DEPARTMENT OF BIOTECHNOLOGY

Govt. T.C.L. P.G. College Janjgir (C.G.)

PROGRAMME OUTCOMES (B.Sc. BIOTECHNOLOGY)

PO-1. To Knowledge of Research.& Development of Biotechnology

PO-2. To Knowledge of classical and modern molecular approach of genetics

PO-3. To Knowledge of normal microbial flora of human body.

PO-4. To Knowledge of symptoms, Chromosome variation in number and structure: Deletion, Duplication, Translocation, Inversion and Aneuploidy.

PO-5. To Knowledge of immune system and defence mechanism against infectious diseases.

PO-6. To knowledge about role of Microbial Growth & Nutrition of Bacteria: Isolation, media sterilization- physical and chemical agents, pure culture-pour plate method, streak plate method and spread plate method..

PROGRAMME SPECIFIC OUTCOMES (B.Sc. BIOTECHNOLOGY)

On completion of the Programme the students will be able to-

PSO-1. Use correct Knowledge of Development of Modern Biotechnology.

PSO-2. Understand the unique importance of Modern Biotechnology

PSO-3. Understand the values of Gene Therapy.

PSO-4. Appear for Competitive Examinations.

COURSE OUTCOMES
(B.Sc. PART- I /II/III - BIOTECHNOLOGY)

S. No.	Name of Course	Year/ Semester	Name of Subject/Paper	Course Outcome
1.	**B.Sc..**	**Part-I (Paper-I)**	**BIOCHEMISTRY, BIOSTASTICS AND COMPUTERS**	1. To give the Students a first-hand knowledge of Introduction to Biochemistry: History, Scope and Development 2. To give the Students a first-hand knowledge of Amino acids and Proteins, Enzymes, Hormones.
2.	**B.Sc..**	**Part-I (Paper-II)**	**CELL BIOLOGY, GENETICS AND MICROBIOLOGY**	1. To give the Students a first-hand knowledge of Mendel's Laws of Inheritance 2. To develop in students the basic knowledge of Bacterial Reproduction: Conjugation, Transduction and Transformation 3. To give the Students a knowledge of History, Scope and Development of Microbiology. 4 To give the Students a knowledge of Chromosome variation in number and structure
3.	**B.Sc..**	**Part-II (Paper-I)**	**MOLECULAR BIOLOGY & BIOPHYSICS**	1. To give the Students a first-hand knowledge of Mendel's Laws of Inheritance 2. To develop in students the basic knowledge of Bacterial Reproduction: Conjugation, Transduction and Transformation 3. To give the Students a knowledge of Genetic recombination 4 To give the Students a knowledge of DNA Repair and restriction
4.	**B.Sc..**	**Part-II (Paper-II)**	**RECOMBINANT DNA TECHNOLOGY**	1. To give the Students a knowledge of Scope and aim of the Biotechnology n. 2. To provide them with knowledge of Recombinant DNA Technology
5.	**B.Sc..**	**Part-III (Paper-I)**	**GENERAL BIOTECHNOLOGY Plant, Environment and Industrial Biotechnology Plant,**	1. To give the Students a first-hand knowledge of Plant cell and tissue culture 2. To give the Students a knowledge of Biofertilizer, Biopesticides.
6.	**B.Sc..**	**Part-III (Paper-II)**	**IMMUNOLOGY**	1. To give the Students a knowledge of Immunology - General Concept, history and Development. Immune system and immunity. 2. To provide them with knowledge of Autoimmune diseases.

Department of Botany

Sr. No.	Class	Program Outcomes	Program Specific Outcomes
1	**B.Sc. Botany**	**PO1. Critical Thinking:** Think logically and organize tasks into a structured form. Understand the evolving state of knowledge in a rapidly developing field. Plan, Conduct and write a report on an independent term project. **PO2. Practical skills:** Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. **PO3. Scientific knowledge:** Apply the knowledge of basic science, life sciences and fundamental processes of plants to study and analyze any plant form. **PO4. Social Interaction.** Due to continuous field visits in the fields students interact with the social activities for their study. **PO5. The Botanists and society:** Apply reasoning informed by the contextual knowledge to assess	**PSO1.** Understand occurrence, morphology, anatomy, reproduction and life cycles of lower group and higher group of plants. **PSO2.** Identify affinities among different groups of plants. **PSO3.** Gain the knowledge of evolution of plants. **PSO4.** To get introduced with fossils, fossilization and some primitive plants. **PSO5.** Understand different plant physiological processes i.e. photosynthesis, respiration, nitrogen metabolism, water absorption, mechanism of flowering, mineral nutrition, plant movements, etc. **PSO6.** Understand the application of genetic engineering and plant tissue culture. **PSO7.** Understand the basic concepts of ecology. **PSO8.** To explore the plants of economic importance. **PSO9.** Perform the laboratory techniques in anatomy, physiology, biochemistry, biotechnology, ecology and utilization of plants.

		plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity and conservation practice **PO6. Ethics:** The subject teaches students about the ethical approach, not to cut the plants. **PO7. Environment and sustainability:** Conservation practices are studied for sustainable development. **PO8. Self-directed and Life-long learning:** Each and every aspect of the syllabus teaches life- long learning.	

Sr. No.	Class	Paper	Course Outcomes
1	B.Sc. I	Ist: Bacteria, Viruses, Fungi, Lichens and Algae	On completion of this course students will be able ➢ To gain knowledge about microbial diversity. ➢ To understand about range of thallus structure of algae, fungi and lichen and their occurrence. ➢ To know about life cycles of different algal and fungal spp. ➢ To gain knowledge about economic importance of bacteria, viruses, algae, fungi and lichens.
		2nd: Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany	➢ To understand about occurrence, structure and reproduction in bryophytes. ➢ To know the evolution of sporophytes in bryophytes. ➢ To gain knowledge about stellar evolution and seed formation habit in pteridophytes. ➢ To understand about occurrence, structure and life cycles of pteridophytes. ➢ To gain knowledge about distribution, structure and life cycles of gymnosperms. ➢ To know about economic importance of bryophytes, pteridophytes and gymnosperms. ➢ To understand about

			geological time scale, fossils and fossilization.
		Practical	➢ To have the knowledge of study of morphology, anatomy of algae, fungi, bryophyte, gymnosperm. ➢ To know the technique of identification of plant disease symptoms. ➢ Gain knowledge of anatomy of some gymnosperms.
2.	**B.Sc. II**	Ist: Plant Taxonomy, Economic Botany, Plant Anatomy and embryology	➢ To know about Bentham and Hooker's system of Classification ➢ To understand about IUCN, Typification, numerical taxonomy chemotaxonomy, Herbaria and Botanical gardens. ➢ To gain knowledge about some important plant families. ➢ To explore the uses of plants as cereal, vegetable, oil, timber, spices, medicines, beverages, biodiesel plants. Also know about cultivation of important flowers and Ethnobotany of CG. ➢ To understand about plant root and stem structure, RAM, SAM organization, secondary growth and anatomical anomalies. ➢ To know the structure of a flower and its different parts. ➢ To get introduced to male

			and female gametophyte development, pollination, self-incompatibility, fertilization, endosperm and embryo development, polyembryony, apomixes and parthenocarpy.
		2nd Ecology and Plant Physiology	➢ To have knowledge of Ecology and its scope, understand different ecological factors, soil formation and soil profile. ➢ To understand Liebig's law of minimum, Shelford's law of tolerance, morphological and anatomical adaptations in hydrophytes, xerophytes and epiphytes. ➢ To know about population and community characterstics, population interactions. ➢ To understand about succession, ecotone, edge effect, ecotypes, ecads keystone species. ➢ To have knowledge of energy flow in ecosystem, food chain, food web and ecological pyramids and biogeochemical cycles. ➢ To understand osmosis, water absorption, mineral nutrition, transpiration photosynthesis and respiration. ➢ To gain knowledge of Plant growth hormone and

