

B. Sc. (Sem I)

Subject- Basics of Electronics

CO I	➢ To give knowledge of some basic electronic components and circuits ➢ Design and analyse of electronic circuits ➢ Understand various functions of network and also the stability of network
CO II	➢ Understand fundamental of various electrical measurements ➢ Understanding the basic electrical properties.
CO III	➢ Understand the current voltage characteristics of semiconductor devices ➢ To study difference between rectifiers & regulators
CO IV	➢ To study types of transistors & its configurations ➢ Experimentally determine Voltage Gain, Current Gain, Input Impedance, Output Impedance of a BJT amplifier in different mode
CO V	➢ Analyse DC circuits and relate models of semiconductor devices with their physical operation ➢ Learn the various parameters and their interrelationship
CO VI	➢ Understand the fundamentals and areas of applications for the integrated circuits ➢ To understand some working of IC based circuits

B. Sc. I (Sem II)

Subject- Digital Electronics

CO I	➢ To study different types of Number systems, their interconversions

	& arithmetic operations
	➢ To study logic gates and their usage in digital circuits.
CO II	➢ Illustrate the basics of Boolean algebra and logic gates
	➢ To study the design of gates using discrete electronic components
CO III	➢ To study multivibrators using transistors
	➢ Understanding terminologies of flipflops
CO IV	➢ Analysing important types of Counters
	➢ Understand the fundamentals of Registers
CO V	➢ Analyse, design and implement combinational logic circuits
	➢ Prepare various combinational and sequential circuits
CO VI	➢ Classify different semiconductor memories
	➢ Compute different parameters of memories

B. Sc. II (Sem III)

Subject- Electronics Devices and Circuits

CO I	➢ Analysis of hybrid parameters & their interconversion
	➢ Study of cascaded amplifiers
CO II	➢ Know about the multistage amplifier using BJT in various class to determine frequency response and concept of efficiency
	➢ Know about different power amplifier circuits, their design and use in electronics and communication circuits
CO III	➢ Know the concept of feedback amplifier and their characteristics.
	➢ Study the different oscillator circuits for various Frequencies
	➢ Employ the concept of positive feedback to design of an oscillator circuits

CO IV	➢ Compute and characterization of operational amplifiers ➢ Analyze and identify linear and nonlinear applications of Op-Amp
CO V	➢ Design and analyze advance applications of Op-Amp ➢ Study mathematical equations by using Op-Amp
CO VI	➢ Learn about various terminologys of A/D and D/A converters.

B. Sc. II (Sem IV)

Subject- Communication Electronics & Microprocessor

CO I	Use of different modulation and demodulation techniques used in analogue communication. Understand about various types of signals and systems, classify them, analyze them, and perform various operations on them. Analyze transmitter and receiver circuits
CO II	To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures
CO III	Understand use of transforms in analysis of signals and system in continuous and discrete time domain
CO IV	Describe the functionalities of 8085 architectures
CO V	To study Assembly language programming for arithmetic operations
CO VI	To understand idea of interfacing and their operating modes

B. Sc. III (SemV)

Subject- Measuring Instruments

CO I	Students will be able to describe functional blocks of instrumentation system

	Student will be able to compare different types of transducers
CO II	To study different instruments for temperature measurement
CO III	Study of PLL using VCO and function generator using IC. Study of timer circuits
CO IV	To study uses of display devices & to understand the operation of recorder
CO V	Students will be able to explain principle of operation for various sensors & actuators
CO VI	Students will be able to understand the different types of biomedical instruments

B. Sc. III (Sem VI)

Subject- Advance Microprocessor and Microcontroller

CO I	To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
CO II	To familiarize the students with the programming and interfacing of microprocessors
CO III	Draw and describe architecture of 8051 microcontroller & to design microcontroller-based system for various applications
CO IV	Write assembly language program for microcontrollers
CO V	Interface various peripheral devices to the microcontrollers & to design microcontroller-based system for various applications
CO VI	Introduce advance terminologies in microcontrollers

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Physics

Course Outcomes (CO)

Program Outcome (PO) & Program Specific Outcome (PSO) B. Sc. Physics

PO	**PO1:** Knowledge of physics is applicable to become competent professional.
	PO2: At global level the knowledge of Physics is applicable to become competent professional.
	PO3: Scientific problems can be identified and solved for higher studies.
	PO4: Select, design and apply appropriate experimental techniques to solve problems of Physics.
	PO 5: Apply and demonstrate the basic Physics in environmental context for sustainable development.
	PO6: For sustainable development one can apply and demonstrate the basic physics in environmental context.
	PO7: Physics graduate can understand ethical principles and responsibilities to serve the society.
	PO8: Enhance and adopt new skills for employability in teaching and research.
	PO9: Examine and successfully compete the competitive examination at national and international level.
	PO10: Identify, formulate, research literature and analyze complex physics problems reading substantiated conclusions using fundamental physical principles.
	PO11: Create, select and apply appropriate techniques, resources and modern physics machines and equipment's.
	PO12: Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
	PO13: Demonstrate knowledge, understand Physics, management principles and apply these to one's own work as a member and leader in team, to manage project in multidisciplinary environments.
PSO	**PSO1**: To design and execute experiments on various advanced equipment, attain a systemic understanding of core physical concepts, principles and theories along with their applications.
	PSO2: Improve aptitude skill, reasoning ability, MOOC learning, internship and

field projects which enables them to qualify various state and national tests/exams for better carrier options

PSO3: Analyses the relationships between different instruments used for some measurements.

PSO4: Perform experiment according to laboratory standard in the area of Mechanics, Electronics, Optics and energy storage devices.

PSO5: Understand the application of Mechanics, Mathematical Physics, Thermodynamics, Quantum Mechanics, Statistical Mechanics, Nuclear Physics, Solid state Electronic devices, Optics and renewable energy sources in field of Medical, Industry, Agriculture and daily life.

PSO6: Acquire the knowledge of various Power electronic circuits and its application.

B. Sc. I (Sem I)

CO I	➢ Learn Kepler's laws of planetary motion. ➢ Learn Newton's law of gravitation, acceleration due to gravity & understand variation acceleration due to gravity with altitude & depth ➢ Understand Gravitational field, Gravitational Potential & its applications to different objects.
CO II	➢ Understand basic concept of motion of rigid body & moment of inertia. ➢ Learn how to determine M.I. of various rigid bodies**.** ➢ Understand concept of linear momentum, angular momentum & its conservation.
CO III	➢ Understand concept of Linear S.H.M. & Angular S.H.M. ➢ Understand the S.H.M of different types of systems. ➢ Learn how to determine to determine 'g' for different types of pendulums ➢ Learn the fundamentals of harmonic oscillator model, including damped and forced oscillators and grasp the significance of terms like

	quality factor.
CO IV	➢ Understand superposition of two SHM & formation of Lissajous figures. ➢ Study the general equation of wave motion in general and TM waves in stretched strings and longitudinal waves in gases ➢ Study standing waves & velocity of waves by Kundt's tube. ➢ Production and detection of ultrasonic waves and its applications.
CO V	➢ Understand fundamentals the elastic properties of matter. ➢ Learn bending of beam & bending moment with its application as a cantilever ➢ Study depression of centrally loaded beam. ➢ Learn how to determine Young's modulus and rigidity modulus are evaluated for different shapes of practical relevance.
CO VI	➢ Understand kinematics of moving fluid. ➢ Learn Euler's equation, Bernoulli's theorem, Poiseulle's equation & Stokes law. ➢ Study Reynold's number, Terminal velocity, Stokes' law, Variation of viscosity with temperature. ➢ Understand concept of surface tension & determination of surface tension using Jaeger's method.
CO Practicals	➢ Learn how to determine acceleration due to gravity 'g' by Simple pendulum, Compound pendulum & Kater's pendulum. ➢ Study how to determine Young's modulus of elasticity by method of vibration, cantilever & bending of beam. ➢ Study how to determine modulus of rigidity by Torsional pendulum & Maxwell needle. ➢ Learn how to determine surface tension by Quinckes & Jaeger's method.

	➢ Learn how to determine M.I. using Fly wheel & Bifilar suspension. ➢ Study how to determine coefficient of viscosity by Poiseulle's method.

B. Sc. I (Sem II)

CO I	➢ Understand the central concepts and basic formalisms od Kinetic Theory of Gases. ➢ Learn degree of freedom, law of equipartition of energy & Vander Waals gas equation of state. ➢ Understand the process of thermal conductivity, viscosity and diffusion in gases.
CO II	➢ Understand the concept of thermodynamics, there laws & and identify its outcomes. ➢ Understand the Heat Engine and there uses. ➢ Evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations.
CO III	➢ Able to Differentiate between principles and methods to produce low temperature, liquefy air, helium and hydrogen. ➢ Learn thermodynamic relationships & Maxwell's equations. ➢ Learn heat equation, thermodynamic potentials, equilibrium of thermodynamically systems.
CO IV	➢ Understand Electric field, electron gun, case of discharge tube, linear accelerator. ➢ Learn magnetic field, Mass spectrograph, velocity selector, working of cyclotron.
CO V	➢ Learn network theorems, Ballistic galvanometer & its applications. ➢ Learn Kirchhoff's laws and analysis of multi-loop circuits.

	➢ Understand rise & decay of current & charge in LR, CR & LCR circuits.
CO VI	➢ Understand the concept of A.C. currents, complex numbers & J operator.
	➢ Learn how to determine impedance & reactance of pure R, L, C & their combinations.
	➢ Learn theory & applications of transformer.
CO Practicals	➢ Design circuit & study Thenenin theorem, Norton's theorem, Milliman's theorem & Kirchoff's law.
	➢ Design circuit & study maximum power transfer theorem.
	➢ Learn how to measure low resistance by Carey-foster Bridge & potentiometer.
	➢ Design circuit & Learn how to measure inductance & capacitance by phasor diagram method.
	➢ Design circuit & study behavior of R-C. circuit as a filter.
	➢ Study of transformer.

B. Sc. II (Sem III)

CO I	➢ To understand concept of Mathematical Physics such as Gradient, divergence and curl of a vector fields, line, surface and volume integral. To study Gauss divergence theorem, Stocks theorem.
	➢ Know basic concept of Electrostatics & its applications.
CO II	➢ To study Faraday's Law, Maxwell's Equations & wave equations for electromagnetic wave.
	➢ To understand Poynting vector and Poynting theorem.

CO III	➢ To know semiconductors, charge carriers & electrical conduction, Fermi level & energy level diagrams, mobility and conductivity. ➢ To understand Hall effect, Hall coefficient, Semiconductor diode & its biasing, LED and Varactor diode.
CO IV	➢ Study BJT, its construction & working, modes of operation, current gains & their relation & CB & CE characteristics ➢ To study JFET- construction & working & it's Characteristics. ➢ Gain knowledge of Basic concept of Difference amplifier & to study the Operational Amplifier and their types.
CO V	➢ To understand the Special of Special Theory of Relativity, Lorentz transformations, Length contraction, Time dilation, relativistic addition of velocities, relativity of mass, Einstein's Mass - energy relation. ➢ To solve Numericals for better understanding.
CO VI	➢ To study structure of earth, Earthquakes, composition of atmosphere. ➢ To understand Radiation in atmosphere, moisture and clouds.
CO Practicals	➢ Design circuit & study characteristics of CB & CE transistor. ➢ Design circuit & study characteristics of FET & FET as voltmeter. ➢ Design circuit & study p-n diode as a rectifier. ➢ Design circuit & study characteristics of p-n junction. ➢ Study of OP AMP as an inverting amplifier, noninverting amplifier, adder & subtractor. ➢ To determine characteristics of Phototransistor. ➢ Design circuit & study Zener regulated power supply.

B. Sc. II (Sem IV)

CO I	➢ Understand optical lens system. ➢ Learn interference in thin films due to reflected and transmitted light, interference in wedge shaped thin film, Understand formation Newton's ring, measurement of wavelength of monochromatic light & refractive index of liquid by Newton's.
CO II	➢ Understand diffraction phenomenon such as Fresnel diffraction, Fraunhofer diffraction, single & double slit diffraction ➢ Understand construction and theory zone plate & plane transmission grating Know resolution of images, Rayleigh's criteria for resolution and R. P. of grating.
CO III	➢ Know about the basic concepts of polarization & phase retardation plates. ➢ Study of production of elliptically and circularly polarized light. ➢ Study Half shade polarimeter
CO IV	➢ Know the history of LASERS and its basic concepts. ➢ Understand the basic principle and working of different types of lasers such as Ruby laser He-Ne laser, Semiconductor laser etc. Know the applications of lasers in various fields.
CO V	➢ Study basic concept of fiber optics, structure and classification of optical fiber. ➢ Understand propagation of light wave in an optical fiber, ➢ Know acceptance angle and numerical aperture, dispersion, fiber losses, fiber optic communication. ➢ Gain information of advantages and disadvantages of optic fibers, application of fiber optics.

CO VI	➢ Know various renewable energy sources ➢ Know Solar energy & To gain knowledge of Solar Energy Storage. ➢ Study Solar Photovoltaic systems-Operating principle, photovoltaic cell concepts & solar PV panel its applications.
CO Practicals	➢ Design circuit & study (a) half wave rectifier (b) full wave bridge rectifier & investigate the effect if C, L & π filter. ➢ Learn how to determine refractive index & dispersive power of prism. ➢ Learn how to determine resolving power of plane transmission grating & telescope. ➢ Learn how to determine wavelength of monochromatic light by Newton's rings & plane transmission grating. ➢ To study & plot characteristics of solar cell. ➢ To determine frequency & phase by CRO. ➢ Learn how to determine number of lines per centimetre of given grating & resolving power.

B. Sc. III (Sem V)

CO I	➢ To understand origin of quantum mechanics. Describe concept of wave packet. ➢ Know Davisson Germer experiment ➢ To understand Heisenberg's Uncertainty principle& its verification using Thought experiment and Gamma ray microscope.
CO II	➢ To understand concept of wave function & its significance. ➢ Know the Schrodinger equations and its applications. ➢ To understand Eigen functions and Eigen values and qualitative analysis

	of zero point energy.
CO III	➢ Understand vector atom model & study Stern-Gerlach experiment and different types of coupling. ➢ Know the properties and types of X-ray ➢ To study for Raman Effect & its basic principal
CO IV	➢ Know about detection of charge particles by using G. M. counter. ➢ Understand concept of nuclear physics like, Alpha decay, Beta decay, Concept of nuclear fission and fusion. ➢ Study construction & working of nuclear reactors.
CO V	➢ Understand hybrid parameter, CE amplifier, Bias stability & Thermal runaway ➢ Study RC coupled amplifier & its variation in gain with frequency ➢ Study noise & distortion in electronic circuits.
CO VI	Know properties, advantage and applications of negative feedback. Describe the construction and working of various types of oscillators and multivibrators.
CO Practicals	➢ Construct regulated power supply using Zener diode & draw the regulation curve. ➢ Interpret the characteristics of a transistor in CB and CE modes. ➢ Determine hybrid parameters& its practical applications ➢ Design circuits for RC coupled amplifier and study the frequency response. ➢ Construct Hartley, Colpitt's, Weins Bridge Oscillator and measure the frequency of oscillations. ➢ Identify elements in optical line spectrum. ➢ Design the circuit to study characteristics of LED & to determine plank constant using LED ➢ Determine 'e' by Thomson's method.

B. Sc. III (Sem VI)

CO I	➢ Understand the concept of Phase space, unit cell, microstates, and macrostate. ➢ Study concept of probability, principle of equal priori probabilities & most probable distribution ➢ Maxwell Boltzmann statistics, and its applications.
CO II	➢ Study Distinguishable & indistinguishable particles & understand concepts of boson & fermions. ➢ Compare Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac Statistics and derive it's outcomes ➢ Understand Fermi function, Fermi energy & Fermi temperature.
CO III	➢ Distinguish between crystalline and amorphous solids. ➢ Study how to calculate atomic packing factor for Cubic structure. ➢ Explain symmetry elements and Bravais lattice. ➢ Distinguish between various types of crystal imperfection.
CO IV	➢ Analyze the success and failure of free electron theory. ➢ Study origin of band gap & classification of materials on the basis of bans structure ➢ Understand Hall effect & its applications.
CO V	➢ Understand different types of magnetic materials ➢ Study classical & quantum mechanical treatment of paramagnetism; ➢ Study Curie's law, Weiss's law, Hysteresis and Energy Loss.
CO VI	➢ Understand superconductors and its type, Meissner effect & Applications of superconductors. ➢ Understand nanomaterials, is physical properties & applications of

	nanomaterials in different fields.
CO Practicals	➢ Understand basic laws, theory, characteristics of photocell and can be determine Plank's constant using photocell. ➢ Design the circuit to study characteristics of Photo diode. ➢ Determine activation energy of thermistor and energy gap of semiconductor. ➢ Understand basic laws, theory and determine Hysteresis losses in transformer core & plot B-H curve. ➢ Determine lattice parameter by using X-ray diffraction pattern. ➢ Understand various crystal structure using crystal models & identify of crystal planes. ➢ Design the circuit to study characteristics of Zener Diode ➢ To study thermo emf using thermocouple.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Microbiology

Course Outcomes (CO)

B. Sc. I (Sem I)

CO I	➢ Get an idea about the historical events in microbiology. ➢ Understand the diversity in microbiology. ➢ Know the scope of Microbiology.
CO II	➢ Know parts of microscope, type and its principal. ➢ Get the theoretical concepts of related stain. ➢ Understand different methods of staining techniques.
CO III	➢ Understand taxonomic Classification of Microorganisms. ➢ Understand diversity of Microorganisms.
CO IV	➢ Understand cells and its types. ➢ Understand shape, size and arrangement of bacteria. ➢ Understand structural organization of bacterial cell and its importance. ➢ Understand anatomy of Prokaryotic cell.
CO V	➢ Understand basic nutritional requirements of microorganisms. ➢ Acquainted with various sterilization techniques. ➢ Know various methods of pure culture isolation. ➢ Know the methods of preservation of pure culture.
CO VI	➢ Understand concept of growth and reproduction of Bacteria. ➢ Know the Synchronous culture and Continuous culture methods. ➢ Understand factors influencing growth of bacteria.
CO Practicals	➢ Understand the parts of Microscope, types of Microscopes and its Principles. ➢ Understand different equipment's used in microbiology lab and their operation. ➢ Develop basic skill of Aseptic technique. ➢ Cultivate bacteria from soil, water, Air, milk and skin. ➢ Perform staining by different methods. ➢ Demonstrate motility of bacteria.