			mechanism of flowering. ➢ To know photoperiodism, vernalization, seed dormancy, germination and plant movement.
		Practical	➢ To get knowledge of study of some important plants in semi-technical language with their classification and identification. ➢ To know about morphology and anatomy of root, stem, and leaves with the help of prepared slides. ➢ To know the structure of flower. To know the technique of study of ovules, placentation, embryo with the help of slides. ➢ To know about some experiments of osmosis, transpiration, photosynthesis, respiration. ➢ To have knowledge of studying of a community by quadrate method. ➢ To know about structure of ecosystem. ➢ Study of some economically important plants.
3	**B.Sc. III**	Ist: Plant Physiology, Biochemistry and Biotechnology	➢ To understand osmosis, water absorption, mineral nutrition in plants. ➢ To have knowledge about photosynthesis and respiration. ➢ To gain knowledge of how light and temperature affects

			flowering in plants. ➢ To get introduced to the structure of phytochrome, cryptochrome and phototropin. ➢ To know the mechanism of nitrogen fixation in plants. ➢ To understand about different types of plant movements. ➢ To gain knowledge of mechanism of action of enzymes. ➢ To have knowledge about seed dormancy. ➢ To know the main techniques of genetic manipulation and plant tissue culture.
		2nd: Ecology and Utilization of plants	➢ To understand different ecological factors. ➢ To understand ecological relationship between organisms and their environment. ➢ To know about plant community and its development. ➢ To have knowledge of ecosystem, food chain, food web and ecological pyramids. ➢ To know about different biogeographical regions of India. ➢ To explore the uses of plants as cereal, vegetable, oil, timber, spices and medicines.
		Practical	➢ To know about some

			experiments of osmosis, transpiration, photosynthesis, respiration. ➢ To know the technique of identification of carbohydtraes, lipids and proteins. ➢ To have knowledge of studying of a community by quadrate method. ➢ To know about structure of ecosystem. ➢ Study of some economically important plants.

Department of Botany

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Department of Botany

S.N.	Class	Program Outcomes	Program Specific Outcomes
	M.Sc. Botany	**PO1. Critical Thinking:** Apply the knowledge of biology to make scientific queries and enhance the comprehension potential.	**PSO1.** They become focused to take up research and teaching opportunities.
		PO2. Effective communication: Successful transfer of scientific knowledge both by orally and writing.	**PSO2.** Procure the knowledge of importance of plants to human being and all other organisms.
		PO3. Social interaction: Function as an individual, as a member or a leader to perform a task in class room situation or during field study.	**PSO3.** The students will be qualified to face CSIR-NET, GATE, ICMR-NET, ICAR-NET.
		PO4. Effective Citizenship: Responsible for learning, develop honesty in work and respect for self and others**.**	**PSO4.** Obtain strong foundation in classical Botany, interdisciplinary subjects such as Agriculture Microbiology, Bioinformatics, Botanical Pharmacy, Organic farming and advance topics in Plant Biotechnology, Cell and Molecular biology, Biochemistry and Bioinstrumentation.
		PO5. Ethics: Convey and practice social, environmental and biological ethics.	**PSO5.** Enable the students to be resourceful in identifying the plants.
		PO6. Environment and sustainability: Insist the significance of conserving a	**POS6.** Find opportunities for higher studies in top ranking universities.

		clean environment for perpetuation and sustainable development.	
		PO7. Self-directed and Life-long Learning: Study incessantly to cope with growing competition for higher studies and employment.	

S.N.	Class	Paper	Course Outcomes
1	M.Sc. Semester-I	Ist: Biology and Diversity of Virus, Bacteria and Fungi	On completion of this course students will be able to • Acquire the knowledge of history and development of Virology, Bacteriology and Mycology. • Develop an understanding of classification, nomenclature, distribution of microbes. • Understand the life cycle pattern and economic importance of microorganisms. • Learn the phylogeny and evolutionary concepts in lower group of organisms.
		2nd: Biology and Diversity of Algae, Bryophytes and Pteridophytes	• Acquire the knowledge of history and development of Phycology and Bryology. • Learn about the occurrence, distribution, structure and life history of lower plants. • Gain adequate knowledge of evolutionary concepts in Algae, Bryophytes and Pteridophytes. • Acquire knowledge of life cycle patterns and economic importance of Algae, Bryophytes and Pteridophytes.
		3rd: Cell and Molecular Biology of Plants	• It brings fundamental concepts as well as recent developments of cell structure and ultrastructure of organelles.

			• Acquire the knowledge about mechanism of translation, DNA replication, DNA damage and repair, splicing of mRNA. • Understand about cytoskeleton, flagellar and other movements. • Get knowledge about mitosis and meiosis, cyclins and PCD.
		4th: Taxonomy of Angiosperms	• Prepare the botanical excursion report. • Understand classical and modern system of classification. • Acquire knowledge on molecular tools for classification. • Impart knowledge on taxonomic evidences. • Acquire knowledge about Plant conservation, sustainable utilization of bio-resource and ecosystem research. • Know about endemism, hot spots and local plant diversity.
		Lab-1: Based on Paper I&II	• Identify cyanobacteria and algae. • Prepare and identify the fungal culture. • Know the symptoms of diseased specimens. • Identify Bryophytes and Pteridophytes.

		Lab-2: Based on Paper III&IV	• Know the technique of isolation of DNA, preparation of Karyotype. • Study of different stages of mitosis. • Obtained skill to identify the plants according to the rules. • Know the technique of preparation of Herbarium sheets. • Know about similarity coefficient and preparation of dendrograms. • Know the economic importance of plants.
2	M.Sc. Semester-II	Ist: Cytology, Genetics and Cytogenetics	• To gain knowledge about DNA packeging. • To understand about structural and numerical alterations in chromosomes. • To know about mapping, genetic recombination in phages and bacteria. • To gain knowledge about gene structure. • Understand about mutation, transposable elements, oncogenes. • To understand about cytogenetics of aneuploids and heterozygotes, C value paradox, alien gene transfer.
		2nd: Biology and Diversity of Gymnosperm species	• To know about evolution of Gymnosperm and their characteristics. • To understand about classification and

			distribution of Gymnosperm. • To get acquainted with comparative study of Cycadeoidales, Cordaitales, Cycadales, Ginkgoales. • To know about comparative structure and reproduction in Cycadales, Ginkgoales, Coniferales, Ephedrales, Welwitschia and Gnetales.
		3rd: Plant Physiology	• To get knowledge about Plant-water relations, nutrient uptake, phloem loading and unloading. • To understand about nodule formation, nitrogen fixation, sulphate uptake and assimilation. • To get knowledge of mechanism of Photosynthesis. • To know about different biotic and abiotic stresses.
		4th: Plant Biochemistry and Bioenergetics	• To get knowledge of thermodynamic principles, structure and function of ATP. • To learn about plant respiration and lipid metabolism. • To know about enzyme action, its regulation and kinetics of enzyme catalysis. • To study about photomorphogenesis and

			phytochromes, cryptochromes, signaling and gene expression. • To know about physiological effects, signal transduction and gene expression of different plant hormones. • Study about photoperiodism, genetic and molecular analysis of floral induction and vernalization.
		Lab-1: Based on Paper I&II	• To know the technique of chromosome banding. • Study of effect of monosomy and trisomy on phenotype of plants. • To know the technique of induction of polyploidy. • Gain skill about isolation of DNA and their estimation. • Comparative study of different gymnosperms. • Collection of various Gymnospermic plant material.
		Lab-2: Based on Paper III&IV	• Know the technique of measurement of catalytic activity of catalase and diastase. • Gain skill to determine R.Q. of different respiratory substrates. • Know the technique of separation of protein by PAGE. • Study of the effects of

			differernt factors on seed dormancy. • Study of Phototropic and Geotropic movements. • Know the technique of plasmolysis and deplasmolysis. • Study about transpiration. • Know the technique of extraction of chloroplast pigment and their separation. • Preparation of absorption spectrum of chlorophyll a. • To know the technique of colorimetry, spectrometry and fluorimetry.
3	M.Sc. Semester- III	Ist: Plant Development	• To get knowledge about important features of plant development. • To know different aspects of seed germination and seedling growth. • Study of organization of SAM, control of differentiation of tissues and wood development. • To know about organization of RAM, vascular tissue differentiation and root-microbe interaction. • Understand about phyllotaxy, control of leaf formation. • Study of origin, structure and differentiation of

			different plant tissues. • To gain knowledge of secondary growth and abnormal secondary growth in various plants.
		2nd: Plant Reproduction	• To know about flower structure and genetics of floral organ differentiation. • Study of microspore and development of male gametophyte. • Understand about megasporogenesis, organization of female gametophytes, GSI and SSI, fertilization. • Know about embryogenesis, endosperm development, storage proteins, dynamics of fruit growth. • Understand about PCD, senescence.
		3rd: Plant Ecology	• Gain knowledge of different types of climatic, edaphic, biotic factors and their interrelationships. • To know about primary production in ecosystem, energy flow, trophic organization, litter fall and decomposition, different biogeochemical cycles. • Study of different biomes and vegetation of the world, analytical and synthetic characteristics of a community, ordination,

			concept of ecological niche. • Study of air, water and soil pollution and Climate change. • To know about resistance, resilience, ecological perturbations, EIA and ecosystem restoration, ecological management.
		4th: Plant Pathology	• Study of history of plant pathology, its development and trends in 21st century. • Understand about parasitic and non-parasitic diseases. • To know about parasitic ability and virulence, mode of infection. • Understand about role of enzymes in pathogenesis, resistance and susceptibility, phytoalexins.
		Lab-1: Based on Paper I&II	• To study the effect of different factors on seed germination and seedling growth. • Gain knowledge of SAM, phyllotaxy and internal structure of leaves. • Study of whole root and internal structure of roots. • Study of different types of tissues and secondary growth. • To know the technique of study of microspore, microsporogenesis, megaspors,

			megasporogenesis, pollen viability, pollen germination, pollen tube growth. • Field study of different types of pollination mechanism. • Study of emasculation, and isolation of embryos at different stages.
		Lab-2: Based on Paper III&IV	• Understand to calculate mean, variance, standard deviation, standard error, coefficient of variation and t-test. • To know about community characteristics by quadrate method. • Gain skill of determination of productivity of ecosystem. • To know the technique of determination of organic matter. • To know about calibration of microscope. • Gain skill of determination of dimensions of microbes and their isolation on media. • Study of symptoms of plant diseases, effects of various biopesticides and artificial pathogenesis.
	M.Sc. Semester-IV	Ist: Plant Cell, Tissue and Organ Culture	• To understand about basic concepts and scope of Biotechnology. • To get acquainted with cellular differentiation, totipotency, organogenesis and adventive

			embryogenesis. • To understand about somatic hybridization, artificial seed, protoplast fusion, production of secondary metabolites, cryopreservation.
		2nd: Plant Resource Utilization and Conservation	• To gain knowledge of biodiversity of ecosystem, IUCN categories of threats, hot spots, utilization of plants. • To gate acquainted with world centers of primary diversity of domesticated Plants. • Understand about origin, evolution, botany, cultivation and uses of some important plants. • To have knowledge of *in situ* and *ex situ* conservation, BSI, NBPGR, ICAR, CSIR, DBT.
		3rd: Genetic Engineering of Plants and Microbes and Biostatistics	• To understand about gene cloning, DNA synthesis and sequencing, PCR, DNA fingerprinting. • To have knowledge of strategies for development of transgenics, *Agrobacterium,* gene tagging, chloroplast transformation, IPR, ecological risk. • Understand about bacterial transformation, selection of

			recombinants, nitrogen fixer's, fermentation technology. • To have knowledge of mapping of genes, molecular markers, genome projects, bioinformatics, microarrays and protein profiling. • To understand about dispersion, standard deviation, standard error, comparison of data by chi-square test.
		4th: Plant Pathology-II	• To get knowledge of effect of environment on disease development. • Regulatory, chemical, biological and breeding for disease resistant varieties. • Crop loss estimate and recommended control for important plant diseases caused by bacteria, viruses, mycoplasma and nematodes.
		Lab-1: Based on Paper I&II	• To know the technique of preparation of Tissue Culture medium and method of transfer of explants on culture media. • Study of isolation of protoplast. • Initiation of organogenesis and embryogenesis using appropriate explants. • Study of some economically important plants.

			• To have knowledge of herbarium, field survey and scientific visit to a protected area.
		Lab-2: Based on Paper III&IV	• Study of bacterial culture media. • To know the technique of isolation of total DNA and plasmid DNA. • Isolation of Rhizobium and Agrobacterium from plant. • Study of various bacterial/ fungal plant pathogens. • To know about antibiosis. • To gain skill of technique of isolation of cellulose.

GOVERNMENT T.C.L. POST GRADUATE COLLEGE JANJGIR

Dist- Janjgir-Champa, Chhattisgarh

Affiliated to Atal Bihari Vajpayee Vishwavidyalaya Bilaspur (C.G.)

Website: http://www.govttclpgcollege.ac.in, Email- tclpgcollege@gmail.com

Phone No. 07817222240

Program Outcomes, Program Specific Outcomes and Course Outcomes

Department of Chemistry

Programme Outcomes: B.Sc. Chemistry

Department of Chemistry	After successful completion of three year degree program in Chemistry a student should be able to-
Programme Outcomes	PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. PO-2. Solve the problem 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 reaction 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.

Programme Specific Outcome	PSO1. Have sound knowledge about the fundamentals and applications of chemical and Scientific theories. PSO2. Every branch of Science and Technology is related to Chemistry PSO3. Easily assesses the properties of all elements discovered. PSO4. Apply appropriate techniques for the qualitative and quantitative analysis of chemicals in laboratories and in industries. PSO5. Will become familiar with the different branches of chemistry like analytical, organic, inorganic, physical, environmental, polymer and biochemistry PSO6. Helps in understanding the causes of environmental pollution and can open up new Methods for environmental pollution control. PSO7. Develops analytical skills and problem solving skills requiring application of chemical principles. PSO8. Acquires the ability to synthesise, separate and characterize compounds using laboratory and instrumentation techniques.

Course outcome of B.Sc. Part-I

Course	**Outcomes** After successful completion of these courses students should be able to;
INORGANIC CHEMISTRY Paper Code- 0795 Total Hours: 60 hrs. M.M. 33	CO1. Knowledge of atomic structure and periodic properties of elements. CO2. Understand various types of bonding in covalent molecules and ions. CO3. Understand various types of bonding in ionic solids.