	➢ Isolate pure culture of bacteria.

B. Sc. I (Sem II)

CO I	➢ Understand structural organization of viruses. ➢ Understand replication of viruses. ➢ Understand concept of virus cultivation.
CO II	➢ Understand basic skill of Aseptic technique. ➢ Understand various methods to control microorganisms. ➢ Understand various mechanisms of cell injury. ➢ Acquainted with knowledge of antibiotics and its mechanism of action.
CO III	➢ Understand the role of microorganisms in various fields. ➢ Understand role of microorganisms in bio-fertilizers and bio-pesticides production. ➢ Understand role of microorganisms in antibiotic and vaccine production. ➢ Understand role of microorganisms in biodegradation and bioleaching of metals from ores.
CO IV	➢ Understand structure and function of various biomolecules and its importance in living cell. ➢ Understand structure and function of Nucleic acids.
CO V	➢ Understand basic concept of biostatistics. ➢ Understand s types of Central tendencies. ➢ Know the concept of Correlation and Regression. ➢ Understand concept of hypothesis testing.
CO VI	➢ Understand basic concept of computers and its peripherals. ➢ Know the concept of Computer memory.

	➢ Use of computer in preparation of presentations, Seminars. ➢ Use of MS-Word and MS- Power Point in routine. ➢ Use of Internet in searching information related to subject.
CO Practicals	➢ Cultivate viruses by plaque formation method. ➢ Study the factors affecting growth of bacteria. ➢ Demonstrate microbiostatic effect of heavy metals. ➢ Cultivate anaerobic bacteria. ➢ Perform antibiotic sensitivity of bacteria. ➢ Use Yeast for Alcohol production and Bread making.

B. Sc. II (Sem III)

CO I	➢ Get an idea about the gene and its parts. ➢ Understand the concept of Split genes and Overlapping genes. ➢ Understand the concept of DNA replication in prokaryotes and different models of DNA replication. ➢ Get an idea about DNA repair mechanisms. ➢ Understand concept of Genetic Code and its importance. ➢ Understand the process of protein synthesis.
CO II	➢ Understand different operons in bacteria and its importance. ➢ Know the concept of mutation and its types. ➢ Understand various mutagenic agents and their effects.
CO III	➢ Understand process of gene recombination in prokaryotic cell. ➢ Acquainted with various mechanisms of gene recombination in bacteria.
CO IV	➢ Acquainted with basic technique of genetic engineering. ➢ Understand uses of different enzymes in genetic engineering. ➢ Know about various vectors used in genetic engineering.

CO V	➢ Understand methods for isolation of DNA. ➢ Acquainted with methods such as DNA sequencing, Polymerase Chain Reaction. ➢ Understand the method for identification of transformed cells. ➢ Understand the concept of Gene Library.
CO VI	➢ Understand concept of recombinant Insulin and its production in large amount. ➢ Understand about Recombinant Vaccine. ➢ Understand the concept of Gene Therapy. ➢ Understand the concept of DNA Probes in diagnosis of disease. ➢ Understand how Transgenic plants are produce nowadays. ➢ Understand about genetically modified microorganisms which control pollution.
CO Practicals	➢ Develop skill of Isolation of DNA from bacteria. ➢ Perform Agarose Gel Electrophoresis. ➢ Isolate Mutant strains of bacteria. ➢ Detect DNA and RNA from the sample. ➢ Carryout Transformation by using Chemical agents.

B. Sc. II (Sem IV)

CO I	➢ Understand concept of epidemiology. ➢ Understand the types of infection and transmission of disease. ➢ Know the normal flora of human body and its importance. ➢ Understand how to control communicable diseases.
CO II	➢ Concept of cells and organs related to immune system. ➢ Immune response and Immune mechanisms. ➢ Immunity and its types.

	➢ Concept related to Hypersensitivity.
CO III	➢ Antigens, its types and bacterial antigens. ➢ Antibodies, its types and importance. ➢ Antigen – Antibody reactions, its types and applications in serological diagnosis of disease.
CO IV	➢ Various bacterial disease, their causative agents, modes of transmission, Epidemiology, Treatments, Laboratory diagnosis and Prophylaxis.
CO V	➢ Various Viral diseases, their causative agents, modes of transmission, Epidemiology, Treatments, Laboratory diagnosis and Prophylaxis. ➢ Various Rickettsial diseases, their causative agents, modes of transmission, Epidemiology, Treatments, Laboratory diagnosis and Prophylaxis. ➢ Various fungal diseases, their causative agents, modes of transmission, Epidemiology, Treatments, Laboratory diagnosis and Prophylaxis. ➢ Various Protozoal diseases, their causative agents, modes of transmission, Epidemiology, Treatments, Laboratory diagnosis and Prophylaxis.
CO VI	➢ Understand chemotherapeutic agents. ➢ Antibacterial antibiotics, their mode of action and uses. ➢ Antiviral agents, their mode of action and uses. ➢ Antifungal antibiotics, their mode of action and uses. ➢ Basic mechanism of antibiotic action. ➢ Understand various methods of Antibiotic sensitivity testing.

CO Practicals	➢ Demonstrate the activity of various enzymes such as Oxidase, Urease and Coagulase. ➢ Isolate and identify bacteria from clinical samples. ➢ Perform serological tests like Widal test, VDRL test and Pregnancy test. ➢ Determine blood group and Hemoglobin. ➢ Perform antibiotic sensitivity of bacteria. ➢ Determine Carbohydrate and Proteins from Urine. ➢ Estimate blood glucose and cholesterol. ➢ Perform Total Leukocyte Count and Differential Leukocyte Count of Blood.

B. Sc. III (Sem V)

CO I	➢ Understand microbial interactions present in natural habitat. ➢ Understand atmosphere and its composition. ➢ Understand different types of microbes present in Air. ➢ Understand about Air- borne disease. ➢ Understand about how to control air borne disease.
CO II	➢ Understand presence of microorganisms in soil. ➢ Understand formation of process of humus. ➢ Understand concept of biological Nitrogen fixation. ➢ Understand different Biogeochemical cycling of elements. ➢ Understand biofertilizers, its competition and its importance in Agriculture.
CO III	➢ Microorganisms present in water, their growth requirements. ➢ Planktons and their importance. ➢ How to control problems created by planktons.

CO IV	➢ Concept of Eutrophication. ➢ Collect water sample from natural sources for testing. ➢ Perform bacteriological analysis of water. ➢ Know the indicators of excretal pollution of water. ➢ Perform Multiple Tube Dilution technique and Most Probable Number technique for testing water potability. ➢ Know the ICMR and WHO standards of drinking water quality.
CO V	➢ Self-purification of water. ➢ Treatment of water ➢ Construction of Slow Sand Filters and Rapid Sand Filters. ➢ Chlorination of water. ➢ Treatment of sewage. ➢ Construction of Municipal Sewage treatment plant. ➢ Secondary treatment of sewage. ➢ Construction of Domestic Sewage treatment plant. ➢ Concept of Chemical Oxygen Demand and Biological Oxygen Demand. ➢ Construction of Biogas production plant.
CO VI	➢ Understands Spectroscopy. ➢ Understand Electrophoresis. ➢ Understand Chromatography, its different types and its importance. ➢ Acquainted with concept of Isotopes and its use in Biological field.
CO Practical	➢ Perform bacteriological analysis of water by various methods. ➢ Determine Biological Oxygen Demand of water. ➢ Estimate chlorine demand of water and residual chlorine from water. ➢ Enumerate microorganisms from soil. ➢ Isolate *Azatobacter* and *Rhizobium* from soil. ➢ Isolate antibiotic producing bacteria from soil.

B. Sc. III (Sem VI)

CO I	➢ Industrial importance of microorganisms. ➢ Process of fermentation. ➢ Production strain. ➢ Scale-up process. ➢ Layout of fermentation plant. ➢ Raw materials used in fermentation. ➢ Antifoam agents used in fermentation process. ➢ Sterilization of fermentation medium
CO II	➢ Industrial production of Ethanol, Beer, Wine, and Acetone- Butanol.
CO III	➢ Industrial Production of Baker's yeast, Single Cell Proteins. ➢ Industrial Production of Penicillin, Amylase, and Vitamin B12.
CO IV	➢ Composition of milk. ➢ Sources of contamination of milk. ➢ Pasteurization. ➢ Testing of milk for its quality. ➢ Preparation of various milk products.
CO V	➢ Understand food spoilage. ➢ Understand how to preserve food. ➢ Know preparation of various fermented food products like Idli, Pickels, and Sauerkraut. ➢ Understand concept of food poisoning and food intoxication.
CO VI	➢ Understand enzymes and its classification. ➢ Understand EMP pathway and TCA cycle of metabolism. ➢ Understand about Electron Transport Chain.
CO Practicals	➢ Perform milk testing by Phosphatase & Methylene Blue Reduction test ➢ Enumerate bacteria in milk.

	➢ Perform test for adulteration of milk. ➢ Produce Ethyl alcohol, Citric acid, and Amylase from raw materials. ➢ Immobilized enzymes. ➢ Produce Pickels, and Cheese. ➢ Produce wine from grapes and other raw materials.

M. Sc. I (Sem I)

CO I	➢ Understand pH and buffer. ➢ Understand concept of Isoionic point and isoelectric point. ➢ Concept of pH dependant Ionization of amino acids.
CO II	➢ Understand laws of absorption. ➢ Know the different parts of UV – Visible Spectrophotometer, working and its applications. ➢ Know the different parts of Infrared Spectrophotometer, working and its applications. ➢ Know the different parts of Flame photometer, working and its applications. ➢ Know the different parts of Nuclear Magnetic Resonance Spectroscopy, working and its applications. ➢ Know the different parts of Electron Spin Resonance Spectroscopy, working and its applications.
CO III	➢ Understand Isotopes and its applications in biology. ➢ Understand Preparation and Labeling of Isotopes. ➢ Understand Detection and Measurement of Isotopes.
CO IV	➢ Understand Paper chromatography and its applications. ➢ Understand Column chromatography and its applications. ➢ Understand Thin Layer chromatography and its applications.

	➢ Understand Gas chromatography and its applications. ➢ Understand Ion Exchange chromatography and its applications. ➢ Understand Affinity chromatography and its applications. ➢ Understand Gel Filtration chromatography and its applications.
CO V	➢ Understand Moving boundary electrophoresis. ➢ Understand Zone Electrophoresis. ➢ Understand Paper Electrophoresis and its application. ➢ Understand Gel Electrophoresis and its application.

M. Sc. I (Sem I)

Subject- Microbial Enzymology (Paper II)

CO I	➢ Understand enzymes and their properties. ➢ Understand concept of Enzymes as a Catalyst.
CO II	➢ Understand how to isolate enzymes and purify. ➢ Know about classification of enzymes by IUB nomenclature. ➢ Know the concept of Constitutive, Inducible and marker enzymes.
CO III	➢ Understand effect of pH and Temperature on enzyme activity. ➢ Understand effect of substrate concentration and Enzyme concentration on enzyme activity. ➢ Understand Derivation of Henry – Michaelis – Menten equation. ➢ Understand significance of Vmax and Km value.
CO IV	➢ Understand types of enzyme inhibition. ➢ Understand Competitive, Non- competitive enzyme inhibition. ➢ Understand mechanism of lysozymes action. ➢ Understand Enzymes activator, Co- enzymes and co- factors for enzyme activity.

CO V	➢ Understand concept of enzyme and substrate specificity. ➢ Understand chemistry of active centre. ➢ Understand factors affecting catalytic efficiency of enzymes. ➢ Understand various theories of enzyme action.

M. Sc. I (Sem I)

Subject- Microbial Physiology and Photosynthesis (Paper III)

CO I	➢ Understand structure and organization of biological membrane. ➢ Understand various types of cellular transports. ➢ Understand Liposome's. ➢ Understand Sodium Potassium pump
CO II	➢ Understand ATP cycle. ➢ Understand the concept of free energy, standard free energy. ➢ Understand energy rich bonds and biological energy transducers.
CO III	➢ Understand Respiratory chain in Mitochondria and bacteria. ➢ Understand Oxidation reduction enzymes. ➢ Understand Respiration linked proton translocation.
CO IV	➢ Understand coupling of Oxidative Phosphorylation to electron transport chain. ➢ Understand inhibitors of Oxidative Phosphorylation. ➢ Understand mechanism of Oxidative Phosphorylation. ➢ Understand various coupling mechanisms.
CO V	➢ Understand structure of photosynthetic pigments. ➢ Understand various photosystems for photosynthesis. ➢ Understand CO_2 fixation in bacterial photosynthesis.

M. Sc. I (Sem I)

Subject- Environmental Microbiology (Paper IV)

CO I	➢ Understand interaction between environment and biota. ➢ Understand concept of habitat. ➢ Understand food chains. ➢ Understand concept of ecosystem and management of ecosystem.
CO II	➢ Understand Nitrogen cycle. ➢ Understand Symbiotic and Non – symbiotic Nitrogen fixation. ➢ Understand mechanism of Nitrogen fixation. ➢ Understand the role of Nitrogenase in Nitrogen fixation.
CO III	➢ Understand Phosphorus cycle. ➢ Understand role of Phosphobacter and mycorrhizae in crop production. ➢ Understand Carbon cycle. ➢ Understand role of microorganisms in degradation of carbon compounds. ➢ Understand Sulphur cycle. ➢ Know about Sulphur metabolism. ➢ Get an idea about Sulphur oxidizing bacteria and its mechanism. ➢ Understand Selenium cycle. ➢ Understand metabolisms, deficiency and toxicity of Selenium.
CO IV	➢ Understand about Iron oxidizing bacteria. ➢ Understand Microbiology and Biochemistry of Metal and Metalloid transformation. ➢ Understand about transformation of Mercury, Arsenic, Lead and Tellurium.
CO V	➢ Understand concept of Biodeterioration. ➢ Understand Biodeterioration of Wood, Metal, Pharmaceutical products and Stone work.

	➢ Understand concept of Bioleaching and its applications. ➢ Understand bacterial bioleaching of various metals.

M. Sc. I (Sem I)

Subject- Soil Microbiology and Analytical Biochemistry & Instrumentation

CO I Practicals	➢ Isolate Microorganisms from soil. ➢ Study antagonism in microorganism from soil. ➢ Isolate Nitrogen fixing bacteria from soil, rhizosphere, phylosphere, and root nodules. ➢ Isolate Azatobacter, Azospirillum and Cynobacteria from soil. ➢ Isolate phosphobacteria from soil. ➢ Estimate Nitrogen by Kjeldhal's method. ➢ Prepare biofertilizers and bioinsecticides.
CO II Practicals	➢ Estimate Sucrose in presence of glucose. ➢ Determine pKa of amino acids. ➢ Estimate Protein by Biuret and Folin- Ciocalteau method. ➢ Perform Ultraviolet spectroscopy of Protein. ➢ Determine absorption spectra of p- Nitro phenol. ➢ Perform Paper Chromatography of Amino acids, sugars and nitrogen bases of DNA. ➢ Separate Proteins by Paper and Gel Electrophoresis. ➢ Estimate DNA and RNA. ➢ Perform Thin Layer Chromatography.

M. Sc. I (Sem II)

Subject- Biostatistics, Bioinformatics and Computer Applications (Paper V)

CO I	➢ Understand Biostatistics and its applications in biology. ➢ Understand concept sample and sampling procedures. ➢ Understand graphical presentation of biological data. ➢ Understand different central tendencies. ➢ Understand Mean deviation, standard error, standard deviation.
CO II	➢ Understand standard error of mean. ➢ Understand standard error of standard deviation. ➢ Understand student's t- test and chi- square test. ➢ Understand probability, rules of probability and probability distribution. ➢ Understand correlation and its types. ➢ Get an idea about regression and type. ➢ Understand difference between correlation and regression.
CO III	➢ Understand basics of computer. ➢ Get knowledge of Input and Output devices of computer. ➢ Understand computer software and Hardware's. ➢ Understand file transfer protocol, HTML, URL and search engines.
CO IV	➢ Understand Bioinformatics and its applications. ➢ Understand role of Bioinformatics in drug designing. ➢ Understand the role bioinformatics in studying bimolecular structure. ➢ Get knowledge about biological data base such as sequence data base, Nucleic acid data base and protein sequence data base. ➢ Understand gene bank and Swiss port.
CO V	➢ Understand Tools for Bioinformatics ➢ Understand s Secondary and Tertiary protein structure prediction. ➢ Understand software's of Bioinformatics.

	➢ Understand Emerging areas in Bioinformatics.

M. Sc. I (Sem II)

Subject- Enzyme Technology (Paper VI)

CO I	➢ Understand Enzyme activators, Co-enzymes and Co-factors in enzyme catalysis. ➢ Understand concept enzyme and substrate specificity. ➢ Understand mechanism of Lysozyme action.
CO II	➢ Understand regulation of enzyme activity by feedback control. ➢ Understand concept of enzyme induction and repression. ➢ Understand multi-enzyme complexes and their significance in metabolism. ➢ Understand membrane bound enzymes in metabolic regulation.
CO III	➢ Understand Isoenzymes and their metabolic significance. ➢ Understand Allosteric enzyme. ➢ Understand Allosterism and its Co-operativity.
CO IV	➢ Understand Compartmentation of Enzyme and substrate and its significance. ➢ Get knowledge of naturally occurring Activators, Inhibitors and Co-enzymes. ➢ Understand Enzyme immobilization and its advantages. ➢ Understand concept of Enzyme probe.
CO V	➢ Understand different methods of Enzyme immobilization and their analytical, therapeutic and industrial applications. ➢ Understand chemical modification of enzyme. ➢ Understand the role of different microbial enzymes industries.