	CO4. Comparative knowledge of s-block elements of periodic table and there compounds. Chemistry of noble gases. CO5. Comparative knowledge of s-block elements of periodic table and there compounds. Chemical principles involve in inorganic chemical analysis.
Paper- II: ORGANIC CHEMISTRY Paper Code- 0796 Total Hours: 60 hrs. M.M. 33	CO1. Knowledge of electronic structure, bonding and mechanism of organic reactions. CO2. Knowledge of stereochemistry of organic compounds. CO3. Understand Chemistry of aliphatic and aromatic ring compounds. CO4. Understand Chemistry of alkenes, dienes and alkynes. CO5. Understand Chemistry of arenes and aromaticity.
Paper- III: PHYSICAL CHEMISTRY Paper Code- 0797 Total Hours: 60 hrs. M.M. 34	CO1. Understand the idea of mathematical concepts for chemists and basic knowledge of computer. CO2. Knowledge of various types of molecular velocities and their effect on properties. Understand behaviour of ideal gases. CO3. Understand intermolecular forces in liquid state, ideal and non ideal solutions, properties of dilute solutions. CO4. Understand structure, properties and uses of liquid crystals. Colloidal states and its properties and uses. CO5. Understand chemical kinetics rate constant and order of reactions and various theories. Characteristics types and industrial applications of catalysis.
Practical work Total Hours: 180 hrs. M.M. 50	CO1. Analyse qualitatively acid and basic radicals by semi-micro analysis method. CO2. Calibration of thermometers. CO3. Determination of melting point and boiling point of organic compounds. CO3. Mixed melting point determination. CO4 Crystallization CO5. Decolourisation and crystallization using charcoal.

	CO6. Sublimation. CO7. Detection of Nitrogen, Sulphur and Halogens and detection of functional group present in organic compounds. CO8. To determine specific rate of hydrolysis of methyl/ethyl acetate catalysed by hydrogen ion at room temperature. CO9. To study distribution of iodide between water and carbon tetra chloride. CO10. To determine the % composition of a given mixture by viscosity method.
Course Outcomes B.Sc. Part Two	
Course	**Outcomes** After successful completion of these courses students should be able to;
Paper- I : INORGANIC CHEMISTRY Paper Code- 0845 Total Hours: 60 hrs. M.M. 33	CO1. Understand chemistry of first transition series elements. CO2. Understand chemistry of second and third transition series elements. CO3. Understand Oxidation and reduction. Coordination compounds. CO4. Understand chemistry of lanthanides and actinides. CO5. Understand Acid and bases and non-aqueous solvents.
Paper- II : ORGANIC CHEMISTRY Paper Code- 0846 Total Hours: 60 hrs. M.M. 33	CO1. Understand chemistry of alcohols, phenols and epoxides. CO2. Understand chemistry of aldehydes and Ketons and its uses. CO3. Understand chemistry of carboxylic acid, substituted carboxylic acids and there derivatives. CO4. Understand Chemistry of organic compound of nitrogen. CO5. Understand Chemistry of heterocyclic compounds and amino acids & peptides.
Paper- III: PHYSICAL CHEMISTRY Paper Code- 0847	CO1. Understand first law of thermodynamics and thermo chemistry. CO2. Understand second law of thermo chemistry, efficiency of a

Total Hours: 60 hrs. M.M. 34	heat engine and concept of entropy. CO3. Understand phase equilibrium, Gibbs rule, and application of phase rule to two component systems and three component systems and Nernst distribution law. CO4. Understand electrolytic conductance, theories of strong electrolytes and migration of ions. CO5. Understand electrochemical cell or galvanic cell, single electrode potential, concentration cell, pH and its determination and corrosion.
Practical work Total Hours: 180 hrs. M.M. 50	CO1. Calibration of fractional weights, pipettes and burettes. CO2. Preparation of standard solutions CO3. Quantitative volumetric estimation of vinegar, antacid tablets, chalk, hardness of water, ferrous & ferric and copper. CO3.Colorimery: Jobs method and mol ratio method. CO4. Adulteration in food stuffs. CO5. Effluent analysis. CO6. Water analysis. CO7.Solvant extraction- separation and estimation of Mg and Fe. CO8. Ion exchange method; separation and estimation of Mg and Zn. CO9. Thin layer chromatography: Determination of Rf value and identification of organic compounds. CO10. Paper chromatography Ascending and circular, Determination of Rf value and identification of organic compounds CO11. Qualitative analysis: identification of an organic compound. CO12. Determination of the transition temperature of given substance by thermometric/ dialometric method. CO13. To study of a solute on the critical solution temperature of two partially miscible liquids CO14. Construct the phase diagram of two component system by cooling curve method.

	CO15. Determine the solubility of benzoic acid at different temperature. CO16. Determine the enthalpy of neutralization and ionization.
Course Outcomes B.Sc. Part-III	
Course	**Outcomes** After successful completion of these courses students should be able to;
Paper- I : INORGANIC CHEMISTRY - I Paper Code- 0895 Total Hours: 60 hrs. M.M. 33	CO1. Understand metal ligand bonding in transition metal complexes. Thermodynamics and kinetic aspects of metal complexes. CO2. Understand magnetic properties of transition metal complexes and electronic spectra of complexes. CO3. Understand chemistry of organometallic compounds. CO4.undrstand bioinorganic chemistry. CO5. Understand hard and soft acids and bases and silicones and phosphazenes.
Paper- II : ORGANIC CHEMISTRY Paper Code- 0896 Total Hours: 60 hrs. M.M. 33	CO1. Understand chemistry of organometallic compounds, organosulphur compounds and organic synthesis via enolates. CO2. Understand biomolecules carbohydrates, proteins and nucleic acid. CO3. Understand Chemistry of synthetic polymers and synthetic dyes. CO4. Understand mass spectroscopy, infrared spectroscopy, UV-Visible spectroscopy and application of mass, IR, UV-Visible spectroscopy to organic molecules. CO5. Understand NMR spectroscopy and ^{13}CMR spectroscopy and magnetic resonance imaging.
Paper- III: PHYSICAL CHEMISTRY Paper Code- 0897 Total Hours: 60 hrs. M.M. 34	CO1.Understand Quantum Mechanics black body radiation, DeBroglie's idea of matter waves, Schrödinger time independent wave equation and its applications. CO2. Understand quantum mechanical approach to molecular orbital theory, Orbitals and there characteristics. CO3. Understand Vibrational and Raman spectra.

	CO4. Understand Third law of thermodynamics, Nernst theorem and its application. Physical property and molecular structure, Magnetic properties. CO5. Understand of chemical kinetics rate constant and order of reactions and various theories. Characteristics types and industrial applications of catalysis.
Practical work Total Hours: 180 hrs. M.M. 50	CO1. Synthesis analysis of sodium trioxalato ferrate(III). CO2. Preparation of Ni-DMG. CO3. Preparation of Copper tetra ammine complex. CO3. Preparation of cis- and trans-bioxalato diaqua chromate(III). CO4. Gravimetric analysis of Cu as CuSCN, Ni as Ni(DMG), Ba as BaSO4 and Fe as Fe_2O_3 CO5. Steam distillation: Naphthalene from its suspension in water, Clove oils from clove, Separation of ortho and para-nitrophenols. CO6. Separation of fluorescein and methelene blue by column chromatography. CO7. Separation of leaf pigments from Spinach leave by column chromatography. CO8. Resolution of recemic mixture of (+,-) maleic acid by column chromatography. CO9. Analysis of an organic mixture containing two solid components. CO10 Acetylation of salicylic acid, aniline, glucose and hydroquinone. CO11. Benzoylation of aniline and phenol. CO 12. Preparation of m-dinitrobenzene, p-nitroacetanilide. CO13. Preparation of p-bromoacetanilide, 2,4,6-tribromophenol. CO14. Preparation of methyl orange and methyl red. CO15. Preparation of benzoic acid from toluene. CO16. Preparation of aniline from nitrobenzene, preparation of m-nitro aniline from m-dinitrobenzene.

	CO17. Determine strength of given acid conductometrically using standard alkali solution. CO18. Study of saponification of ethyl acetate conductometrically. CO19. Determine the specific rotation of a given optically active compound. CO20. Determination of molecular weight of a non-volatile solute by Rast method/ Beckmann freezing point method. CO21. Verify Beer-Lambert law for $KMnO_4$/ $K_2Cr_2O_7$ and determination of concentration of the given solution of the solution.