M. Sc. I (Sem II)

Subject- Microbial Metabolism (VII)

CO I	➢ Understand EMP pathway, ED pathway, HMP pathway and Phosphoketolase pathway. ➢ Understand mechanism of Gluconeogenesis. ➢ Understand mechanism of Tricarboxylic Acid Cycle. ➢ Understand Glyoxylate pathway.
CO II	➢ Understand oxidation of Methanol, Formaldehyde and Formate. ➢ Understand Mechanism of Ribulose Pathway. ➢ Understand Serine pathway. ➢ Understand Xylulose Monophosphate pathway.
CO III	➢ Understand biosynthesis of Purine and Pyrimidine Nucleotides. ➢ Understand inhibitors of Nucleotide synthesis.
CO IV	➢ Understand Ortho Cleavage pathway, Meta Cleavage pathway and Gentisate pathway. ➢ Understand the catabolic pathway of Aromatic amino acids. ➢ Understand biosynthesis of different fatty acids.
CO V	➢ Understand biosynthesis of branched chain amino acids, Aromatic amino acids, Sulphur containing amino acids and Basic amino acids. ➢ Understand catabolism of different amino acids.

M. Sc. I (Sem II)

Subject- Environmental Microbiology & Extremophiles (Paper VIII)

CO I	➢ Understand concept of Recalcitrant compound and their occurrence in nature.

	➢ Understand mechanism of Biomagnification and consequences. ➢ Understand biomagnification of chlorinated hydrocarbons and pesticide. ➢ Understand biodegradation of recalcitrant and toxic chemicals.
CO II	➢ Understand Eutrophication. ➢ Understand role of Phosphorus and Nitrogen in Eutrophication. ➢ Understand how to control Eutrophication.
CO III	➢ Understand concept of acidophilic, alkalophilic, thermophilic, basophilic and osmophilic microbes. ➢ Understand applications of Thermophiles and Extremophiles.
CO IV	➢ Understand Water treatment process. ➢ Understand methods of disinfections of water. ➢ Understand total coliforms. ➢ Understand methods of assessment of water quality. ➢ Understand the indictor's microbes of water pollution.
CO V	➢ Understand Primary, secondary and tertiary treatment of water. ➢ Understand activated sludge process. ➢ Understand methods of Secondary treatment of water by various methods and its applications.

M. Sc. I (Sem I)

Subject- Soil Microbiology + Analytical Biochemistry & Instrumentation

CO I	➢ Isolate Microorganisms from soil.
Practicals	➢ Study antagonism in microorganism from soil. ➢ Isolate Nitrogen fixing bacteria from soil, rhizosphere, phylosphere, and root nodules.

	➢ Isolate Azatobacter, Azospirillum and Cynobacteria from soil. ➢ Isolate phosphobacteria from soil. ➢ Estimate Nitrogen by Kjeldhal's method. ➢ Prepare biofertilizers and bioinsecticides.
CO II Practicals	➢ Estimate Sucrose in presence of glucose. ➢ Determine pKa of amino acids. ➢ Estimate Protein by Biuret and Folin- Ciocalteau method. ➢ Perform Ultraviolet spectroscopy of Protein. ➢ Determine absorption spectra of p- Nitro phenol. ➢ Perform Paper Chromatography of Amino acids, sugars and nitrogen bases of DNA. ➢ Separate Proteins by Paper and Gel Electrophoresis. ➢ Estimate DNA and RNA. ➢ Perform Thin Layer Chromatography.

M. Sc. II (Sem III)

Subject- Molecular Biology (Paper IX)

CO I	➢ Understand importance of nucleic acid in living system. ➢ Understand composition of nucleic acids. ➢ Understand Purine and Pyrimidine bases and their tautomeric forms. ➢ Understand structures of nucleosides and nucleotides. ➢ Understand Watson and Crick model for DNA. ➢ Get knowledge of different types of DNA and RNA.
CO II	➢ Understand enzymes of DNA replication in prokaryotes and eukaryotes. ➢ Understand mechanism of DNA replication in Prokaryotes, Eukaryotes and Bacteriophages.

	➢ Understand DNA repair mechanisms.
CO III	➢ Understand mechanism of Transformation, Conjugation, Transduction and Transposable elements. ➢ Understands concept of gene, Multigene families, Pseudogenes, Spilt genes and Overlapping gene. ➢ Understand Genetic code. ➢ Understand Gene Mutation.
CO IV	➢ Understand mechanism of Transcription. ➢ Understand post Trancriptional modifications. ➢ Understand mechanism of Translation. ➢ Understand post Translational modifications. ➢ Understand non- ribosomal polypeptide synthesis. ➢ Understand Processing of RNA.
CO V	➢ Understand mechanism of gene regulation in prokaryotes. ➢ Understands concept of Operon. ➢ Understand Gene regulation in Eukaryotes.

M. Sc. II (Sem III)

Subject- Virology (Paper X)

CO I	➢ Understand historical aspect of Viruses, Origin and Evolution of Viruses. ➢ Understand general properties of viruses. ➢ Understand Replication of Viruses.
CO II	➢ Understands Epidemiology, pathogenesis and host response to virus infections. ➢ Understand Laboratory diagnosis of viral infections. ➢ Understand Interferon's and Antiviral agents.

CO III	➢ Understand Microscopy of Viruses ➢ Understand different methods for cultivation of Viruses.
CO IV	➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Pox Virus. ➢ Understand. Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Herpes Viruses. ➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Adenoviruses.
CO V	➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Orthomyxovirus. ➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Arboviruses. ➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of Rubella Virus. ➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of RhabdovViruses.

M. Sc. II (Sem III)

Subject- Fermentation Technology (paper XI)

CO I	➢ Understand Design and types of Fermentor. ➢ Understand mechanism of Batch and Continuous fermentation. ➢ Understand Computer control of fermentation process.
CO II	➢ Understand Industrial production of antibiotic Penicillin, Streptomycin and Tetracycline. ➢ Understand Industrial production of anticancer drugs, Interferon's and L – asparginase. ➢ Understand Industrial production of rare biological molecules and

	their applications.
CO III	➢ Understand production of different cheese, Yoghurt and Dahi. ➢ Understand production of mycotoxins. ➢ Understand production of Oriental food products such as Koji, Soy Sauce and Miso. ➢ Understand single cell protein from bacteria and fungi. ➢ Understand production of different alcoholic beverages and whisky.
CO IV	➢ Understand the concept starter culture for food industries. ➢ Understand production and preservation of fermented food products. ➢ Understand the application of microbial enzymes in food industries. ➢ Understand food borne infections.
CO V	➢ Understand bacterial biomass production of Bacillus megatherium and Acinebacter cerificans. ➢ Understand fungal biomass production of Paecilomyces varioti and Candida utilis. ➢ Understands Prebiotics and Probiotics, its importance, Sources,Desirable charecteristics and benefits of Probiotics consumption.

M. Sc. II (Sem III)

Subject- Immunology (Paper XII)

CO I	➢ Understand Anatomic organization of the immune system, types of cells and organs of immune system. ➢ Understand mechanism specific and non – specific immune response. ➢ Understands various types of immune response.

CO II	➢ Understand Antigen, its types. ➢ Understand Antibody structure, types and their functions. ➢ Understand various types of Antigen – Antibody reactions.
CO III	➢ Understand Complement system, its mechanism and functions. ➢ Understand Tumor immunology. ➢ Understand concept of Autoimmunity and Autoimmune diseases.
CO IV	➢ Understand Hypersensitivity and its types. ➢ Understand Major Histocompatibility molecules and its role in hyper sensitivity. ➢ Understand total coliforms. ➢ Understand vaccines and its types.
CO V	➢ Understand Immunization of Animals. ➢ Understand isolation of stimulated spleen cell, myolema cells. ➢ Understand Hybridoma technologyfor production of Monoclonal antibodies and its applications.

B. Sc. II (Sem III)

Subject- Applied Microbiology

CO I Practical	➢ Isolate antibiotic producing organisms fro soil ➢ Perform Assay antibiotics and purify by ion – exchange resins. ➢ Prepare various fermented food products such as Yoghurt, Koji, Cheese and Idli. ➢ Perform assay of Amino acids and Vitamins. ➢ Prepare media for Plant Tissue Culture. ➢ Prepare Callus from explants, Haploid culture and Protoplast culture.

CO Practicals	II	➢ Isolate and Identify pathogenic microorganisms from various specimens such as Blood, Urine, Cerebrospinal fluid, throat swab, sputum, faeces, pus and wound fluid. ➢ Isolate and identify various pathogenic bacteria. ➢ Perform various Serological tests for diagnosis of disease. ➢ Perform double diffusion and immunoelectrophoresis. ➢ Estimate Hemoglobin, Pack Cell Volume, Blood cell count, Erythrocyte Sedimentation Rate, Bleeding time, Clotting time and blood smear examination. ➢ Perform routine examination of urine. ➢ Antibiotic Sensitivity.

B. Sc. II (Sem IV)

Subject- Biotechnology (Paper XIII)

CO I	➢ Understand different Enzymes used in Recombinant DNA technology. ➢ Understand different Vectors used in Recombinant DNA technology.
CO II	➢ Understand Isolation of gene. ➢ Understand methods of gene transfer. ➢ Understand selection and screening of recombinant DNA. ➢ Understand methods of different blotting techniques. ➢ Understand Colony hybridization technique.
CO III	➢ Understand cloning from m- RNA and genomic DNA. ➢ Understands synthesis of gene and preparation of DNA probes. ➢ Understand construction of gene bank and gene libraries. ➢ Understand gene mapping, DNA sequencing and DNA

	fingerprinting. ➢ Get knowledge of Polymerase Chain Reaction and Gene amplification.
CO IV	➢ Understand Culture media and plant cell culture. ➢ Understand Tissue culture, Micropropogation and Somaclonal variations. ➢ Understand production and use of haploid cell culture. ➢ Get knowledge of Protoplast culture, regeneration and somatic hybridization. ➢ Understand methods of gene transfer in plants, animals and transgenic plants.
CO V	➢ Understand applications of biotechnology in agriculture, plant and animal improvement. ➢ Understands applications of biotechnology in Enzymology. ➢ Understand protein engineering, immunotoxins and drug designing. ➢ Understands over production of metabolites. ➢ Understands use of microbes in industries and agriculture. ➢ Understand the application of Biotechnology in medical science, gene therapy, and genetic counseling.

B. Sc. II (Sem IV)

Subject- Clinical Virology (Paper IV)

CO I	➢ Understand Classification, life cycle and replication of Tobacco Mosaic Virus (TMV), PVX virus, PVY virus, CMV virus. ➢ Understand Cynophages and Mycoviruses.
CO II	➢ Understands Life cycle, Structure and Replication of various RNA viruses.

	➢ Understand Life cycle, Structure and Replication of various DNA viruses.
CO III	➢ Understand DNA containing Oncoviruses.
	➢ Understand RNA containing Oncoviruses.
CO IV	➢ Understand Structure, Pathogenesis, Laboratory Diagnosis and Immunology of HIV Virus.
	➢ Understand Retroviruses.
CO V	➢ Understand Viroids and Prions.

B. Sc. II (Sem IV)

Subject- Microbial Technology (Paper V)

CO I	➢ Understand Isolation and screening of microorganisms.
	➢ Understand process of inoculums development, sterilization, strain improvement and downstream processing.
	➢ Understand scale up process for solid state fermentation.
CO II	➢ Understand production of Aspartic acid, Glutamic acid and Gluconic acid by fermentation.
	➢ Understand production of Bioplastic and Biopolymers.
	➢ Understand production of Enzymes and Vitamins.
CO III	➢ Understand Immobilization of enzymes and methods of Immobilization.
	➢ Understand concept of Biosensors and Bioelectrodes.
CO IV	➢ Understand concept of Biofuel and Energy crops.
	➢ Understand mechanism and method of Biogas production.
	➢ Understand production method of Bioethanol and Biobutanol.
CO V	➢ Understand basic concept of Biofertilizers and its types.

	➢ Understand method of Biofertilizers production and its application. ➢ Understands method of production of Bioinsecticide and its application.

B. Sc. II (Sem IV)

Subject- Medical Microbiology (Paper VI)

CO I	➢ Understand Morphology, Cultural characteristics, Biochemical characteristics and Laboratory diagnosis of Staphyllococci, Streptococci, and Mycobacterium.
CO II	➢ Understand Morphology, Cultural characteristics, Biochemical characteristics and Laboratory diagnosis of Escherichia, Klebsiella, Proteus, Salmonella and other Gram negative bacteria.
CO III	➢ Understand Morphology, Cultural characteristics, Biochemical characteristics and Laboratory diagnosis of Microsporum, Trichophyton, Epidermophyton and Candida albicans. ➢ Understand Morphology, Cultural characteristics, Biochemical characteristics and Laboratory diagnosis of Cryptococcus neoformans and Histoplasma capsulatum.
CO IV	➢ Understand Morphology, life cycle and Laboratory diagnosis of Entamoeba histolytica, Leishmania donovani, Trypanosoma and Palsmodia spp. ➢ Understand Morphology, life cycle and Laboratory diagnosis of Taenia saginata,Taenia solium, Ascaris lumbricoides and Wuchereria bancrofti.
CO V	➢ Understand normal flora of human body. ➢ Understand Diarrheal diseases.

CO VI	➢ Understand concept of Bacterimia, septicemia and hospital acquired infections. ➢ Perform Agarose Gel Electrophoresis. ➢ Perform Restriction digestion and Ligation of DNA. ➢ Perform Southern Blotting and Northern blotting. ➢ Isolate and Purify Plasmid DNA and Genomic DNA. ➢ Perform Transformation and Conjugation.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Computer Science

Course Outcomes (CO)

Program Outcome (PO) & Program Specific Outcome (PSO) B. Sc. Computer Science

Program Outcome

- PO-1. Demonstrate, solve and understanding of major concepts in all disciplines of Computer Science.
- PO-2. Solve the problems and also think methodically, independently and draw a logical conclusion.
- PO-3. Employ critical thinking in programming way and the scientific knowledge to design, carry outs, records and analyze the results of practically done with the help of programming language.
- PO-4. Create an awareness of the impact of programming language and use of computer science with in it on in a useful way on the environment, society and development outside the scientific community and as well as in a society.
- PO-5. Demonstrate proficiency in problem-solving techniques using the computer.
- PO-6. Able to do Hands on work in proficiency in at least two high-level programming languages and two operating systems.
- PO-7. In depth proficiency in the analysis of complex problems and the synthesis of solutions to those problems.
- PO-8. Practically gaining the knowledge of comprehension of modern software engineering principles.
- PO-9. Major impact on a breath and depth of knowledge in the discipline of Computer Science. PO-10. The revised and restructured curriculum for the Three-year integrated course is systematically designed considering the current industry needs in terms of skills sets demanded under new technological environment.
- PO-11. The proposed curriculum is more contextual, industry affable

	and suitable to cater the needs of society and nation in present day context.

B. Sc. I (Sem I)

CO	➢ To understand the computer fundamentals like operating systems, peripheral devices, internet and it's types. ➢ To understand various DOS commands and features of windows ➢ To understand internet and Types of Internet connections. ➢ To understand Programming Concept like Algorithm flowcharting programming languages. ➢ To understand assembler, interpreter and compiler ➢ To understand C language its history, features and structure of C program ➢ To understand keywords, identifiers, constants, variables, basic data types of C. ➢ To understand I/O Operations like Formatted I/O and Unformatted I/O ➢ To understand Control structure and conditional operator with its applications.
CO Practicals	➢ Execution of various DOS commands. ➢ Application of number systems. ➢ To understand and applications of web browser and E-mail. ➢ Design, implement, test, debug, and documents programs in C

Implementation of Arithmetic, relational, logical operaotrs.

- Demonstration & use of various I/O operations.
- To understanding about writing algorithms and step by step approach in solving problems with the help of flowchart.
- Demonstration of Control structure and conditional operator.

B. Sc. I (Sem II)

CO

- To understand the fundamentals of data structure like list, array, stack, queue.
- To understand algorithms of traversing, insertion and deletion operation.
- To understand Linked list, circular queue & there implementation.
- To understand Tree, tree Traversing, sorting and searching Techniques.
- To understand Function in C language function prototype, local & global variable.
- To understand and implementation of array.
- To understand String Handling in C language.
- To understand and implementation Pointers and Pointer and array.
- To understand and implementation of Structure and Union.
- To understand and implementation of File Handing and I/O Operations on file.

CO

- To implement data structure like array, stack, queue.

Practicals

- To demonstration of algorithms of traversing, insertion and deletion operation on Linked list and circular queue.
- Demonstration of tree, tree Traversing, sorting and searching Techniques.
- Demonstration of function in c language
- To implementation of function prototype, local & global variable.
- To demonstration and implementation of array.
- To demonstration of String Handling in C language.
- To demonstrate and implementation Pointers and Pointer and array.
- To demonstration and implementation of Structure and Union.

B. Sc. II (Sem III)

CO

- Understand basic data structures such as arrays, linked lists, stacks and queues and their applications.
- Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
- To design and implement various data structure algorithms.
- To impart a thorough understanding of non-linear data structures such as trees and there applications.
- Familiarity with various sorting, searching techniques and their performance comparison.
- Determine and demonstrate bugs in program, recognize needed basic operations with data structures.
- Describe the procedural and object-oriented paradigm with concepts

of streams, classes, functions, data and objects.