Post Graduate M.Sc. Chemistry

Department of Chemistry	After successful completion of two year degree programme in chemistry a student should be able to;
Programme Outcomes	PO-1.Demonstrate, solve and an understanding of major concepts in all disciplines of Chemistry. PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion. PO-3. Create an awareness of the impact of chemistry on the society, and development outside the scientific community. PO-4. Become professionally trained in the area of Industry, material science, lasers and Nano-Technology. PO-5. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Chemistry experiments. PO-6. To inculcate the scientific temperament in the students and outside the scientific community. PO-7. Apply modern methods of analysis to chemical systems in a laboratory setting.
M.Sc.Chemistry Semester- I	
Programme Specific Outcome	PSO1 Provide theoretical background and develop practical skills for analysing materials using modern analytical methods and

	instruments, PSO2 Inculcate a problem solving approach by coordinating the different branches of chemistry. PSO3 Becomes professionally skilled for higher studies in research institutions and to work in chemical industries. PSO4 In-depth knowledge helps to qualify in competitive exams.
Course Outcomes M.Sc. Chemistry Semester-I	
Paper- I : INORGANIC CHEMISTRY M.M. 100	CO1. Understand stereochemistry and bonding in main group compounds. CO2. Understand metal ligand bonding. CO3. Understand electronic spectra of transition metal complexes. CO4. Understand magnetic properties of transition metal complexes. CO5. Understand symmetry and matrix representation. CO6. Understand group theory in chemistry.
Paper- II : ORGANIC CHEMISTRY M.M. 100	CO1. Understand reaction intermediates. CO2. Understand nature of bonding in organic molecules. CO3. Understand stereochemistry. CO4. Understand reaction mechanism: structure and reactivity. CO5. Understand pericyclic reactions. CO6. Understand molecular rearrangement
Paper- III : PHYSICAL CHEMISTRY M.M. 100	CO1. Understand Introduction to exact quantum mechanical results. CO2. Understand approximate methods and angular momentum. CO3. Understand electronic structure of atom. CO4. Understand molecular orbital theory. CO5. Understand chemical dynamics. CO6. Understand surface chemistry.

	CO7. Understand macromolecules
Laboratory Course-I : ORGANIC CHEMISTRY M.M. 100	CO1. Separation, purification and identification of binary organic mixture. CO2. Organic synthesis based on various reactions. CO3. Quantitative estimation of various organic compounds.
Course Outcomes M.Sc. Chemistry Semester- II	
Paper- I : INORGANIC CHEMISTRY M.M. 100	CO1. Understand metal ligand equilibrium in solution. CO2. Understand reaction mechanism of transition metal complexes. CO3. Understand metal clusters. CO4. Understand metal carbonyls and metal nitrosyls. CO5. Understand isopoly and hetropoly acid and salts.
Paper- II : ORGANIC CHEMISTRY (REACTION MECHANISM) M.M. 100	CO1. Understand aliphatic electrophilic substitution. CO2. Understand aliphatic nucleophilic substitution. CO3. Understand aromatic nucleophilic substitution. CO4. Understand free radical reaction. CO5. Understand addition to carbon-carbon multiple bond. CO6. Understand addition to carbon-hetero multiple bonds. CO7. Understand elimination reactions.
Paper- III: PHYSICALCHEMISTRY (KINETICS AND ENERGETICS) M.M. 100	CO1. Understand classical thermodynamics. CO2. Understand statistical thermodynamics. CO3. Understand non equilibrium thermodynamics. CO4. Understand electrochemistry. CO5. Understand electro catalysis. CO6. Understand electron diffraction and neutron diffraction.
Paper- IV : SPECROSCOPY,	CO1. Understand atomic spectroscopy.

DIFFRACTION METHODS & COMPUTER FOR CHEMISTS M.M. 100	CO2. Understand molecular spectroscopy. CO3. Understand photo electric spectroscopy. CO4. Understand Nuclear magnetic resonance spectroscopy. CO5. Understand Electron spin resonance spectroscopy. CO6. Understand photo acoustic spectroscopy. CO7. Understand X-ray diffraction. CO8. Understand computer fundamental. CO9. Understand programming in C. CO10. Understand programming in chemistry and use of computer programmes.
Laboratory Course-I: INORGANIC CHEMISTRY M.M. 100	CO1. Qualitative analysis of mixture containing eight radicals including some less common metal ions. CO2. Quantitative analysis involving two ions in alloys or mixture in solution- one by volumetric and other by gravimetric method. CO3. Quantitative Analysis:-involving two of following in ores, alloys or mixture in solution- one by volumetric and other by gravimetric method Ag, Cu, Fe, Cr, Mn, Ni, Zn, Ca, Mg, Chloride, Sulphate. CO4. Estimation of:- (A) Phosphoric acid in Commercial ortho phosphoric acid. (B) Boric Acid in Borax. (C) Ammonium ion in Ammonium Salt. (D) MnO in pyrolusite (E) Available Cnl0rlne, in bleaching powder. (F) H_2O_2 in commercial sample. CO5. Preparation of selected inorganic compounds and study of their properties by various method including IR, Electronic Spectra, Mossbauer, ESR. Spectra, Magnetic susceptibility etc. (i) V(acac)2 (ii) cis $K[Cr(C_2O_4)_2(H_2O)_2]$, (iii) $[Co(NH_3)_6]Cl_3$, trans $K[Cr(C_2O_4)_2(H_2O)_2].2H_2O$ (iv) Na $[Cr(NH_3)_2 (SCN)_4]$ (v) Mn $(acac)_3$ (vi) $K_4[Fe(C_2O_4)_3]$ (vii) Prussian Blue, Turnbull's Blue.

	(viii) $[Co(NH_3)_4][Co(NO_2)_6]$ (ix) Hg $[Co(SCN)_4]$ (x) $[Ni(NH_3)_4]Cl_2$, (xi) Ni $(DMG)_2$, (xii)$[Cu(NH.)_4SO_4$ (xii) $K_3[Cr(C_2O_4)_3].3H2O$ (xiii) $[Cu(NH_3)_4]SO_4$
Laboratory Course-II: PHYSICAL CHEMISTRY M.M. 100	CO1. Verification of Freundlich's Adsorption isotherm. CO2. To study surface tension - concentration relationship for. solutions (Gibbs equation). CO3. Determination of congruent composition and temperature of binary system e.g. diphenylamine - benzophenone system. CO4. Determination of glass transition temperature of given salt e.g. $CaCl_2$ conductometrically. CO5. To construct the phase diagram for three component system e. g. chloroform, acetic acid and water. CO6. Hydrolysis of an ester/ ionic reactions. CO7. Determination of the velocity constant of hydrolysis of an ester. Determination of effect of (a) change of temperatures, (b) change of concentration of reactants and catalyst and(c) ionic strength of the media on the velocity constant of media. CO8. Determination of the rate constant for the oxidation of iodide ions by hydrogen peroxide. CO9. Determination of the primary salt effect on the kinetics of ionic reaction and Testing of the Bronsted relationship (iodide ions oxidized by persulphate ion). CO10. Determination of solubility of sparingly soluble salt (e.g. $PbSO_4$, $BaSO_4$) Conductometrically. CO11. Determination of the strength of strong and weak acids in a given mixture conductometrically. CO12. Determination of dissociation constant of weak electrolyte by conductometer. CO13. .Determination of velocity constant, Order of reaction and energy of activation for Saponification of ethyl acetate by sodium hydroxide. CO14. Determination of the strength of strong and weak acid in a given mixture using pH meter/potentiometer.

	CO15. Determination of dissociation constant of weak acid by pH meter. CO16. Determination of concentration of acid in given buffer solution by pH meter. CO17. Determination of strength of halides in a mixture potentiometrically. CO18. Determination of the valency of mercurous ions potentiometrically. CO19. Determination of the strength of strong acid, weak acids in a given mixture using a potentiometer/ pH meter. CO20. Determination of temperature dependence of EMF of a cell. CO21. Determination of the formation constant of silver- ammonia complex and stoichiometry of the complex potentiometrically. CO22. Determination of activity and activity coefficient of electrolytes. CO24. Determination of thermodynamic constant. ΔG, ΔS and ΔH for the reaction by e.m.f. method. $Zn + H_2SO_4 = ZnSO_4 + H_2$ CO25. Determination of the dissociation constant of monobasic / dibasic acid. CO26. Determination of rate constant for hydrolysis/inversion of sugar using a polarimeter. Enzyme kinetic - inversion of sucrose. CO27. Determination of molecular weight of non-volatile and non-electrolyte/electrolytes by cryoscopy method and to determine the activity coefficient of an electrolyte. CO28. Determination of the degree of dissociation of weak electrolyte and to study the deviation from ideal behaviour that occurs with a strong electrolyte.
Course Outcomes M.Sc. Chemistry Semester- III	
Paper- I : APPLICATIONS OF SPECTROSCOPY (COMPULSORY) M.M. 100	CO1. Understand Vibrational spectroscopy. CO2. Understand Electron spin resonance spectroscopy. CO3. Understand Nuclear Magnetic Resonance of Paramagnetic substances in solution

	CO4. Understand Ultraviolet and Visible Spectroscopy. CO5. Understand Nuclear Magnetic Resonance Spectroscopy. CO6. Understand Carbon-13 NMR Spectroscopy. CO7. Understand mass Spectrometry.
Paper- II: CHEMISTRY OF BIO-INORGANIC & BIO.ORGANIC (COMPULSORY) M.M. 100	CO1. Understand Metal ions in Biological Systems. CO2. Understand transport and storage of dioxygen. CO3. Understand introduction of bioorganic chemistry. CO4. Understand enzymes. CO5. Understand kind of reactions catalysed by enzymes. CO6. Understand Co-enzyme chemistry. CO7. Understand enzyme models. CO8. Understand biotechnological application of enzymes.
Paper- III: ORGANOTRANSITION METAL CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand Alkyls and Aryls of Transition Metals. CO2. Understand Compounds of transition Metal-Carbon multiple bond. CO3. Transition Metal π-complexes. CO4. Understand Transition Metal Compounds with Bonds to Hydrogen. CO5. Understand Fluxional Organometallic Compounds. CO5. Understand homogeneous catalysis.

Paper- IV: PHOTOINORGANIC CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand basics of photochemistry. CO2. Understand properties of exited states. CO3. Understand exited states of metal complexes. CO4. Understand ligand field photochemistry. CO5. Understand metal complex sensitizers. CO6. Understand redox reactions by exited metal molecules.
Course Outcomes M.Sc. Chemistry Semester- IV	
Paper- I: PHOTOCHEMISTRY & SOLID STATE CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand photochemistry reaction. CO2. Understand determination of reaction mechanism. CO3. Understand photochemistry of alkenes. CO4. Understand photochemistry of carbonyl compounds. CO5. Understand photochemistry of aromatic compound. CO6. Understand miscellaneous photochemical reactions. CO7. Understand solid state reactions. CO8. Understand crystal defects and non-stoichiometry. CO9. Understand electronic property and band theory.
Paper- II: BIO-PHYSICAL & ENVIRONMENTAL CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand Biological cell and its constituents. CO2. Understand Statistical mechanics in biopolymers. CO3. Understand Biopolymer interactions. CO4. Understand Thermodynamics of biopolymer solutions. CO5. Understand Cell Membrane and Transport of Ion. CO6. Understand Biopolymer and their Molecular Weights.

	CO7. Understand diffraction method. CO8. Understand Environment. CO9. Understand Hydrosphere. CO10. Understand water quality parameter. CO11. Understand industrial pollution
Paper- III: BIOINORGANIC CHEMISTRY & SUPRA-MOLECULAR CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand Metal Storage Transport and Bio-mineralization. CO2.Understand Metalloenzymes CO3.Understand Peroxidise and cytochrome p-450. Copper enzymes. CO4.Understand Metal-Nucleic Acid Interactions CO5.Understand Metals in Medicine. CO6.Understand Molecular recognition. CO7.Understand Transport processes and carrier designs. Understand supra-molecular chemistry.
Paper- IV: ANALYTICAL CHEMISTRY (Optional for group-A, Inorganic Chemistry) M.M. 100	CO1. Understand Introduction, classification and various technique of analytical chemistry. CO2. Understand Error and Evaluation. CO3. Understand Food Analysis. CO4. Understand Analysis of Water Pollution. CO5. Understand Analysis of Soil Fuel. CO6. Understand Fuel analysis.
Laboratory Course-: (SPECIAL CHEMISTRY) PHOTO INORGANAIC & ORGANO-TRANSITION CHEMISTRY M.M. 100	CO1. Preparation of selected inorganic compounds and their study by IR, electronic spectra, Mossbauer, ESR, and magnetic susceptibility measurements. Handling of air and moisture sensitive compounds involving vacuum lines. CO2. Kinetics and mechanism of following reactions: i. Substitution reactions in octahedral complexes (acid hydrolysis and base hydrolysis). ii. Redox reaction in octahedral iii. Isomerisation reaction of octahedral. CO3. Extraction of chlorophyll from green leaves of

	student's choice. Separation of chlorophylls and their electronics spectral study. CO4. Complexation study of Cu (II) ion with biologically important amino acids. CO5. Synthesis of potassium ferrioxalate and determination of the intensity of radiation. ii. Photo-oxidation of oxalic by U02 sensitization. iii. Photodecomposition of HI and Determinant of its quantum yield.

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GOVT. T.C.L. P.G. COLLEGE JANJGIR(C.G.)

Department Of Mathematics

B.Sc. Maths(Graduate)

Programme Specification Outcomes

On Completion Of The Student Will Be Able To -

PS01 - Provide The Basic Knowledge Of Maths.

PS02 - Understand Different Problem Of Maths.

PS03 - Measure The Height Of a Building Or Mountain.

PS04 - Appear For Competitive Examination.

PS05 - Use For Teaching In School Level.

PS06 - Use In Engineering and Medical Fields.

PS07 - Use In Banking and Railway Areas.

PS08 - Helps The Study in Higher Education.

PS09 - Thinking a Critical Manners.

PS10 - Calculate The Motion Of Body and Various Oscilators.

PS11 - Develop Self Confidence, Skill and Reasoning.

S.N.	Name Of Course	Name Of Sub./Paper	Course Outcome
1	B.Sc. 1st	Algebra & Trigonometry - 1	1. To Give The Student Of First-Hand Knowledge Of Matrix.
			2. To Develop In Students Application Of Linear Equation .
			3. To Give Knowledge Of Major Mathematians Of Their Contribution.
			4. To Give The Students On Knowledge Of Mappings And Homomorphism.
			5.To Understand Permutation Group.
			6. Knowledge Of Trigonometrical Functions.
			7. Understand Group And Its Properties.
2	B.Sc. 1st	Elementary Calculus - 2	1. Knowledge Of Limit Of Function Asymptotes.
			2. Understand Of Curvature & Tracing Of Curves.
			3. Understand Of Integration Of Transcendental Functions.
			4. Knowledge Of Degree And Order Offer Differential Equation.
			5. Knowledge Of Linear Differential Equation.
3	B.Sc. 1st	Vector Analysis & Geometry - 3	1. Knowledge Of Is Scalar And Vector Product.
			2. Understand Vector Integration In Theorem Of Gauss And Green Stocks.
			3. Understand System Of Conics And Polar Equation Of Conic.
			4. Understand Plane, Sphere And Cone.
4	B.Sc. 2nd	Advanced Calculus - 1	1. Understand Sequence And Series.
			2. Understand Continuity Of Function And It's Properties.
			3. Understand Beta And Gamma Functions And Its Theorem.
			4. Understand The Euler Theorem On Homogeneous Function.
			5. Understand Envelops Maxima And Minima Lagrange's Multiplier Method.
5	B.Sc. 2nd	Differential Eqaution - 2	1. Understand The Power Series Method Bessel And Legendre Functions.
			2. Understand Laplace Transformation And It's Existence Theorem.