- Students should be able to write, compile and debug programs in C++ language.
- Use different data types in a computer program.
- Basic idea about Classes and object with specifies, data members and member functions.
- Understanding the pure concept of managing console I/O with manipulators and operators.
- Using functions with their features and design programs involving decision, structures, loops and using different functions.
- **C**onstructor and Destructor types and usage.
- Operator overloading usage in a way that unary and binary operators
- With the help of Inheritance understand the visible mode and virtual as well as abstract base classes for object-oriented programming.

CO Practicals

- Programs to demonstrate fundamental algorithmic problems include tree.
- Implement various searching and sorting algorithms.
- Programs to demonstrate the implementation of various operations on stack and queue.
- To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
- The strengths of C++, which provide the students with the means of writing modular, efficient, maintainable, and portable code.
- Implement the use of various OOPs concepts with the help of programs.

- Identify with the help of classes and objects defining data member and member functions, accessing members in creation of program and usage of the supported factors needed for a finding the solution to specific problem.
- To learn how to overload functions and operations in C++.
- Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.

B. Sc. II (Sem IV)

CO

- To introduce the concept of DBMS with respect to the relational model, to specify the functional and data requirements for a typical database application and to understand creation, manipulation and querying of data in databases.
- Identify the basic concepts and various data model used in database design ER modeling concepts and architecture use and design queries using SQL.
- Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression to the form of queries.
- Identify basic database storage structures and access techniques such as file organizations, indexing methods.
- An understanding of normalization theory and apply such knowledge to the normalization of a database.
- Recognize the purpose of query processing and optimization and also to demonstrate the basic of query evaluation.

- Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
- Understanding the concept of SQL DDL, DML commands and Clauses.
- Apply and relate the concept of Function with the supported format of Number, Character, Conversion and Date the in the database.
- In database management system and SQL commands along with PL/SQL using Oracle gives the student mastery on an open source-based toolkit, which has more scope in the job market.
- Perform PL/SQL programming using concept of Cursor Management and Triggers.
- Deep Knowledge about the Transaction in processing PL/SQL.
- Able to understand the concept of securities in database which is mostly dependent on PL/SQL.

Co Practicals

- Transform an information model into a relational database schema and to use a data definition language and utility to implement the schema using a DBMS.
- Using an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.
- Formulate query, using SQL, solutions to a broad range of query and data update problems.
- Use a desktop database package to create, populate, maintain, and query a database.
- Demonstrate a rudimentary understanding of programmatic interfaces to a database and be able to use the basic functions of

one such interface.

- Analyze an information storage problem and derive an information model expressed in the form.
- Understand query processing and techniques involved in query optimization.
- Improve the database design by normalization.
- Execute various PL/SQL queries related to Transaction Processing.
- Understand the PL/SQL architecture and write PL/SQL code for procedures, Cursor Triggers.

B. Sc. III (Sem V)

CO

- After successfully completing this course, students will be able to know:
- To explore .NET technologies for designing and developing dynamic, interactive and responsive web applications. To build Windows applications using structured and object-based programming techniques.
- Learn about .NET framework developed by Microsoft.
- Design and develop professional console and window-based .NET application.
- Be able to understand use of VB.NET basics, Objects and Types, Inheritance.
- To develop, implement, and demonstrate Component Services, Threading, Remoting, Windows services, web.
- To understand and be able to explain Security in the .NET framework

and Deployment in the .NET.

- To develop Assemblies and Deployment in .NET, Mobile Application Development.
- Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements VB.NET application.
- Construct classes, methods and assessors also the instantiate objects.
- Understand and implement string manipulation, events and exception handling within .NET application environment.
- Use Object Oriented paradigm to develop code and understand the concepts of Core Java and to cover-up with the pre- requisites of Core java. The introduction to Java programming is done through the framework of object-oriented systems.
- Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
- Be able to use the Java SDK environment to create, debug and run simple Java programs.
- Identify Java language components and how they work together in applications.
- Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes.
- The knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods.
- Understand the fundamentals of object oriented programming in Java, including defining classes, objects, invoking methods and exception handling mechanisms.

- Understand the principles of inheritance, packages and interfaces.

CO Practicals

- To aware with complete the all introductory part of to .Net IDE Component Framework.
- To develop, implement and creating Applications with VB.NET.
- Programming concepts in .Net Framework.
- Understand .NET framework and can realize some of the major enhancements in the new version of VB.
- Experience to using the VB .NET environment and how to develop small programs.
- Develop programs using Decisions, loop and Arrays in VB .NET.
- To design and program stand-alone Java applications.
- Understand the basic concepts such as Classes, methods, function Overloading, array and string manipulation in Java.
- Apply the types of inheritance in Java.
- Implement Strings, packages, and Interface techniques.

B. Sc. III (Sem VI)

CO

- Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
- Explore Exception Handling and design the Multithreading application in Java.
- Understand the concept of applets by how to create and run applets and Graphics programming by various classes in the graphics class.
- Interact with the concept of applets life cycle and creating with

supported methods in Java

- Event handling with the application of AWT in Java.
- Design and implement windows application using windows forms, control library
- Single and Multiple form-based and menu -based technique shows in a .Net applications using basic and advanced control.
- Implementation of GUI application with Form Controls and its Event.
- Handle controls in Forms (message Box, Input Box), Windows MDI forms and Controls (Textbox, Creating Multiline, Word Wrap textboxes)
- Connect database by using ADO.NET and manipulate the database
- ADO.net based database driven .Net application.
- Understand ADO .NET and develop database applications**.**

CO Practicals

- Working on the concepts of multi-threading by using thread class and implementing Run able interface.
- Find out the errors and exceptions, keywords that are used to manage exceptions and various ways in Java application.
- Develop Applet programs and manipulate the IO streams.
- Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT). Apply event handling on AWT with Java application.
- Understand the VB .NET environment and how to develop small programs.
- Develop menu-based program for text manipulation.

- Connect database by using ADO.NET and manipulate the database.
- Develop the applications using Data Grid for displaying records.

Program Outcome (PO) & Program Specific Outcome (PSO) M. Sc. Computer Science

Program Outcome

- PO-1. An ability to apply knowledge of computing and mathematics appropriate to the discipline.
- PO-2. An ability to identify, formulate, and develop solutions to computational challenges.
- PO-3. An ability to design, implement, and evaluate a computational system to meet desired needs within realistic constraints.
- PO-4. An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.
- PO-5. An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.
- PO-6. An ability to communicate and engage effectively with diverse stakeholders.
- PO-7. An ability to analyze impacts of computing on individuals, organizations, and society.
- PO-8. Recognition of the need for and ability to engage in continuing professional development.
- PO-9. An ability to use appropriate techniques, skills, and tools necessary for computing practice.
- PO-10. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computational systems in a way that demonstrates comprehension of

	the trade offs involved in design choices. ➢ PO-11. An ability to apply design and development principles in the construction of software systems of varying complexity.
PSO	➢ PSO1. Communicate computer science concepts, designs, and solutions effectively and professionally. ➢ PSO2. Apply knowledge of computing to produce effective designs and solutions for specific problems ➢ PSO3. Use software development tools, software systems, and modern computing platforms

M. Sc. I (Sem I)

CO I	➢ Apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions. ➢ Develop K-maps to minimize and optimize logic functions up to 5 Variables. ➢ Acquire knowledge about various logic gates and logic families and analyze basic circuits of these families. ➢ Design various combinational and sequential circuits such as encoders, decoders and counters using multiplexers, and flip – flops. ➢ Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits. ➢ Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors. Describe the architecture, bus structure and memory organization of 8086 as well as pin diagram,

	signal description, register organization. ➢ Explore techniques for interfacing I/O devices to the microprocessor 8086 Demonstrate programming using the various addressing of 8086 microprocessor.
CO II	➢ To Understanding .net, the C# environment ➢ To understand and implement framework base classes, user and program Interfaces. ➢ Be able to understand use of C# basics, Objects and Types, Inheritance, program structure; Literals, variables and data types, operators, Expressions, Decision making and branching, looping, methods in c# ➢ To develop, implement and creating Applications with C#. ➢ To understand and implement Operator overloading. ➢ To understand and be able to explain Multithreading in c# with Implementation. ➢ To develop or implement Data Access with .Net: ADO.net
CO III	➢ After completing this course, students will be able to: Allocate Main Memory based on various memory management techniques. ➢ Compare Memory allocation using Best fit, Worst fit, and first fit policies. Apply page replacement policies for dynamic memory management ➢ Schedule CPU time using scheduling algorithm for processors. ➢ Compare various device scheduling algorithms.
CO IV	➢ Understand computer network basics, network architecture, TCP/IP and OSI reference models.

- Identify and understand various techniques and modes of transmission
- Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme,
- To understand Routing; Internet Protocol: IP Addressing, IPv4: Classes and Packet format, DHCP; ICMP; Routing in the Internet: RIP, OSPF, BGP.
- Discuss the elements and protocols of transport layer
- Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS
- To understand Network Management Architecture; Internet Network Management Framework; SMI, MIB, SNMP.

CO Practicals

(Lab 1)

- Study of logic gates and realization of OR,AND,NOT AND XOR Functions using universal gates Design and implement combinational circuits like half adder/full adder, half subtractor /full subtractor, code converters, comparators, MUX / DEMUX
- Design and implement sequential circuits like flip-flops, counters and shift registers
- Demonstration of 8-bit DAC and 8-bit ADC Solve basic binary math operations using the instructions of microprocessor 8086.
- Apply programming knowledge using the capabilities of the stack, the program counter. Design, code and debugs
- Assembly Language programs to implement simple programs Execute a machine code program on the training boards.
- Student can understand internal structure and operations of OS along

	withvarious processes including threading, inter process communication and synchronization with I/O operations.
CO Practicals (Lab II)	➢ Understand code solutions and compile C# projects within the .NET framework ➢ Demonstrate knowledge of object-oriented concepts Design user experience and functional requirements C#.NET application. ➢ Construct classes, methods, and assessors, and instantiate objects Understand and implement string manipulation, events within .Net application environment. ➢ Identify and resolve problems (debug /trouble shoot) in C#.NET window based application Design and Implement database connectivity using ADO.NET in window based application Identify and resolve problems (debug /trouble shoot) in C#.NET window based application

M. Sc. I (Sem II)

CO I	➢ To learn graphics and animation on the web pages, using Java Applets. ➢ To learn and design a full set of Event driven UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings ➢ To learn Java Data Base Connectivity (JDBC) so as to retrieve and manipulate the information on any relational database through Java programs. ➢ To learn the server side programming using Servlets and JSP.

	➢ To learn Java Bean so as to make the reusable software components. ➢ To learn invocation of the remote methods in an application using RMI ➢ To learn the development of Enterprise based applications, using EJB: Stateful, Stateless and Entity Beans ➢ To make the students familiar with Struts frameworks, which gives the opportunity to reuse the codes for quick development ➢ To learn Hibernate for the mapping of Java classes and objects associations to the relational database tables
CO II	➢ After successfully completing this course, students will be able to know: ➢ Learn the notions of data structure, Abstract Data Type. ➢ Understand basic data structures such as arrays, linked lists, stacks and queues. ➢ To evaluate various methods of linked list formulation. Also explore different kinds of linked lists and their applications in day to day problem solving. ➢ To evaluate various formulation of queues. Also explore different kinds queues and their applications and implementations in simulations ➢ To learn Sorting: Insertion sort, merge sort, Heaps and heap sort, Quick sort, Linear sort, priority queue, order statistics, lower bounds for sorting. ➢ To learn Searching: Balanced tree, red-black tree, lower bounds for Searching. ➢ To learn Graph: representation and algorithms, Breadth-first search (BFS), Depth-first search (DFS), topological sorting, Shortest Paths,

	Single source shortest paths problem, Minimum spanning tree, topological ordering, sparse matrices, linked list implementation of graph and graph traversal. ➢ To explore hashing, and various implementations of searching and hashing algorithms.
CO III	➢ Learn the phases of software development LO2. LO3. LO4. LO5. ➢ Develop process models and process system models. ➢ Gather, understand, analyze and specify requirements, Analyze and translate a specification into a design, and then realize that design practically, using an appropriate Software engineering methodology. ➢ Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice ➢ Develop architectural diagram, and implement by following coding principles ➢ Able to use modern engineering tools necessary for software project Management, time management and software reuse. ➢ Apply testing strategies and handle software product maintenance issues.
CO IV	➢ Ability to understand Sets and their algebra, duality, power sets and partitions. Principle of Strong Mathematical Induction, set theory. ➢ Ability to analyze various binary relations characteristic function and Recursive functions. ➢ Ability of Counting, Algebraic Structures, Algebraic systems, and Solving cosets and Lagrange's theorem

- Ability to understand logical operators, Implications, Lattice as POSETs and properties,
- Lattice as algebraic systems, sublattices, Direct product and homomorphism, Special lattices, Boolean algebra
- Ability to model problems using Graphs , connectivity, Rooted trees, simple precedence grammars-syntax terminology, a view of parsing, notion and use of precedence relations, formal definition of precedence relations.
- To understand Turing machines and partial recursive functions.
- Ability to learn the notions of languages, finite state automata, phrase structure grammars, finite state machines.

CO V Understand the structure of compilers

- Understand the basic techniques used in compiler construction such as lexical analysis, top-down, bottom-up parsing, context-sensitive analysis, and intermediate code generation.
- Understand the Memory Allocation like Static and dynamic memory allocation, array allocation and access, allocation for strings, structure allocation.
- Understand the basic data structures used in compiler, Compilation of control structures: Control transfers, procedural calls, conditional execution, iteration control constructs Understand Error detection, indication and recovery. Compilation of I/O statements: Compilation of I/O list, compilation of FORMAT list, the I/O routine, file control.
- Understand Code optimization, program flow analysis, Global optimization, writing compilers.

CO

- To build software development skills using java programming for real

Practicals (Lab III)	world applications. ➢ To implement frontend and backend of an application. ➢ To implement classical problems using java programming. ➢ Read and make elementary modifications to Java programs that solve real-world problems. ➢ Validate input in a Java program.
CO Practicals (Lab IV)	➢ Able to prepare SRS document, design document, test cases and software configuration management and risk management related document. ➢ Apply various white box and black box testing techniques. ➢ Develop function oriented and object oriented software design using tools like rational rose. ➢ Able to perform unit testing and integration testing. ➢ Able to track the progress of a project using Openproj tool. ➢ Implement basic data structures such as arrays and linked list. ➢ Programs to demonstrate fundamental algorithmic problems including Tree Traversals, Graph traversals, and shortest paths. ➢ Implement various searching and sorting algorithms. ➢ Programs to demonstrate the implementation of various operations on stack and queue.

M. Sc. II (Sem III)

CO I	➢ Understand the basics of computer graphics, different graphics systems and applications of computer graphics.

	➢ Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis ➢ Use of geometric transformations on graphics objects and their application in composite form ➢ Extract scene with different clipping methods and its transformation to graphics display device. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. Render projected objects to naturalize the scene in 2D view and use of illumination models.
CO II	➢ Describe and Synthesise concepts of programming for networking, including, multithreading, delegate and event handling, remote files I/O and database connectivity. ➢ Develop Code for basic network and Internet protocols including sockets, stream and packet protocols such as TCP, UDP, HTTP, FTP and SMTP protocols for creating simple two tier client server applications. ➢ Program multi-tier client server computing systems with remote and web services protocols for creating distributed client server systems ➢ Design and develop specialized client server systems with better security, scalability, queuing, and optimal performance and bandwidth utilization; ➢ Program different network programming tools, network monitoring, tracking and analyzing advanced client server systems
CO III	➢ To provide hardware and software issues in modern distributed systems.

CO IV	➢ To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. ➢ To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed. ➢ To know about Shared Memory Techniques ➢ Have Sufficient knowledge about file access. ➢ Have knowledge of Synchronization and Deadlock. ➢ Understanding of the basic kinds of finite automata and their capabilities. ➢ Understanding of regular and context-free languages. ➢ Understanding of the key results in algorithmic complexity, computability and solvability of problems. ➢ Ability to describe and transform regular expressions and grammars. ➢ Using the Prolog language as an experimental tool for testing properties of basic computational structures. ➢ Understanding the key notions of computation, such as algorithm, computability, decidability, reducibility, and complexity, through problem solving. ➢ Understanding Natural Language
CO Practicals	➢ Demonstrate the use of ARFF files taking input and display the output of the files.
Lab V	➢ Implement the Preprocess and classify Customer dataset. ➢ Perform Preprocessing, Classification techniques on Agriculture dataset.

	➢ Preprocess and classify Weather dataset ➢ Perform Clustering and association techniques on Customer/agriculture dataset. ➢ Compare various Data Mining techniques available in WEKA ➢ Understand the basic concepts of computer graphics. ➢ Design scan conversion problems using C++ programming. ➢ Apply clipping and filling techniques for modifying an object. ➢ Understand the concepts of different type of geometric transformation of objects in 2D and 3D. ➢ Understand the practical implementation of modeling, rendering, viewing of objects in 2D
CO Practicals	➢ Design and Set up a client /server environment using LAN and WAN Scenarios.
Lab VI	➢ Design and build client server applications with network programming exposure. Understand basic networking concepts using sockets. ➢ Examine the techniques which are required to develop network application/ internet based application. ➢ Compare various application deployment mechanisms and the use of digital certificates ➢ Outline the prevention strategies for network attacks with at least one prevention technique providing in two or three tier environment.

M. Sc. II (Sem IV)

CO I	➢ Represent Knowledge using various knowledge representation schemes. ➢ Understand Artificial Neural Networks and its applications ➢ Understand the basic knowledge acquisition methods. ➢ Understand the theoretical base of the expert system and its development process. ➢ Differentiate between different knowledge representation techniques and describe methods of knowledge acquisition and extraction. ➢ Develop expert systems using various available tools ➢ Analyze the development process of expert system through various case studies
CO II	➢ Understand the basic concepts of algorithms and analyze the performance of algorithms. ➢ Discuss various algorithm design techniques for developing algorithms. ➢ Discuss various searching, sorting and graph traversal algorithms. ➢ Understand NP completeness and identify different NP complete problems. ➢ Discuss various advanced topics on algorithms.
CO III	➢ Describe network security services and mechanisms ➢ Understanding Breaking an Encryption Scheme, Types of Cryptographic Function, Respective Algorithms of cryptography,

	Cryptographic Authentication Protocols, ➢ Understanding Kerberos V4: Tickets, Kerberos V5: ASN.1, Names, Delegation of Rights, Ticket Lifetimes, Key Versions, Optimizations.. ➢ Various network security applications, IPSec, Firewall, IDS, Web security, Email security, and Malicious software etc. ➢ Understanding Firewalls
CO IV	➢ Understanding the basic principles of mobile communication systems AND Satellite Systems Understanding an analysis of mobile communications with the interpretation of the call prints, Wireless LAN: Infrared Versus Radio Transmission, Infrastructure and Adhoc Network. ➢ Understanding the basic principles of the modern mobile and wireless communication systems and Mobile Network Layer. ➢ Understanding the operation of mobile communications systems and their generation divisions Understanding Support for Mobility like File Systems, World Wide Web, Wireless Application Protocol, i-Mode, SyncML.
CO V	➢ Examine various types of images, intensity transformations and spatial filtering. ➢ Develop Fourier transform for image processing in frequency domain. Learn different techniques employed for the enhancement of images. Evaluate the methodologies for image segmentation, restoration etc Implement image process & analysis of algorithms ➢ Learn different causes for image degradation and overview of image restoration techniques. ➢ Understand the need for image compression and to learn the

	spatial and frequency domain techniques of image compression. ➢ Learn different feature extraction techniques for image analysis and recognition.
CO VI	➢ Have an ability to apply software testing knowledge and engineering methods. ➢ Understanding the software test outline to test cases, creating test cases, documentation short cuts, introduction to using tables and spreadsheet. ➢ Have an ability understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods. ➢ Create test strategies and plans, design test cases, prioritize and execute them. ➢ Able to develop the Testing Web Applications ➢ Manage incidents and risks within a project.
CO Practicals Lab (VII)	➢ Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,) Implement fundamentals of knowledge representation, inference and theorem proving using AI tools ➢ To implement advance learning techniques-search ➢ To demonstration to Expert System to solve various problems ➢ Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking. ➢ Able to implement Quick sort ,Merge sort algorithm, BFS and DFS algorithms

- Able to implement backtracking algorithm for the N-queens problem.
- Able to implement greedy algorithm for job sequencing with deadlines.
- Get awarded with Dijkstra's , Prim's algorithm , Kruskal's algorithm on spanning tree.
- Able to implement Floyd's algorithm for the all pairs shortest path problem.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Zoology

Course Outcomes (CO)

B. Sc. I (Sem I)

CO

- State the outline of animal classification of non-chordates
- Knowledge about protozonal human diseases.
- Describe the morphology, habit and habitat. Systematic position and various systems
- In Sycon and Metridium
- Describe the morphology, habit and habitat. Systematic position and various systems
- In Fasciola and Ascaris.
- Describe the morphology, habit and habitat. Systematic position and various systems
- In Leech and Cockroach.
- Describe the morphology, habit and habitat. Systematic position and various systems
- In Pila and Asterias.
- Describe the morphology, habit and habitat. Systematic position and various systems
- In Fasciola and Ascaris.
- Describe body organization and affinities of Balanoglossus.
- Explain Structure and importance of coral reefs.
- Explain Parasitic Adaptations in helminthes and larval forms of Non-chordates.
- List of ten invertebrate phyla

CO Practicals

- After successfully completing this course, students will be able to:
- State outline classification of non-Chordate.
- List of ten invertebrate phyla.
- Enlist the various animals belonging to different phyla.

- To know the structures of various organs of non-chordate animals.
- To understand the Anatomy of leech and cockroach.
- To prepare permanent slides

B. Sc. I (Sem II)

Subject- Cell and Developmental Biology

CO

- After successfully completing this course, students will be able to:
- Differentiate prokaryotic and Eukaryotic cells.
- Describe the structure and functions of Endoplasmic reticulum.
- Describe various Structural models of Plasma membrane with its function
- Describe the structure and functions of Golgi complex, Ribosome, Mitochondria and Lysosomes
- Explain the structure and functions of Nucleus, typical chromosomes and Giant chromosomes.
- Explain the cell division process and its significance.
- Describe the process of Gametogenesis.
- Explain the types and Mechanism of fertilization.
- Describe development up to Coelom formation in Amphioxus
- Explain development up to Gastrulation in frog and chick.
- Describe the development of extra embryonic membranes in chick
- Explain the various types of placenta in mammals.
- Describe parthenogenesis and regeneration in animals.
- Give elementary idea of Stem cells.

CO Practicals

- Use of Microscope.
- Prepare gram staining.

- To prepare slides of polytene chromosomes.
- To prepare slides of various stages of Mitosis and Meiosis.
- Identify the stages of Gametogenesis in rat
- Identify the different type's animal eggs.
- To explain the life cycle of Cockroach, housefly, mosquito and butterfly.
- To demonstrate chick development.
- To identify developmental stages of frog and chick.
- To know the structure of placenta in mammals.

B. Sc. II (Sem III)

Subject- Life and Diversity of Chordata and Concept of Evolution

CO

- To state the classification of chordata.
- Classify phylum Protochordates to Class-Mammalia
- Students acquires anatomical knowledge of Amphioxus, Scoliodon, Frog, Calotes and Pigeon
- Gain knowledge of anatomy of vertebrates from Protochordates to Class Mammalia
- Impact knowledge of evolutionary processes ex. Darwinism, Lamarkinism, Speciation
- Understand the co-relation among animal species.
- Understand the Human Evolution
- Gain knowledge and Understanding of protection of endangered species, biodiversity, environmental conservation processes and its importance.

CO

- To state the classification of Chordata.
- To understand the anatomy through video, Models , Photographs

Practicals	➢ Gain knowledge of bones of fowl and rabbit ➢ Gain knowledge of fossils and living fossils ➢ Study of evolution of beaks and leg of birds ➢ To know the histology of Amphioxus and frog.

B. Sc. II (Sem IV)

Subject- Advanced Genetics and Animal Ecology

CO	➢ Gain Mendelian and Non- Mendelian inheritance ➢ To understand theories of sex determination ➢ Understand Human Genetical Disorders ➢ Gain knowledge of Genetic Screening and prenatal diagnosis ➢ Gain knowledge of Abiotic and Biotic factor ➢ Understand different ecosystem and relationship between habit and ecological niche.
Co Practicals	➢ Recording of Mendelian Traits in Man ➢ Detection of Monohybrid and Dihybrid Cross ➢ To identify human Karyotype and Chromosomal syndrome from photo slide. ➢ To record human genetically traits. ➢ To Estimate of DO, Salinity, PH, free CO2, Calcium, Carbonates, Bicarbonates. ➢ To Prepare field Report. Food Web diagram and Identification of common Animals

B. Sc. III (Sem V)

Subject- Animal Physiology and Economic Zoology

CO

- Describe the Structure of respiratory organ.
- Explain the physiology of respiration and respiratory pigment.
- Neurophysiologic control of respiration.
- Describe blood circulation and its types.
- Explain the structure and mechanism of heart.
- Describe blood groups, blood coagulation, and factors.
- Explain the types and structure of muscles.
- Describe the physiology of muscle contraction.
- Explain the structure and types of neuron.
- Describe the neurotransmitter, synapse and synaptic transmission.
- Explain the hormones and their physiological role.
- Describe the reproductive cycle and hormonal control of reproduction.
- Explain the osmoregulation in aquatic and terrestrial animals.
- Describe the beneficial and harmful insects.
- Present status of aquaculture in India and fresh water fish culture.

CO Practicals

- Detection of blood groups.
- Estimation of hemoglobin percentage.
- RBC and WBC count.
- Preparation of haemain crystals.
- Measurement of blood pressure.
- To demonstrate action of salivary amylase on starch.
- To detect nitrogenous waste product.
- To explain the life cycle of honey bee, lac insect and silk moth.
- To identify the histological slides of major organs of respiratory, circulatory and nervous system.
- To know the locally available fishes.

B. Sc. III (Sem VI)

Subject- Molecular Biology and Biotechnology

CO

- To prove the genetic material by various experiment.
- Explain the chemical structure and types of DNA and RNA.
- Describe the semi-conservative replication of DNA.
- State the concept of genes.
- Describe the process of protein synthesis.
- Explain the gene regulation in *E.Coli.*
- Describe the theory, types and significance of mutation.
- Explain the DNA repair process.
- Describe the PCR and blotting technique.
- State the DNA finger printing.
- Explain the recombinant DNA technology and its practical application.
- Describe the immune system and its types.
- To state the humoral and cell mediated immunity.
- To know the ELIZA and RIA technique.

CO

- To state the scope and importance of Microtechnique.

Practicals

- To prepare he various fixative.
- To know the collection of various tissue.
- To prepare the alcoholic grades & Use and care of oven.
- To know the block making and trimming.
- Use and care of microtome & To prepare the various stains.
- To know the section cutting and staining technique.
- To know the camera Lucida and its use and drawings.
- To prepare the slide of mitochondria.
- To know the extraction of DNA.
- Explain the application of DNA finger printing

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Mathematics

Course Outcomes (CO)

B. Sc. (Sem I)

Subject- Algebra & Trigonometry (Paper I)

CO I	➢ Student will apply the De Moivers' theorem in finding the roots. ➢ Students will know the Definition of hyperbolic function and inverse hyperbolic function. Also the relation between hyperbolic functions and circular functions. ➢ Students can find real and imaginary parts of the circular and hyperbolic functions of complex
CO II	➢ Students are able to find the Gregory series, Euler's series, Machin's series, Rutherford's series, summation of series, series based upon sin x , cos x , sinh x , cosh x , exponential series, logarithmic series and series based upon Gregory series.
CO III	➢ Students get the knowledge of quaternions its Definition. They know the concept of Equality and addition, multiplication of quaternions, complex conjugate of a quaternion, norm, inverse. ➢ Students can find quaternion as a rotation operator, and its geometric interpretation. ➢ Students have knowledge of a special quaternion product, operator algorithm, quaternion to matrices.
CO IV	➢ After completion of the course students are able to Know the relations between the roots and coefficients and can find roots of the polynomial. ➢ Student will use the transformation of equations and solve the cubic equations using Cardon method, biquadratic equations.
CO V	➢ Student will be able tofind the rank of a matrix, row rank, column rank and find the eigenvalues, eigenvectors and the characteristic equation of a matrix.

	➢ Student will verify Cayley- Hamilton theorem and its application.

B. Sc. (Sem I)

Subject- Differential and Integral (Paper II)

CO I	➢ Student will understand the basic concept and definition of a limit of a function and continuity and the basic difference between them. ➢ Student will prove the properties of limits and Calculus continuity of functions and find the limit of the function and verify the continuity of the function. ➢ Student will verify types of discontinuities and problems based on it.
CO II	➢ Students will be able to familiar with the techniques finding the derivatives of any order using successive differentiation. ➢ Student will study and apply Leibnitz theorem for successive differentiation of multiplication of two different functions. ➢ Student will identify and apply the L'hospital's rule in case of indeterminate form of the limits.
CO III	➢ Student will verify Rolle's theorem, Lagrange's Mean Value Theorem, Cauchy's Mean value theorem and their appliction in solving problems. ➢ Student will know the Maclaurin's and Taylor series expansions and their applications in solving problems for finding their power series expansion.
CO IV	➢ Students will be able to develop knowledge of limit, continuity, differentiation of real valued function of two variables. ➢ Student will define homogenous functions and study Euler's

	theorem for finding the differential equations.
CO V	➢ Student will know the quadrature, rectification and have knowledge of methods and concepts of multiple integrals and their application ➢ Student will find reduction formulas for $\int sinnxdx, \int cosnxdx, and\ Walli\ '\ s\ Formula \int tannxdx, \int cotnxdx, \int secnxdx, \int cosecnxdx, \int sinnxcosmxdx.$ ➢ Student will know the quadrature, rectification and have knowledge ofmethods and concepts of multiple integrals and their application

B. Sc. I (Sem II)

Subject- Differential Equations (Paper III)

CO I	➢ Students will be able to determine degree and order of a ordinary differential equation. Solve linear differential equations and differential equations reducible to the linear form. ➢ Student will Verify and solve the exact differential equations. Study and solve differential equations of first order and higher degree using the methods differential equations solvable for p and y, differential equations in Clairaut's form. ➢ Student will Define and find the orthogonal trajectories.
CO II	➢ Students will be able to determine Second order linear differential equations with constant coefficients. ➢ Student will find the Complementary function for the homogeneous linear differential equation and Particular integral of the linear ordinary differential equations and Convert the equations reducible to homogeneous differential equations to find the primitive.
CO III	➢ Students will be able to study and apply the reduction of order, transformation of the equation by changing the dependent variable

	and independent variable. ➢ Student will Learn the normal form (removal of first order derivative) and Apply method of variation of parameters. ➢ Student will find the solution of Ordinary simultaneous differential equations.
CO IV	➢ Student will understand partial differential equations and find the solution of total partial differential equations of the first order or Pfaffian using various methods. ➢ Student will solve the Lagrange's method, some special types of equations which can be solved easily by methods other than the general method.
CO V	➢ Students will be able to solve Compatible differential equations, Use Charpit's general method of solution. ➢ Student will learn and find the solution of partial differential equations of second and higher orders. ➢ Students will Solve Homogeneous and nonhomogeneous equations with constant coefficients.

B. Sc. I (Sem II)

Subject- Vector Analysis (Paper IV)

CO I	➢ Students will be able to have knowledge of Scalar and vector product of three vectors. ➢ Student will define and solve the product of four vectors, vector differentiation and vector integration.
CO II	➢ Students will be able to have knowledge of the geometry of space

	curve t, n, b vectors, fundamental planes. ➢ Student will define and find the curvature, torsion and have knowledge Frenet-Serret formulae.
CO III	➢ Students will be able to define and find the Gradient, divergence and Curl, directional derivative, line integral (existence and evaluation). ➢ Student will Find and evaluate the work done and prove and apply the Greens theorem.
CO IV	➢ Students will be able to solve the problems of lines in three dimensions, planes of different forms of spheres. ➢ Student will have the knowledge different forms of spheres. Section of a sphere by a plane and their geometry by using their algebraic equations. ➢ Student will have the knowledge of intersection of sphere and a line. Condition of orthogonally of two intersecting spheres
CO V	➢ Students will be able to study the equation of cone with guiding curve, equation of cone with vertex and origin, Equation of right circular cylinder and its geometry.

B. Sc. II (Sem III)

Subject- Advanced Calculus (Paper V)

CO I	➢ Student will be able to understand knowledge and proofs of theorems on limits of sequences, bounded and monotonic sequences, Knowledge and proofs of Cauchy's convergence criterion.
CO II	➢ Students will be able to knowledge of Series of non negative terms, convergence of geometric series and the series $\sum 1\ np$ Comparison tests.

	➢ Student will use of Cauchy's integral test, Ratio test, Root test and understand the concept of absolute Convergent, conditional convergent, Leibnitz rule, Abel's test, Dirichlet's test
CO III	➢ Students will be able to understand Limit and continuity of functions of two variables, Algebra of limits and continuity, Taylor's theorem for function of two variables.
CO IV	➢ Students will be able to define and find the maxima and minima of functions of two variables. ➢ Student will Apply the Lagrange's multipliers method to find the maxima and minima of the functions of two variables. Evaluate the Jacobian of the function of two variables.
CO V	➢ Students will be able to define and evaluate the double integrals. ➢ Student will Change the order of integration in double integrals. Define and evaluate the triple integrals. Prove and apply the Guass and Stoke's theorem.

B. Sc. II (Sem III)

Subject- Elementary Number Theory (Paper VI)

CO I	➢ Students will be able to understand the concept and definition of the divisibility and their properties and results. ➢ Student will Prove division algorithm and its application in finding the results on greatest common divisor, Methods of finding the gcd of more than two integers. ➢ Student will define and find the least common multiple and its results, Knowledge of Euclidean algorithm and its applications.

	➢ Student will Find the relation between the gdc and lcmand find the lcm of more than two integers.
CO II	➢ After completing this course students will be able to define and find Prime numbers. ➢ Prove and apply the fundamental theorem of arithmetic or Unique factorization theorem. ➢ Student will define and Find Fermat numbers and understand the concept of linear Diophantine equations.
CO III	➢ Students will be able to define the Congruence and its properties. ➢ Student will have the knowledge of special divisibility test, linear congruences. Proof and application of Chinese remainder theorem.
CO IV	➢ Students will be able to define and understand the concept of Arithmetic functions. ➢ Student will Prove the apply Euler's theorem. Define and find the σ and τ functions, Mobius μ function.
CO V	➢ Students will be able to define and find the Primitive roots, primitive roots for prime, polynomial congruences, the congruence $x\ 2 \equiv (mod\ p)$, general quadratic congruence, quadratic residues.

B. Sc. II (Sem IV)

Subject- Modern Algebra (paper VII)

CO I	➢ Students will be able to define and verify a group with examples, properties of a group, subgroups, cyclic groups, order of a generator of cyclic group, permutation groups even & odd permutations rings)

CO II	➢ Students will be able to define and find Cosets, Knowledge of Statement and proof of Lagrange's theorem, Definition and Properties of normal subgroups, different characterization of normal subgroups, algebra of normal subgroups, quotient group.
CO III	➢ Students will be able to define & verify Homomorphism, homomorphic image, kernel of homomorphism, isomorphism of a group. ➢ Student will State and prove Fundamental theorem on homomorphism of a group, natural homomorphism, second isomorphism theorem, third isomorphism theorem. And their applications.
CO IV	➢ Students will be able to define Rings, Integral domain and field and their results with examples. ➢ Student will define and verify the Ring Homomorphism, homomorphic image, kernel of homomorphism, isomorphism of a group, Fundamental theorem on homomorphism of a group, natural homomorphism, second isomorphism theorem, third isomorphism theorem.
CO V	➢ Students will be able to define and verify left ideal, right ideal, examples, algebra of ideals, prime ideal, maximal ideal, principle ideal, quotient ring, ring homomorphism.