			3. Understand The Lagrange's Solution And Charpit Method.
			4. Understand Variational Problem With Fixed Boundaries Eulers Equation For Functional Containing First Order Derivatives.
6	B.Sc. 2nd	Mechanics - 3	1. Understand Equilibrium Of Coplanar Forces Stable And Unstable Equilibrium And Virtual Work.
			2. Understand Forces In Three Dimensions Poinsot's Central Axis And Null Lines And Planes.
			3. Knowledge Of Simole Harmonic Motion And Hooke's Law.
			4. Understand Velocities And Acceleration Along Radial And Transverse Directions.
			5. Knowledge Of Kepler's Law Of Motion (Planetary Motion).
7	B.Sc. 3rd	Analysis - 1	1. To Give The Student A First Hand Knowledge Of Series Of Arbitrary Term Double Series And Implicit Function.
			2. Understand The Riemann Integral And The Fundamental Theorem Of Integral Calculus.
			3. Knowledge Of Matric Space And Limit Points.
			4. Understand Complex Numbers As Ordered Pair And Analytic Function.
			5. Understand Baire Category Theorem And Extension Theorem.
8	B.Sc. 3rd	Abstract Algebra - 2	1. To Give The Student A Knowledge Of Group Automorphism A Normalizer.
			2. Understand Ring Theory And Homomorphism And Isomorphism Theorem.
			3. To Give The Student A Knowledge Of Vector Space And Their Basic Properties Basis.
			4. To Give The Student A Knowledge Of Linear Transformation And Diagonalization.
			5. Understand Inner Product Space And Cauchy Schwarz Inequality.
9	B.Sc. 3rd	Discrete Mathematics - 3	1. Understand Phrase Structure Grammars And Langauges.
			2. Knowledge Of Relation And Function Graph.
			3. Understand Finite State Machine And Equivalent Machine.

			4. Understand Recurrence Relation And Homogeneous.
			5. Understand Boolean Algebra (Lattice) And Boolean Function
			6. Knowledge Of Switching Circuits.

S.N.	Name Of Course	Name Of Sub./Paper	Course Outcome
1	B.Sc. 1st	Algebra & Trigonometry - 1	1. To Give The Student Of First-Hand Knowledge Of Matrix.
			2. To Develop In Students Application Of Linear Equation .
			3. To Give Knowledge Of Major Mathematians Of Their Contribution.
			4. To Give The Students On Knowledge Of Mappings And Homomorphism.
			5.To Understand Permutation Group.
			6. Knowledge Of Trigonometrical Functions.
			7. Understand Group And Its Properties.
2	B.Sc. 1st	Elementary Calculus - 2	1. Knowledge Of Limit Of Function Asymptotes.
			2. Understand Of Curvature & Tracing Of Curves.
			3. Understand Of Integration Of Transcendental Functions.
			4. Knowledge Of Degree And Order Offer Differential Equation.
			5. Knowledge Of Linear Differential Equation.
3	B.Sc. 1st	Vector Analysis & Geometry - 3	1. Knowledge Of Is Scalar And Vector Product.
			2. Understand Vector Integration In Theorem Of Gauss And Green Stocks.
			3. Understand System Of Conics And Polar Equation Of Conic.
			4. Understand Plane, Sphere And Cone.
4	B.Sc. 2nd	Advanced Calculus - 1	1. Understand Sequence And Series.
			2. Understand Continuity Of Function And It's Properties.
			3. Understand Beta And Gamma Functions And Its Theorem.
			4. Understand The Euler Theorem On Homogeneous Function.
			5. Understand Envelops Maxima And Minima Lagrange's Multiplier Method.
S.N.	**Name Of Course**	**Name Of Sub./Paper**	**Course Outcome**
5	B.Sc. 2nd	Differential Eqaution - 2	1. Understand The Power Series Method Bessel And Legendre Functions.
			2. Understand Laplace Transformation And It's Existence Theorem.

			3. Understand The Lagrange's Solution And Charpit Method.
			4. Understand Variational Problem With Fixed Boundaries Eulers Equation For Functional Containing First Order Derivatives.
6	B.Sc. 2nd	Mechanics - 3	1. Understand Equilibrium Of Coplanar Forces Stable And Unstable Equilibrium And Virtual Work.
			2. Understand Forces In Three Dimensions Poinsot's Central Axis And Null Lines And Planes.
			3. Knowledge Of Simole Harmonic Motion And Hooke's Law.
			4. Understand Velocities And Acceleration Along Radial And Transverse Directions.
			5. Knowledge Of Kepler's Law Of Motion (Planetary Motion).
7	B.Sc. 3rd	Analysis - 1	1. To Give The Student A First Hand Knowledge Of Series Of Arbitrary Term Double Series And Implicit Function.
			2. Understand The Riemann Integral And The Fundamental Theorem Of Integral Calculus.
			3. Knowledge Of Matric Space And Limit Points.
			4. Understand Complex Numbers As Ordered Pair And Analytic Function.
			5. Understand Baire Category Theorem And Extension Theorem.
8	B.Sc. 3rd	Abstract Algebra - 2	1. To Give The Student A Knowledge Of Group Automorphism A Normalizer.
			2. Understand Ring Theory And Homomorphism And Isomorphism Theorem.
			3. To Give The Student A Knowledge Of Vector Space And Their Basic Properties Basis.
			4. To Give The Student A Knowledge Of Linear Transformation And Diagonalization.
			5. Understand Inner Product Space And Cauchy Schwarz Inequality.
9	B.Sc. 3rd	Discrete Mathematics - 3	1. Understand Phrase Structure Grammars And Langauges.
			2. Knowledge Of Relation And Function Graph.
			3. Understand Finite State Machine And Equivalent Machine.

			4. Understand Recurrence Relation And Homogeneous.
			5. Understand Boolean Algebra (Lattice) And Boolean Function
			6. Knowledge Of Switching Circuits.

GOVT. T.C.L. P.G. COLLEGE JANJGIR(C.G.)

Department Of Mathematics

M.Sc. Maths(Post Graduate)

Programme Specification Outcomes

On completion of the student will be able to -

PS01 - Understand All Branches Of Maths.

PS02 - Know The Computer Langauge and Computer Software.

PS03 - Appear For Competitive Examination.

PS04 - Understand For Electrical and Engineering Technique.

PS05 - Develop Research and Development Management.

PS06 - Understand Teaching Career In School and College, University Level.

PS07 - In Depth Knowledge Helps To Quality In Competative Exams.

PS08 - Understand The Signal Analysis.