B. Sc. II (Sem IV)

Subject- Classical Mechanics (Paper VIII)

CO I	➢ Students will be able to understand the concept of Constraints,

	generalized coordinates. ➢ Student will State and prove D'Alembert's principle and to derive Lagrange's equations of motion from it. Also construct the Lagrangian find to derive the Lagrange's equations of motion.
CO II	➢ Students will be able to understand the concept of central force field, tyes of central force. Equivalent one body problem. ➢ Student will define Areal velocity, central orbit, ➢ Student will state and prove Virial theorem, Kepler's laws of motion
CO III	➢ Students will be able to define functional, difference between function and functional ➢ Student will define and find the extremals, Euler's differential equation, solution of Brachistochrone problem. ➢ Student will understands invariance of Euler's equation. ➢ Derive and use Euler-Poisson equations for a functional dependent on higher derivatives, Euler-Ostrogradsky equations.
CO IV	➢ Students will be able to define Hamiltonian of the system. ➢ Student will understand the concept of Hamilton's principle for conservative and nonconservative system. ➢ Student will derive Hamilton's equations and Lagrange's equations for nonholonomic conservative system. ➢ Follow Routh's procedure and least action principle.
CO V	➢ Students will be able to find generalized co-ordinates of a rigid body, Eulerian angles, Euler's theorem, finite rotations, infinitesimal rotations.

B. Sc. III (SemV)

Subject- Mathematical Analysis (IX)

CO I	➢ Student will be able to define Riemann Integral and its properties. Integrability of continuous and monotonic functions. ➢ Student will to prove the fundamental theorem of integral calculus, mean value theorem of integral calculus. And to solve the examples.
CO II	➢ Students will be able to have the knowledge of improper integrals and their convergence, comparison and limit tests. ➢ Student will Learn definitions and properties of Beta and gamma functions and relation between them.
CO III	➢ Students develop knowledge in the limits, Continuity and differentiability of complex function, analytic function, Cauchy-Riemann equations, harmonic and conjugate functions, Milne-Thomson method.
CO IV	➢ Students will have the knowledge of Elementary function, mapping by elementary function, Mobius transformation, fixed point, cross ratio, inverse and critical points, conformal mapping.
CO V	➢ Students will be be able to learn basic ideas of analysis. ➢ Student will define and verify the examples of metric spaces, neighbourhood, limit point, interior point, open and closed sets, Cauchy sequences, completeness.

B. Sc. III (SemV)

Subject- Mathematical Methods (Paper X)

CO I	Students will be able to define and solve Legendre's equation, Legendre's polynomials, generating function of (x) , recurrence formulae for $Pn(x)$, Methods) Legendre's polynomial, Rodrigue's formula. orthogonality of Legendre's polynomial, Rodrigue's formula.
CO II	Bessel's equation, solution of Bessel's equation, generating function for $(\boldsymbol{x})$, Recurrence formulae for $(\boldsymbol{x})$. Strun-Liouville boundary value problem Students will be able to define and evaluate the Bessel's equation, solution of Bessel's equation, generating function for (x) , Recurrence formulae for $Jn(x)$. Strun-Liouville boundary value problem.
CO III	Students will be able to apply the fundamental concepts of Fourier series, Fourier series for odd and even functions, half-range Fourier sine series and half-range Fourier cosine series. Student will find the Fourier Cosine and Fourier sine series to find the series representation of irrational numbers.
CO IV	Students will be able to learn the method and properties of Laplace transform of some elementary functions, existence of Laplace transform. properties of Laplace transform. Laplace transform of derivatives and integrals, multiplications of $t\ n$ and division by t. Student will define inverse Laplace transform and their properties, convolution property, application of Laplace transform in solving ordinary and partial differential equations.
CO V	Students will be able to apply the fundamental concepts of Finte Fourier transform, Fourier Sine Transform, Fourier Cosine Transform and Evaluate Improper Integrals. Infinite Fourier transform, infinite Fourier sine transform and cosine transform, properties of Fourier transform application to partial differential equations.

B. Sc. III (Sem VI)

Subject- Linear Algebra (Paper XI)

CO I	➢ Student will be able to use the concept of vector spaces ➢ Student will define subspaces and proves using the theorems on it. ➢ Student will define sum and direct sum of subspaces, prove theorms on it and solve the examples. ➢ Student will define linear span, linear dependence, independence and their basic properties. ➢ Student will define and find the basis of a finite dimensional vector spaces, prove existence theorem for bases, invariance of the number of elements of a basis set, dimension.
CO II	➢ Student will be able to apply the properties of linear transformations to linearity of transformations, kernel & rank of linear transformations using rank– nullity theorem, inverse transformations to solve the problems of matrix transformations, change of basis.
CO III	➢ Student will be able to define the Dual space, bidual space. ➢ Student will state and prove the theorems on natural isomorphism and define the adjoint of a linear transformation, Eigen values and eigenvectors of a linear transformation and sole examples on it.
CO IV	➢ Student will be able to use the concept of inner product spaces to find norm of vectors, distance between vectors, check the orthogonality of vectors, to find orthogonal and orthonormal basis. ➢ Student will state and prove Cauchy-Schwarz inequality, orthogonal vectors, orthogonal complements, orthonormal sets and bases, Bessel's inequality for finite dimensional spaces, Gram Schmidt orthogonalisation process.

CO V	➢ Students will be able to Modules, submodules, quotient modules, homomorphism and isomorphism theorems.

B. Sc. III (Sem VI)

Subject- Special Theory of Relativity (Paper XII)

CO I	Students will be able to understands Newton's laws of motion and their application and have the knowledge of Inertial frames, speed of light and Galilean relativity, relative character of space and time, postulates of special theory of relativity, Lorentz transformation and its geometrical interpretation, group properties of transformation.
CO II	Students will be able to understand the concept of Composition of parallel velocities, length contraction, time dilation, transformation equation for components of velocities and acceleration of a particle, Lorentz contraction factor. The thermodynamics of moving systems : The two laws of thermodynamics for a moving system, the Lorentz transformation for thermodynamics quantities a) volume and pressure b) energy c) work d) heat e) entropy f) temperature
CO III	Students will be able to understand the concept of Four dimensional Minkowskian space-time of relativity , time like and space like intervals , proper time , world line, four vectors and tensors in Minkowskian space-time ,past, present and future null cone ,basic tensors, covariant, contravariant, mixed , operations on tensors, outer product, inner product, quotient law.
CO IV	Students will be able to understand Variation of mass velocity, equivalence of mass and energy, transformation equation for mass, momentum and energy, relativistic force and transformation equations for its components, relativistic Lagrangian and Hamiltonian, the energy momentum tensor.

CO V	Students get the knowledge of electromagnetic theory mathematically. They will study Maxwell's equations of electromagnetic theory in vacuum, propagation of electric and magnetic field strengths, scalar and vector potential, transformation of electromagnetic four potential vector, transformation of charged density and current density, Lagrangian for a charged particle in electromagnetic field, the force on a moving charged- Lorentz force, Gauge transformation, four dimensional formulation of the theory, Maxwell's equation in tensor form, transformation for electric and magnetic field strength, energy momentum tensor of the electromagnetic field. component of Tij in term of electric and magnetic strength.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Chemistry

Course Outcomes (CO)

B. Sc. I (Sem I)

PO	PO-1. Demostrate, solve and understanding of major concepts in all disciplines of chemistry.
	PO-2. Solve the problems and also think methodically, independently and draw a logical conclusion.
	PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
	PO-4. Create an awareness of the impact of chemistry on the environment, society and development outside the scientific community
	PO-5. Find out the green route for chemical reactions for sustainable development.
	PO-6. To inculcate the scientific temperament in the students and outside the scientific community.
	PO-7. Use modern techniques, decent equipments and chemistry softwares.
PSO	PSO-1 Gain the knowledge of chemistry through theory and practicals.
	PSO-2 To explain nomenclature, stereochemistry, structures, reactivity and mechanism of chemical reactions.
	PSO-3 Identify chemical formulae and solve numerical problems.
	PSO-4 Use modern chemical tools, models, chem-draw, charts and equipments.
	PSO-5 Know structure activity relationship.
	PSO-6 Understand good laboratory practices and safety
	PSO-7 Develop research oriented skills.
	PSO-8 Make aware and handle the sophisticated instruments, equipments.

B. Sc. I (Sem I)

CO	➢ Different periodic properties of elements. ➢ Periodic trends of atomic and ionic radii, Ionization energy, electron affinity and electonegativity. ➢ Definition of ionic bonding, Factors affecting on ionic bond formation, Born-Lande equation to calculate Lattice energy, Born Haber cycle to determine lattice energy, Solvation and salvation energy. ➢ S block elements and P block elements ➢ Inductive effect, Electromeric effect, Resonance effect, Hyoerconjugation. ➢ Reactive intermediates Carbocations, Carbanions and free radicals. ➢ Aliphatic Hydrocarbons – Alkanes, Alkenes, Alkynes and Alkadienes ➢ Aromatic Hydrocarbons – structure of benzene, Reactivity of benzene and orientation of benzene. ➢ Thermodynamics – Adiabatic and Isothermal process, Statement of First law of thermodynamics, Need of Second law of thermodynamics. ➢ Concept of entropy, Physical significance of entropy, entropy of fusion, sublimation, vapourisation, transition and its calculation. ➢ Gaseous state – Postulates of Kinetic theory of gases, RMS, average and Most probable Velocity. ➢ Phase Rule – Statement of Phase rule, explanation of phase rule, ➢ Number of components and degree of freedom, Applications of Phase rule towater and Sulfur dioxide.
CO Practicals	➢ Detection of Acidic and Basic radicals from given inorganic mixture. ➢ Preparation of acetamide, benzanilide, Phenyl azo dye, tribromoaniline, benzoic acid.

B. Sc. I (Sem II)

CO	➢ Understand the concept of polarisation and Fajans rule with its

application.

- Describe the covalent bond and hybridisation and its types.
- Discuss the concept of acids and bases, classify hard and soft acids.
- Apply Pearsons HSAB or SHAB principle to acids and bases.
- Compare the study of p-block elements of group 16 and 17 with reference to different periodic properties.
- Interhalogen compounds, their structure and properties and introduction of Fluorocarbons.
- Study noble gases, compounds of noble gases with their structure and bonding.
- Discuss non-aqueous solvent, water as Universal solvent with different parameters. Liquid ammonia as solvent with its merits and de-merits.
- Explain different methods of preparations of alkyl and aryl halides with different chemical reactions and comparison of reactivity. Benzyne intermediate mechanism.
- Study alcohols Methods of preparation, reactions & uses of dihydric alcohol.
- Pinacol-pinacolone re-arrangement mechanism.
- Co-relate and study phenols, ethers and epoxide. Their methods of preparation with specific name reactions-like Williamsons synthesis, Fries-rearrangement, Kolbe's reaction.Ring opening reaction of epoxides.
- Understand electrical and magnetic properties with their application.
- Study the types of magnetic properties.
- Study Gouy's balance method. Application of magnetic moment for identification of molecular structure with different numericals .
- Visualise and discuss the concept of chemical kinetics.
- Study terms involved in it. Half-life period, order of reaction with

examples. Determination of order of reaction using different methods like- vant-Hoff's method, Ostwald's method.

- Activation energy and Arrhenius equation with numericals.

CO Practicals

- Systematic analysis of organicompound under following heads:
- Preliminary test, element detection, fuctional group, melting /boiling point and preparation of derivative with its melting point.
- Determination of surface tension by stalagmometer.
- Determination of coefficient of Viscosity of unkown liquid by Ostwald's Viscometer method.
- Comparison of cleaning power of detergents sample by stalagmometer.
- Determination of parachor value of $-CH_2-$ group by stalagmometer.
- Determination of heat of solution of KNO_3 solution.

B. Sc. II (Sem III)

CO

- Molecular orbital theory, Concept of bond order, MO structure of homonuclear diatomic molecul, Comparison of VB and MO theory.
- Free electron theory & properties of metals, Resonance theory of metals
- Various rules under VSEPR theory to explain molecular geometry
- Volumetric analysis, Molarity,Normality, Types of acid & base titration
- General principles involved in redox titration, Iodometric estimation of Cu(II)
- Theoretical principles underlying various steps involved in gravimetric analysis, Estimation of barium as barium sulphate
- Preparation of acetaldehyde, benzaldehyde, acetone, acetophenone, structure of carbonyl group, reaction of aldehyde and ketones
- Structure and reactivity of carboxylic group, Preparation of oxalic acid, Lactic acid, Benzoic acid and their reaction.

- Element of symmetry, chirality, asymmetric carbon atom, enantiomers and diasteriomers.
- Cis-trans and E-Z nomenclature, Methods of structure determination.
- Bayer strain theory, stability of cycloalkanes, conformational isomers
- Gibbs and Helmholtzs free energy function, partial molal function, Gibbs- Duhem equation.
- Nerst distribution law and its applications, Phase transition-clausis-clyperson equation.
- Surface tension and applications of surface tension, Viscosity and its applications
- Conductance of electrolyte solution, Conductometric titration and its application, Determinaion of dissociation constant of weak electrolyte.

CO Practicals

- Experiments related toVolumetric Analysis such as neutralizing capacity of antacid, the strength of oxalic acid, FAS, K2Cr2O7, Percentage purity of FAS, Estimation of copper by iodometric titration.
- Experiments related to Gravimetric analysis such as Estimation of Barium, Nickel, Iron.
- Physical chemistry experiments such as determine refractive index, consulate temperature for phenol water system, Transition temperature of MnCl2.4H2O, Kinetics of hydrolysis of methyl acetate, kinetics of saponification of ethyl acetate, determine partition coefficient of benzoic acid, Iodine, determine so lubility of benzoic acid at different temperature and heat of solution.

B. Sc. II (Sem IV)

CO

- Know characteristics of transition elements, general properties of transition elements with special reference to group trend, Comparison of 3d series element with 4d and 5d series element.

- Know principle involve and factors affection in extraction of elements, Apply thermodynamic concept to reduction process (Ellingham diagram).
- Know special properties of lanthanides, Learn electronic configuration & oxidation state of Actinides, comparison of Lanthanides & Actinides.
- Know general properties of metallurgy.
- Know orbital picture, synthesis and reactions of naphthalene (Electrophilic Substitution), Preparation of napthal and napthalamine.
- Know synthesis and properties of malonic ester, Acetoacetic ester.
- Know constitution, structure of glucose and fructose, Epimerisation, Conversion of glucose to fructose.
- Know preparation of nitrobenzene, Reduction reaction of nitrobenzene in acidic, basic and neutral medium.
- Know basicity of amine compounds, Preparation and properties of aniline, Hoffmann exhaustive methylation and its mechanism.
- Know preparation of benzene dizonium chloride and its synthetic applications.
- Know classification, synthesis and properties of proteins.
- Describe colligative properties of dilute solutions with respect to elevation of boiling point, depression in freezing point, Explain abnormal behaviour of solution, Van't Hoff's factors (i), Determination of degree of dissociation and association from Van't Hoff's factors and to solve the numericals.
- Know type of symmetry, Laws of symmetry, Weiss and Miller indices of lattice planes, Calculation of h,k,l, Bravesis lattice of SCC, BCC, FCC, Bragg's law, Method of determination of orbital structure of NaCl and KCl and to solve the numericals.

Co
- Employ scientific knowledge for separation of binary mixture of Cu2+

Practicals	and Ni2+ ions by paper chromatography and determination of Rf value. ➢ Employ scientific knowledge for estimation of Zn2+ ion by complexometric titration. ➢ Employ scientific knowledge for determination of strength of unknown calcium salt solution by complexometric titration. ➢ Employ scientific knowledge for estimation of hardness of water by complexometric titration. ➢ Use modern technique for estimation of Cu2+ ion in CuSO4 sample solution by spectrophotometry. ➢ Employ scientific knowledge and good laboratory practice for isolation of casein from milk. ➢ Employ scientific knowledge and good laboratory practice for estimation of glucose. ➢ Employ scientific knowledge and good laboratory practice for estimation of acetamide. ➢ Employ scientific knowledge for determination of equivalent weight of organic acid.

B. Sc. III (Sem V)

CO	➢ After successfully completing this course, students will be able to know: ➢ Basic terms involve in coordination chemistry, Werner's theory. ➢ Nomenclature and isomerism in coordination compounds, Structure and bonding in complexes of 3d series elements. ➢ Definition, classification and application of chelates. ➢ Crystal field theory, Crystal field splitting, concept of CFSE, High spin and low spin complexes. ➢ Electronic spectra of transition metal complexes, Calculation of ground

term, Orgeldiagram of d1 and d9 complexes, Electronic spectrum of [Ti (H2O) 6]3+.

- Stability of complexes, Thermodynamic and Kinetic stability.
- Orbital picture and substitution reaction of pyrrole and pyridine,Chemical reaction and orientation.
- Method of preparation and synthetic application of organomagnesium, organolithium and organozinc compounds.
- Retrosynthetic analysis and applications.
- Polymers, Dyes, Drugs and Pesticides.
- Quantum mechanics, Plank quantum theory, Photoelectric effect, Compton effect, de Broglie hypothesis, Heisenberg's uncertainty principle.
- Classical wave equation, Derivation of time independent Schrodinger wave equation, well behaved wave function.
- Application of Schrodinger wave equation, Concept of atomic orbital.
- .Molecular spectroscopy, Energy level diagram of molecule, Conditions and selection rules for rotational, vibrational and Raman spectrum.
- Pure rotational and vibrational Raman spectrum of diatomic molecule.

CO Practicals

- After successfully completing this course, student will able to know:
- Preparation of tetraminecopper (II) sulphate, hexamine nickel (II) chloride, potassium trioxalatoaluminate (III), Prussian blue, chrome alum, sodium thiosulphate and dithionite, cuprous chloride.
- Estimation of acetamide, glucose, formaldehyde, nitro group, protein.
- Qualitative separation of mixture of dyes using TLC/ Paper chromatography.
- Demonstration of Steam Distillation.
- Conductometric titration of mixture of strong and weak acid against a strong base.

- Determination of dissociation constant of weak acid by conductometry.
- pH metric titration of strong acid against a strong base by computer simulation.
- Potentiometric titration of strong acid against strong base.
- Verification of Lambert- Beer Law using $KMnO_4$/ $K_2Cr_2O_7$ solution.

B. Sc. III (Sem VI)

CO

- Thermodynamic and kinetic stability of complexes and different factors affecting the stability of complexes
- Two types of substitution reactions shown by coordination compounds with their mechanisms viz. SN1 dissociative mechanism and SN2 associative mechanism
- Labile and inert complexes and the various factors affecting the lability of complexes
- Various regions of electromagnetic spectrum, phenomenon of coloration of complexes and laws of light absorption,
- Principle and applications of spectrometer, colorimeter and paper chromatography
- Metal carbonyls, Effective atomic numbers (EAN) rule, structure of metal carbonyls on the basis of VBT, concept of synergic bonding structure and bonding in silicon polymers, polyphosphazenes, role of bioinorganic molecules or trace elements in biological system
- Principle, instrumentation, solvent and application of electronic spectroscopy and IR spectroscopy in elucidation of unknown organic compound
- Principle, instrumentation and application of 1H-NMR spectroscopy and mass-spectrometry in structural elucidation of given organic molecules
- Introduction to elementary quantum mechanics involving Planck's

	quantum theory , Heisenberg's Uncertainty Principle, de Broglie hypothesis, Photoelectric effect, Compton's effect, Schrodinger wave equation, wave function and concept of atomic orbitals ➢ Principle and application of pH-metry using different electrodes and about potentiometric titration ➢ Nuclear models, Meson theory, nuclear fission and nuclear fusion reactions, Q-value and application of radioisotopes foe human welfare
CO Practicals	➢ Estimation of organic compounds like glycine, formaldehyde, ascorbic acid, phenol from the given solution skillfully ➢ Handling of instruments conductometer, potentiometer skillfully and performed practicals by using this instruments.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Botany

Course Outcomes (CO)

B. Sc. I (Sem I)

Subject- Diversity & Applications of Microbes & Cryptogams

CO I	➢ Understand the diversity of microbes and plants (cryptogams). ➢ Understand different microbe's structure & their role in different areas. ➢ Understand the diversification of plant on the basis of Habitat, forms, nutrition's and ecological adaptations.
CO II	➢ Understand the classify algae up to classes. ➢ Understand the different classes of algae on the basis of habitat, thallus, pigmentation, reserve food and reproduction.
CO III	➢ Understand the classification of fungi by Ainsworth. ➢ Understand the different classes of fungi on the basis of their morphology and reproduction. ➢ Understand the different forms of lichens and their importance.
CO IV	➢ Understand the classification of bryophyte. ➢ Understand the different Bryophytic forms on the basis of thallus organisation i.e. *Marchantia* and *Funaria*. ➢ Understand the evolution in Bryophyta and affinity to Pteridophyta. ➢ Learn about some Indian bryologist.
CO V	➢ Understand about the first vascular plant i.e. pteridophyta. ➢ Understand the classification of pteridophyta. ➢ Understand the different examples of pteridophyta i.e. *Equisetum* and *Marsilea.* ➢ Understand about the evolution of stele and heterospory and seed habit in pteridophytes.
CO VI	➢ Understand the applications of microbes and their economic importance in different areas.

	➢ Understand the plant diseases by different microbes i.e. Fungal diseases, viral diseases and Bacterial diseases. ➢ Understand the importance of cryptogam's i.e.Bryophyta.

B. Sc. I (Sem II)

Subject- Gymnosperm, Morphology of Angiosperms and Utilization of Plants

CO I	➢ Understand the process of fossilization and types of fossils. ➢ Understand the geological Time Scale and fossils of of gymnosperm.
CO II	➢ Understand the classification of gymnosperm. ➢ Learn about the gymnospermic plant i.e. *Gnetum* and *Pinus* by studying morphology anatomy and life cycle. ➢ Understand the affinity of gymnosperm to pteridophytes and angiosperm. ➢ Understand the economic importance of gymnosperm.
CO III	➢ Understand the morphology of plant on basis of root, stem and leaves. ➢ Understanding diversity of plant i.e. annual plant biannual plant and perennial plant. ➢ Understand the different morphological parts of the plants their types and characteristics.
CO IV	➢ Understand the types of inflorescence. ➢ Understand the types of flower, structures their parts. ➢ Understand the placentation in plant and types of pollination.
CO V	➢ Understand the types of fruit. ➢ Understand the utilisation of plants i.e. the food plants , fibre plants

	and oil yielding plants.
CO VI	➢ Understand the about spices and their importance. ➢ Understand the different medicinal plants with their medicinal uses and their characters.

B. Sc. II (Sem III)

Subject- Angiosperm Systematics, Anatomy & Embryology

CO I	➢ Understand the origin and evolution of angiosperm with different theories. ➢ Understanding Botanical nomenclature and its principles,rules ,taxonomic rank, type concept and valid Publication. ➢ Understand the herbarium with its techniques, significance and examples. ➢ Understand concept of biodiversity and its conservation i.e. ex situ conservation and in situ conservation.
CO II	➢ Understand the Angiosperm classification system that is Bentham and hooker and englers and prantles. ➢ Understand the taxonomic studies of family Malvaceae, Brassicaceae leguminaceae and Apiaceae. ➢ Understand the systematic studies and importance of Asteraceae, Asclepidiaceae, Apocynaceae, Solanaceae, verbanaceae, lamiacae euphorbiaceae, liliaceae, and poaceae.
CO III	➢ Understand the anatomy of plant. ➢ Understand the types of plant tissues i.e. simple tissues and complex tissues. ➢ Understand the anatomy of stem with their characteristics rings,

	sapwood and heart wood. ➢ Understand and roots systems, monocot and dicot root with secondary growth in dicot root.
CO IV	➢ Understand the embryology. ➢ Understand the development of male gametophyte. ➢ Understand the development of female gametophytes and its types. ➢ Understand the double fertilization process and triple fusion. ➢ Understand the classification of embryo and endosperm types and its significance.
CO V	➢ Understand the anatomy of stem i.e. monocot and Dicot stem. ➢ Understand the abnormal primary growth in boerhaavia stem and secondary growth in bignonia and dracenna stem. ➢ Understand the anatomy of leaf with respect to nerium leaf and Maize leaf.

B. Sc. II (Sem IV)

Subject- Cell Biology, Genetics & Biochemistry

CO I	➢ Understand the concept of cell and about the prokaryotic and Eukaryotic cells. ➢ Understand structures and functions of cell wall. ➢ Understand the structures and functions of plasma membrane with their models. ➢ Understand the structure and functions of nucleus. ➢ Understand the structure and functions of chloroplast.
CO II	➢ Understand the structure and functions of different cellular organelles i.e. Golgi Complex ,vacuole, ribosome, Peroxisomes and

	mitochondria. ➢ Understand the cell cycle with mitosis and meiosis.
CO III	➢ Understand the structure of chromosome with its types and their components. ➢ Understand the chromosomal aberrations structural and numerical chromosomal aberrations.
CO IV	➢ Understand the mendel's laws i.e. law of dominance, law of segregation and law of independent assortment. ➢ Understand the interaction of genes i.e. complementary, supplementary and epistasis gene interaction. ➢ Learn the problem solving on the mendelism and interactions of genes.
CO V	➢ Understand the linkage of genes its types with their theories. ➢ Understand the crossing over concept its types and theories. ➢ Understand the concept of mutation with spontaneous mutation and induced mutation.
CO VI	➢ Understand the nomenclature of enzymes. ➢ Learn the characters of enzymes. ➢ Understand the concept of holoenzymes, coenzyme and cofactor. ➢ Understand the mechanism and action of enzymes. ➢ Understand the structure and functions of carbohydrate i.e. monosaccharide, disaccharide and polysaccharide.

B. Sc. III (Sem V)

Subject- Plant Physiology & Ecology

CO I	➢ Understand the plant water relationship and process of imbibition, diffusion, osmosis and plasmolysis.

	➢ Understand the absorption of water by active and passive transport. ➢ Understand the concept of ascent of sap by root pressure and transpiration pull theory. ➢ Understand the process of transpiration with its types, mechanism and significance. ➢ Understand the mineral uptake by active process by Carriers and by passive process by Ion exchange.
CO II	➢ Understand the concept of photosynthesis their mechanism and process with light reaction and dark reaction. ➢ Understand the concept of respiration in mitochondria its types and with glycolysis, kreb cycle and electron transport chain.
CO III	➢ Understand the nitrogen metabolism with role of Nitrogen, nitrogen fixation by symbiotic and non-symbiotic process. ➢ Understand the concept of growth in plants by phases of growth, growth curve, geological role of growth hormones like Auxin, gibberellin cytokinins, Absasic acid and Ethylene. ➢ Understand the concept of senescence and Abscission.
CO IV	➢ Understand the concept of photoperiodism, concept of florigen and role of phytochrome. ➢ Understand the concept of vernalization and its significance. ➢ Understand Movement in plants i.e. phototrophic, Geotropic, epinasty, hyponasty and seismonasty movement. ➢ Understand the stress physiology in plant- types of stress, water and salinity stress.
CO V	➢ Understand the concept of ecology ,environment and scope of ecology. ➢ Understand ecological factors i.e. light, temperature and water. ➢ Understand the atmosphere and its composition.

	➢ Understand the Edaphic factors, process of soil formation, soil profile, soil biota and their role. ➢ Understand the ecological adaptation morphological and Anatomical in hydrophytes and xerophytes.
CO VI	➢ Understand the concept of ecosystem, structure and functions, food chain, food web concept and energy flow model. ➢ Understand the population Ecology, natality and mortality concept and characteristics of community like frequency, density and abundance. ➢ Understand the concept of ecological succession i.e. Hydrosphere and Xerosphere. ➢ Understand the types of ecosystem i.e.Pond ecosystem and desert ecosystem.

B. Sc. III (Sem VI)

Subject- Molecular Biology & Biotechnology

CO I	➢ Understand the chemical composition of DNA and double helical model of DNA. ➢ Understand the DNA replication in eukaryotes. ➢ Understand the historical account of DNA & genetic material by Griffith & Chase experiment. Understand the packaging of DNA. ➢ Understand the Satellite, repetitive DNA and transposable elements.
CO II	➢ Understand the concept of gene and their structure. ➢ Understand the expression of gene, Central dogma, types of RNA, genetic code and ribosomes. ➢ Understand the concept of transcription in eukaryotes, mechanism and

	RNA processing. ➢ Understand the translation process in eukaryotes. ➢ Understand the concept of endo-membranous system i.e. flow of peptide.
CO III	➢ Understand the regulation of gene expression in prokaryotes, concept of Operon ex. Lac Operon. ➢ Understand the regulation of gene in eukaryotes, Britton Davidson model. ➢ Understanding protein folding mechanism and structure of proteins. ➢ Understand the process of protein sorting for protein targeting to organelles.
CO IV	➢ Understand the Recombinant DNA technology, Tools and techniques. ➢ Understand the concept of restriction enzymes and its nomenclature and types. ➢ Understand the concept of vector with some examples plasmid, cosmid and phage. ➢ Understand the source of gene ex. genomic library and c DNA library. ➢ Understand the gene transfer techniques, indirect technique- chemical and physical and direct technique- agrobacterium mediated gene transfer. ➢ Understand the concept of gene amplification by PCR method.
CO V	➢ Understand the basics of plant tissue culture. ➢ Understand the laboratory equipment and infrastructure for plant tissue culture. ➢ Understand the cultural media and growth hormones used in plant tissue culture. ➢ Understand the different sterilization techniques.

	➢ Understand plant tissue culture technique i.e. Callus culture, micro propagation and concept of cellular totipotency , differentiation and morphogenesis.
CO VI	➢ Understand the application of biotechnology in agriculture i.e. haploid plant production, protoplast culture, somatic hybridization, transgenic plant like BT- cotton and synthetic seed production. ➢ Understand the improvement in crop biotechnology. ➢ Understand the applications of biotechnology in industries in fermentation Technology, Bakery product production and alcohol production. ➢ Understand the biotechnology applications in Health-care for example edible vaccine production. ➢ Understand the biotechnological applications in conservation for example ex-situ conservation and in situ conservation.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Political Science

Course Outcomes (CO)

B.A. I (Sem I)

Subject- Indian Constitutional Provisions and Local Self Government

CO I	➢ Student learns the various features of Indian Constitution and political System. ➢ Student learns the parliamentary system of India and its importance for Indian society. ➢ Student learns and understands the objectives of Indian constitution through Preamble. ➢ Students learns the meaning nature and importance of Fundamental Rights like ,Right to Equality ,freedom, Right to Religion Etc. ➢ They also understand the role of judiciary for the protection of Fundamental Rights through Right to Constitutional Remedies.
CO II	➢ Student learns welfare nature of Directive Principle. ➢ Students understand the role and importance of Directive Principle for Socio-Economic and Political Justice. ➢ Student learns liberal view of Directive Principle about responsibility of world Peace of Indian Government. ➢ Student learns and understands the duties of citizens. ➢ Student learns the meaning, importance and methods to be acquired by the Indian citizenship.
CO III	➢ Student learns the role of constitutional head of Indian President, Vice-President in Government of India. ➢ Student learns the role of Prime Minister as real constitutional head his powers and his relation with cabinet and President.
CO	➢ Student learns the structure and powers of Indian Parliament.

IV	➢ They also understand the role of Loksabha and Rajyasabha as a house of peoples representative and as a house of State representative of both houses. ➢ Student understands and learns the Politically Neutral and respectable role and importance of speaker of Loksabha.
CO V	➢ Student learns importance, structure and power of judiciary. ➢ Student learns the important role of Supreme court and High Court as guardian of constitution, guardian of Indian federation and as a guardian of Rights, Justice of Citizens. ➢ Students learn the concept of Judicial Review, Judicial Activism in the sake of common people.

B.A. I (Sem II)

Subject- Indian Constitutional Provisions and Local Self Government

CO I	➢ Students Learns the importance of Autonomous institute like, Election Commission for the Safe and transparent Election Process. ➢ Students understand Election Commission role for Strengthen to Indian Democracy. ➢ Students became well known about the reforms in Election process. ➢ Students learn that Election commission gives recognition to political parties in India and control them by lawful way for betterment of Democracy.
CO II	➢ Student learns & understands dual Parliamentary System at State Level. ➢ They also learn the role of Constitutional head (Governor) and the same

	time learn role of real Constitutional Head (Chief Minster) of State. ➢ Student learns the power, Role and Relations between governor, Chief Minister and State Cabinet.
CO III	➢ Student learns the structure, powers and Role of both State Legislature i.e. Legislative Assembly and Legislative Council in Maharashtra State. ➢ They also learn the importance of legislative Council in State which is Establish in few only by the provisions of Constitution.
CO IV	➢ Students learns that institution like, Local Self Government encourage to Common People for the participation in politics which help Strengthen to Indian democracy. ➢ Student learns that such LSG are tool of Political Socialization which Strengthen to democracy at bottom level. ➢ Students learn that Gram Sabha is Local Parliament at Village level. ➢ Students understand that Local problems may solve quickly only by LSG due to Local representative. ➢ Student Learn the importance of 73rd and 74th constitution amendment for LSG.
CO V	➢ Students learn the importance of 50 % reservation policy for women's participation in Panchayat Raj. ➢ Girls Students feels eager to participate for innovative work in Panchayat Raj system. ➢ Students learn the importance of Nagpur pact and its Recommendations for the development of Vidarbha. ➢ Students learn the importance and need of Right To Information Act for the transparency in governance. ➢ Student understands that RTI is a tool of justice for common people so, they are also eager to use it in their life as per need.

B.A. II (Sem III)

Subject- Selected Constitution and International Relations (UK, USA & SAARC)

CO I	➢ Student Learns historical background of Parliamentary System of UK. ➢ Student Learns various feature of British Parliamentary System. ➢ Student learns the role of Prime Minister, Cabinet & their responsibility. ➢ Student understands difference between crown and king.
CO II	➢ Students learn role and functions of House Lords and House of Commons with their historical evolution. ➢ Students learn role, importance and responsibility of opposition party and leader in democracy. ➢ They also learns concept of Shadow Cabinet.
CO III	➢ Students learn and understand presidential form of democracy which is developing in USA originally. ➢ Students learn various feature of First written Constitution of the world i.e. USA. ➢ They learn the role and functions of President, Vice- President and Cabinet.
CO IV	➢ Students learn the importance role of senate though it's a second house of Congress. ➢ Students learn comparatively the power and functions of both houses of Congress. ➢ Students learn the senate's constitutional power which can control the decision of President.

	➢ Students understand the role and powers of Supreme Court of USA and its Rights of Judicial Review and role as a guardian of Constitution. ➢ They also learn theory of separation of powers and principle of Checks and Balance, which is adopted wisely in Constitution.
CO V	➢ Students learn the role and importance of SAARC in South Asian countries. ➢ They learn importance of cooperation, peace, various issues among the member countries for the development of peoples of same countries.

B. A. II (Sem IV)

Subject- Selected Constitutions and International Relations (China-UNO)

CO I	➢ Student learns the various features of China's constitution and political system, based on Communist ideology. ➢ Student learns the role of National People's Congress and role of Standing Committee as a controller of NPC. ➢ Student learns population control policy of Chinese Government.
CO II	➢ Student learns the role of President, Prime Minister, State Council in Executive of China. ➢ Student learns and understands the role of Communist Party as single Political Party System in Government of China. ➢ Student learns the structure of Communist party and its real control and Discipline on government.
CO III	➢ Students learn and understand the universal aims and value of UNO. ➢ They understand the value and importance of UNO for the

	development of human kind. ➢ Students learn the role of General Assembly and Security Council for the peace and prosperity of World.
CO IV	➢ Students Learn the role of Security Council as a Executive of world. ➢ Students understand the sensitive role security council in UNO as a messenger of peace for world. ➢ Students understand the main role of ICJ to dilute the conflicts between countries.
CO V	➢ Students of UG learn in real base the Indo-China Relations. ➢ Students Learn the Tibet dispute and its historical background, its importance as a buffer state for India. ➢ Students Learn china's negative attitude about India in UNO. ➢ Students understand China's Dual role about terrorism and backing to Pakistan against India. ➢ Students understand impact of China's goods and market on Indian Economy in global era

B. A. III (Sem V)

Subject- Modern Concepts and Policy in Politics

CO I	➢ Students learn the meaning and Characteristics of leadership. ➢ Students learn the main Factors which mainly shape to the leadership. ➢ They also learn types of leadership i.e. dictator, democratic leaders. ➢ They also learn the role of leadership in Social, Economic and Political System.
CO II	➢ Students learn and understand the need of reservation policy for

	weaker sections of society. ➢ They also understand that reservation policy is only way for establishment of justice and equality in society. ➢ They also learn that reservation policy is adopted as per Constitutional Provision for Equal opportunity. ➢ Student also learn that some political parties make the issue of reservation policy for their political interest due to which may harmful for national and social integrity, which should stop.
CO III	➢ Students learn the real liberal meaning of Nationalism. ➢ Students learn the emotion of Nationalism is a tonic for the unity among citizens which increase patriotism in citizens. ➢ They also learn real nationalism never create emotion of intolerance, jealousy among the citizens. ➢ They also understand the present status of Nationalism in India, which is use for Political interest by both sides through political parties, which is very harmful for social unity.
CO IV	➢ Student learns and understands harmful nature of communism. ➢ They also understand that communism is a main obstacle for development, unity, Principle of tolerance, secularism. ➢ They also understand that some political parties use communism for their short political interest. ➢ They also understand the importance of secularism, tolerance, social unity to overcome on communism.
CO V	➢ Students learn the meaning, nature and kind of terrorism. ➢ Students learn that the terrorism is a main obstacle before Indian democracy, social unity of society. ➢ They also understand that terrorism is a enemy of humanity. So

	anybody should not support it direct or indirect. ➢ Students also learn the acts for prevention to Terrorism in India and its need in present era.

B. A. III (Sem VI)

Subject- Concept of Western and Indian Thinker

CO I	➢ Student learn Aristotle as a father of Political Science. ➢ Student learn classification of state just as his thought on slavery, revolution, women's liberty Etc. ➢ Student learn Gandhian thoughts as a innovative moral principles in politics. ➢ Student learn the concept of Ramrajya for people's welfare and self-dependent society.
CO II	➢ Student learn the concept of democracy of walter Bagehot , Abraham Lincon and Students learn the concept of parliamentary democracy of Dr.B.R.Ambedkar. ➢ Students learn the importance and necessity of parliamentary system other than presidential democracy by his extreme analysis.
CO III	➢ Student learn the concept of nationalism through the thoughts of Machivelli, Swami Vivekanand , V. D. Sawarkar. ➢ Students learn and understand the basic difference, nature about the concept of nationalism between three of them separately.
CO IV	➢ Student learns the real hard leffist concept of socialism through the thoughts of Karl Marx. ➢ Student impressed by the theories of Marx which proves the

	systematical exploitation of Poor's by Richers of society. ➢ Student learns that Nehru's and Lohiya's socialism emphasis on social justice, equality, liberty and security of individuals and on another hand Karl Marx denied liberty of individual. ➢ Student learns the soft concept of Heharus socialism which may help for the development of India and at the same time which helps welfare of middle and poor sections of Indian society. ➢ Students learn another Ram Manohar Lohiya's concept of socialism which gives importance to de centralization of power.
CO V	➢ Student learns David Eston's concept of behaviorisms and its importance in modern political science as a tool of study. ➢ Student learns that human behavior is very important in study of political science. ➢ Student learns David Eston's Explain Eight feature for study of political science point of view of human behavior. ➢ Student learns Gabrial Almond emphasis on Political science should not value free, Should not lose touch with brute realities of politics so he put post behavioral theory. ➢ Student learns the importance concept of sovereignty in political science and they learn John Austin's theory of sovereignty.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of English

Course Outcomes (CO)

B. A.

English Language

- English Language has been introduced to all the undergraduate classes of all the three faculties viz. Arts, Commerce and Science. The basic outcome of learning English is to equip the student to use English as Library Language. Most of the research outcomes are available in English only in the world. Therefore a graduate student should have the ability to understand and interpret the research output available in English.
- In this global world, communicative competence occupies central position. English language helps a student to communicate in English. As a result one can transfer his knowledge to others and vice-versa.
- Reading of Texts prescribed for syllabus makes the students competent enough to interpret the ideas in their own English language. It also enriches the mental maturity of the students as every text is written by the author, is based on his or her life experiences.
- Literary works written by varieties of writers are selected in the texts. Every writer has peculiar way of using language to narrate his life philosophy. The students get acquainted with different ways of writing styles by studying them.
- The texts written by authors of different nations also carry history, culture of the nations. Students by reading the texts understand cultures and history of other nations and can compare and contrast our position in the world.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Compulsory English

Course Outcomes (CO)

B.A. I (Sem I)

CO I	➢ Technique of writing autobiography. ➢ New words related to the livestock. ➢ Interpretation of figurative language. ➢ Technique of writing essay on real incidences.
CO II	➢ Use of colloquial words in the poem. ➢ Use of figures of speech in the poem. ➢ Paraphrasing the poem.
CO III	➢ To identify different parts of speech with their usages. ➢ To use proper tense as per the situation ➢ Development of reading skill with comprehension. ➢ To compose letters such as – Personal letters, Formal letters, etc. ➢ Writing CV / Resume

B.A. I (Sem II)

CO I	➢ Dialogue writing ➢ Direct – Indirect Speech ➢ Shavian style of writing. ➢ Prefixes to derive new words
CO II	➢ To write summary of a poem . ➢ Poetic devices ➢ To develop an idea into a paragraph.
CO III	➢ Enrichment of language.

CO IV	➢ To develop an idea into a short story ➢ Writing Fax, e-mails, etc. ➢ To draft Notice, Agenda and Minutes as a part of business correspondence

B.A. II (Sem III)

CO I	➢ The technique of narration ➢ New words and develop vocabulary. ➢ Direct – Indirect Narration ➢ Poetic device
CO II	➢ Use of simple language for poetic creation ➢ Use of poetic images.
CO III	➢ Adjective and Adverb Clauses, ➢ Types of sentences
CO IV	➢ Telephone and Interpersonal Communication

B.A. II(Sem IV)

CO I	➢ Types of sentences ➢ Varieties of suffixes to derive new words ➢ Situational dialogues ➢ Technique of narration
CO II	➢ To understand prosaic poetry

	➢ To write an abstract of a poem.
	➢ Imagery in poetry
	➢ Simile and metaphor in a poem
CO III	➢ Transformation of sentences: Simple, Compound and Complex
	➢ Synthesis of Sentences
	➢ Interpersonal Conversation and Casual Conversation

B. Com III (Sem V)

CO I	➢ New words and its usage
	➢ Use of short sentences to answer short answer type question.
	➢ Language of journalism.
	➢ Framing questions.
	➢ Inspirational language.
CO II	➢ Writing interpretation of a poem in simple language.
	➢ Style of writing poetry.
CO III	➢ What is précis?
	➢ Characteristics of good précis.
	➢ Origin of précis writing.
	➢ Technique of writing précis
	➢ How to develop thought in a lucid way

B.A. III (Sem VI)

CO I	➢ Sentence construction
	➢ Usage of simple present
	➢ Dialogue writing
	➢ Dialogue writing

CO II	➢ Interpreting a poem in a simple language. ➢ Imagery in poetry
CO III	➢ To write News Paper Report ➢ Language of the report, event description ➢ To write Descriptive Essays , Narrative Essays, Expositary Essays, Argumentative Essays.

Course Outcome

B. A. (History)

- Understand the basic themes, concepts, chronology and the scope of Indian History and its distinctive eras.
- Understand the history of the countries other than India with comparative approach.
- Critically recognize the Social, Political, Economic and cultural aspects of History.
- To study further in the applied field of history as archeology.
- Think and argue historically and critically in writing and discussion.
- Prepare for various types of Competitive Examinations.

Shri. Shivaji Science & Arts College, Chikhli, Dist Buldana

Department of Commerce & Management

Course Outcomes (CO)

B. Com I (Sem I)

CO I	➢ Understand Evolution, Generation & Types of Digital Computer. ➢ Understand the Block Diagram of Computer, CPU elements and Types of Software ➢ Understand the concepts of Primary and Secondary Memory [RAM & ROM} of Computer System. ➢ Understand the concept of Input & Output Devices of Computer and how it works. ➢ Student will have a working knowledge of Paragraph Formatting and Saving and Printing a Document in Ms Word 2007.
CO II	➢ To record the basic Journal entries, Ledger& Trial Balance and rectify error's in Account. ➢ Able to prepare various Subsidiary Books &n Cash Books. ➢ Know about final Account of individual. ➢ Memorize how to calculate Depreciation by applying various methods. ➢ Able to prepare Bank Reconciliation statement.

B. Com I (Sem II)

CO I	➢ Understand the Meaning, characteristics and Scope of Business and Managerial Economics. ➢ Analyze operations of markets under Price determination and Price discrimination monopoly. ➢ Understand the Meaning, Characteristics and determination of Perfect competition. ➢ Apply the Marginal productivity theory.

	➢ Analyze operations of markets under Dynamic & Risk bearing theory of Profit.
CO II	➢ Student will able to understand the Concepts, Structure, types of Operating System. ➢ Understand the Features and Functions of Operating System. ➢ Learn about the modern communications Channel FAX, Voice mail, Video Conferencing and E-mail. ➢ Student will have a working knowledge of Create Table, Add Row and Columns and Mail Merge in Ms Word 2007. ➢ Student will have a working knowledge of Creating, Opening /Saving Presentations and working with different slide views in MS Power Point 2007.
CO III	➢ To record the Account or Non Trading Institution. ➢ Know about Account of Co – operative societies. ➢ To record Accounting for Agriculture Farms. ➢ Student can able to make necessary journal entries.in the Books of record under hire purchase & instalment purchase method. ➢ Know about insolvency & procedure of insolvency and able to prepare insolvency account.
CO III	➢ To apply Basic terms of integration in solving practical problems field to as or business. ➢ Student will able to calculate Discount, Commission & Brokerage. ➢ To solve problems of average, profit & loss. ➢ To solve problems in the area of business calculation simple & compound Interest. ➢ To solve the problem of Ratio & Proportion.
CO IV	➢ Describe the financial system.

	➢ Explain the concept of fundamental financial concepts, especially time value of money. ➢ Apply capital budgeting projects using traditional methods. ➢ Analyze the main ways of raising capital and their respective advantages and disadvantages in different circumstances ➢ Integrate the concept and apply the financial concepts to calculate ratios and do the capital budgeting

B. Com II (Sem III)

CO I	➢ To apply Basic terms of integration in solving practical problems field to as or business. ➢ Student will able to calculate Discount, Commission & Brokerage. ➢ To solve problems of average, profit & loss. ➢ To solve problems in the area of business calculation simple & compound Interest. ➢ To solve the problem of Ratio & Proportion.
CO II	➢ Describe the financial system. ➢ Explain the concept of fundamental financial concepts, especially time value of money. ➢ Apply capital budgeting projects using traditional methods. ➢ Analyze the main ways of raising capital and their respective advantages and disadvantages in different circumstances ➢ Integrate the concept and apply the financial concepts to calculate

	ratios and do the capital budgeting
CO III	➢ Learned the concept of Data and Data Processing and Applications in Business. ➢ Learned the concept and Objective of Database, Data warehousing and Data Mining and its Applications. ➢ Learned about Database Management System(DBMS) ➢ Students will have a working knowledge of Spreadsheet Package. ➢ Students will have a working knowledge of basic functions and formulas in MS-Excel.
CO IV	➢ Student will understand the audit process the engagement planning stage through completion of the Audit. ➢ Student will explain the internal Audit process including the professional standard applicable to the internal Audit profession. ➢ Student will understand Auditors Legal Liabilities and able to apply case law in making a judgment whether Auditors might be liable to certain parties . ➢ Student will understand the Rendering of and Audit opinion via the various report option. ➢ Student will able to Audit of Banking , Insurance & educational institutions

B. Com II (Sem IV)

CO I	➢ Know about Final Account of Banking Company. ➢ Learn about the Final Account of Fire & Accident Insurance Company.

	➢ Learn about Liquidation of Companies & process of Liquidation of Companies. ➢ Learn about the Valuation of and will be various method. ➢ Learn about the valuation of shares by various methods.
CO II	➢ Student will able to interpret the meaning of the calculate basic statistical indicators. ➢ Standard will Know about Index Number & Construction or Index Number. ➢ Student will able to indepently calculate basic statistical parameters (mean, median & mode) ➢ Student will able to calculate statistical parameters (measures of Dispersion & skewness) ➢ Able to calculate co- efficient of co- relation & probable errors.
CO III	➢ Define the procedure of Direct tax assessment. ➢ Able to compute Income from salary & House. Property. ➢ Able to compare Income from other sources and file IT returns on individual basis. ➢ To Know about power of Income Tax officer & Commissioner. ➢ Able to return of Income & various form's
CO IV	➢ Student will able to understand the Concepts and uses of Information and Information Technology. ➢ Student will able to understand the Concepts of Manual V/s Computerized Accounting. ➢ Learned about the Company Information menu and Gateway of Tally menu. ➢ Student will have a working knowledge of Company Creation, Groups Creation, Ledger and Voucher Creations in Tally.

	➢ Learned about the Various Accounting Reports Displaying and Various Report Printing in Tally.
CO V	➢ Comprehend what money is. ➢ Outline the financial intermediaries make up the monetary banking sector. ➢ Describe the different measures of money. ➢ Evaluate the money identity. ➢ Describe the essence of the creation of money.

B. Com III (Sem V)

CO I	➢ Expose the student to the basic concept of Cost Accounting & define the various components of total cost of product. i. e. Direct, Indirect, Fixed & variable cost. ➢ Define the meaning& classification of material & use cost sheet to compute unit cost of product. ➢ Determine meaning of Direct & In direct labour, & computing Tender price of a product & also use methods or Time keeping & wages payments. ➢ Define the meaning & Classification or overhead and use of Reconciliation statement to compute actual cost. ➢ Define the process to compute total cost of a product belong to various production processes.
CO II	➢ Define various elements internal as well as external affecting business environment. ➢ Explain the techniques like SWOT analysis. ➢ Define the terms like inflation, GDP, etc.

	➢ Define the consequences with regard to BOP.
	➢ Explain the economic trends and effect of Govt. policies as LPG.
CO III	➢ Learn the difference between valid void and voidable contract.
	➢ Memorize difference between contract of guarantee and indemnity.
	➢ Analysize the rights and duties of pawnor and pawnee under contract of bailment.
	➢ Learn how to pursue the consumer rights under consumer protection act 1982.
	➢ Describe the various elements of contract
CO IV	➢ Learned and evaluated about the various components of E-Commerce.
	➢ Learned about the current scenario and Government FDI policy about e-commerce in India.
	➢ Learned about the B2C, C2B, C2C Retail e-commerce & Procedure and benefits of E-auction.
	➢ Learned about the Meaning, Characteristics and e-Marketplace models of B2B E-Commerce.
	➢ Thoroughly learned about concept and importance of e-payment and e-banking in current era.
CO V	➢ Understand the concept of Network and Types of Network.
	➢ Understand evolution of internet, its applications and its basic services.
	➢ Students will have a working knowledge of Electronic Mail and Gmail.
	➢ Learned about the concept of WWW and Importance of Website in current era.
	➢ Students will able to designing website and webpage.

B. Com III (Sem VI)

CO I	➢ Exposes the student to the basic concept of management Account and to know the comparison between Management Account and Cost & Financial Account. ➢ Define the terms with regard to BEP Analysis. ➢ Define the terms with regard to Ratio analysis. ➢ Determine meaning of Budget control & able to prepare cash Budget. ➢ Define Meaning of Budgetary control & able to prepare Flexible budget.
CO II	➢ Learned about the Internet based E-Commerce Business models. ➢ Learned about the Internet Marketing and online marketing strategies. ➢ Learned the concept of EDI and JIT. ➢ Understand the meaning & objectives of E-governance in G2B, B2G and C2G. ➢ Conceptually learned the Various e-governance models.
CO III	➢ Learn about the Journal entries of issue of shares & Re-issue of shares. ➢ Know about the final Accounts of the companies. ➢ Work with profit prior to incorporation and post incorporation profit in companies Account. ➢ Know about the Amalgamation of the companies. ➢ Know about Absorption of the companies.

CO IV	➢ Can able to learn the conditions of partnership act. ➢ Critically evaluate conditions and warranties of sale of goods act. ➢ Aware about rights to information. ➢ Can able to use negotiable instrument in practical life. ➢ Explain the provisions of various elements of contracts.
CO V	➢ Discuss the supply and demand theory and its impact on insurance. ➢ Explain the effects of government policy on the economic environment and insurance industry. ➢ Outline how an entity operates in a business environment. ➢ Describe how financial information is utilized in business. ➢ Explain the legal framework that regulates the insurance industry