S.N.	Name Of Course	Name Of Sub./Paper	Course Outcome
1	M.Sc. 1st, 2nd Sem.	Advanced Abstract Algebra - 1	1. Understand Permutation Group, Isomorphism Theory. 2. Understand Normal Series, Solvable Group And Jordan-Holder Theorem. 3. Understand Rings and Modules Zorn's Lemma. 4. Understand Modules, Vector Space and Rank Nullity Theorem . 5.Understand Field Theory, Neothetherian and Artinian Modules.
2	M.Sc. 1st, 2nd Sem.	Real Analysis - 2	1. Understand The Riemann Stieljes Integral and Fundamental Theory Of Calculus. 2. Understand Function Of Several Variable (Linear Transformation). 3. Understand Sequence and Series Of Function and Its Theorem . 4. Understand Power Series and Abel's Theorem. 5. Understand Measurable Sets and Functions Riesz Theorem. 6. Understand Lebesque Integral and Lebesque LP Spaces.
3	M.Sc. 1st, 2nd Sem.	Topology - 3	1. Understand Topological Spaces, Closed Sets. 2. Understand Separation Axioms and Its Basic Properties. 3. Understand Countable Spaces and Tietz Extension Theory. 4. Understand Compactness and Its Basic Properties. 5. Understand Connected Spaces and Connectedness (Tychonoff's Theorem).
4	M.Sc. 1st, 2nd Sem	Complex Analysis - 4	1. Understand Complex Integration, Cauchy Goursat Theorem And Cauchy's Integral Formula. 2. Understand Meromorphic Functions and Inverse Function Theorem. 3. Understand Residues and Cauchy Residue Theorem. 4. Understand Bilinear Transformation, Their Properties and Classification. 5. Understand Entire Functions, Gamma Function and Its Properties. 6. Understand Canonical Product and Jensen's Formula.
5	M.Sc. 1st, 2nd Sem	Advanced Discrete Mathematics - 5	1.Knowledge Connectives, Truth Table and Tautology. 2. Knowledge Algebraic Structure and Basic Homomorphism Theorem. 3. Understand Lattices(Posets) and It's Properties . 4. Understand The Karnaugh Map Method.

			5. Understand Grammar and Language Finite State Machines. 6. Knowledge Graph Theory, Degree Of Vertex and Trees.
6	M.Sc. 3rd, 4th Sem.	Integration Theory & Functional Analysis - 1	1. To Give The Student a First-Hand Knowledge Of Signed Measure, Hahn Decomposition Theory. 2. To Provide Them With Knowledge Of Inner Product Spaces, Orthonormal Sets, Bessel's Inequality . 3. To Develop In Student The Basic Knowledge Of Uniform Boundedness Theorem . 4. To Give The Students a Knowledge Of Lebesque Stieltjes Integral, Product Measure and Hausdroff Measure .
7	M.Sc. 3rd, 4th Sem	Partial Differential Eqaution	1. Understand Fundamental Solution Of Laplace's Equation, Mean Value Theorem and Properties Of Harmonic Function. 2. Understand Heat Equation, Mean Value Formulae and Properties Of Solution. 3. Understand Laplace and Fourier Transforms and Their Application . 4. Understand Hamilton Canonical Equations and Routh's Equations. 5. To Give The Students Knowledge Of Potential Of Rod, Spherical Shell, Surface and Solid Harmonics .
8	M.Sc. 3rd, 4th Sem	Fuzzy Sets & Their Application - 3	1. Understand Fuzzy Sets α - Cut and Basic Properties On Fuzzy Sets . 2. To Give The Student a First-Hand Knowledge Of Fuzzy Numbers and Fuzzy Equation . 3. Knowledge Of Fuzzy Relation Of Fuzzy Sets and Fuzzy Morphism. 4. Understand Possibility Theory - Fuzzy Measure. 5. Knowledge Of Fuzzy Control Controllers Fuzzyfication. 6. To Develop In Students Decision Making In Fuzzy Environment, Individual Decision Making.
9	M.Sc. 3rd, 4th Sem	Operation Research - 4	1. Understand Operation Research and Its Scope . 2. Knowledge Of Simplex Method and Big M Method Of Solution To LPP. 3. Understand Network Analysis - Shortest Path Problem and Maximum Flow / Problem. 4. Knowledge Of Game Theory - Two Person and Games With Mix Strategies. 5. Understand Of Quequeing System Deterministic Quequeing System.
10	M.Sc. 3rd, 4th Sem	Fluid Mechanics	1. Understand Kinematics - Lagrangian and Eulerian Method. 2. Understand Equation Of Motion - Euler's Dynamical Equation and Incompressible Fluids. 3. Understand Languages Stream Function and Stoke's Stream Function.

			4. Understand Vortex Motion and Its Properties Energy Of Progressive Waves.

DEPARTMENT OF MICROBIOLOGY

Govt. T.C.L. P.G. College Janjgir (C.G.)

PROGRAMME OUTCOMES
(B.Sc. Microbiology)

PO-1. To Knowledge of Research.& Development of Microbiology

PO-2. To Knowledge of classical and modern molecular approach of genetics

PO-3. To Knowledge of normal microbial flora of human body.

PO-4. To Knowledge of symptoms, pathogenicity and preventive measures and treatment of microbial diseases.

PO-5. To Knowledge of immune system and defence mechanism against infectious diseases.

PO-6. To knowledge about role of microbes in production and spoilage of several foods, basic information about fermenter and production of Industrial Microbiological products and production of biofertilizer and its applications.

PROGRAMME SPECIFIC OUTCOMES
(B.Sc. Microbiology)

On completion of the Programme the students will be able to-

PSO-1. Use correct Knowledge of Development of Modern Microbiology.

PSO-2. Understand the unique importance of Modern Microbiology

PSO-3. Understand the values of Microbial Diversity.

PSO-4. Appear for Competitive Examinations.

COURSE OUTCOMES (B.Sc. PART- I /II/III - Microbiology)				
S. No.	**Name of Course**	**Year/ Semester**	**Name of Subject/Paper**	**Course Outcome**
1.	**B.Sc..**	**Part-I (Paper-I)**	**General Microbiology & Basic Technique**	1. To give the Students a first-hand knowledge of Fundamental, History & Developments 2. To enrich the Historical development of Microbiology. 3. To develop in students the Basic Microbial Techniques 4. To give the Students a first-hand knowledge of Virology, Parasitological, Mycology, Phycology & Protozoology & Bacteriology. 5. To give the Students a first-hand knowledge of Major Scientists of India and their contribution in Scientific Research.
2.	**B.Sc..**	**Part-I (Paper-II)**	**Biochemistry & Physiology**	1. To develop in students the Basic Microbial Techniques. 2. To give the Students a first-hand knowledge of Carbohydrates and Proteins, Lipids and Nucleic Acids,& Enzymes 3. To develop in students the knowledge of Microbial Metabolism 4. To make them able to solve the Microbiological questions.
3.	**B.Sc..**	**Part-II (Paper-I)**	**Microbial Physiology & Genetics**	1. To give the Students a first-hand knowledge of bacterial cell division 2. To develop in students the basic knowledge of Primary and Secondary metabolism. 3. To give the Students a knowledge of Genetic recombination 4 To give the Students a knowledge of DNA Repair and restriction
4.	**B.Sc..**	**Part-II (Paper-II)**	**Principles of Bioinstrumentation and Techniques**	1. To give the Students a knowledge of instrumentation. 2. To provide them with knowledge of Electrophoreses techniques- types and their application
5.	**B.Sc..**	**Part-III (Paper-I)**	**Molecular Biology & Genetic Engineering**	1. To give the Students a first-hand knowledge of History of molecular biology, model systems, concepts of molecular biology, Early history of genetic engineering 2. To give the Students a knowledge of DNA repair and restriction, types of repair systems, restriction modification systems
6.	**B.Sc..**	**Part-III (Paper-II)**	**Environmental and Medical Microbiology**	1. To give the Students a knowledge of Aerobiology. 2. To provide them with knowledge of Soil microbiology, Aquaticd microbiology, Food spoilage and food borne infections.

Department of Physics, Govt. T.C.L. P.G. College Janjgir (C.G.)

PROGRAMME OUTCOMES, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES

PROGRAMME OUTCOMES
(Under Graduate)

PO-1. Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.

PO-2. Students will demonstrate knowledge of classical mechanics, electromagnetism, quantum mechanics, and thermal physics, and be able to apply this knowledge to analyze a variety of physical phenomena.

PO-3. Students will show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.

PO-4. Students will be capable of oral and written scientific communication, and will prove that they can think critically and work independently.

PROGRAMME SPECIFIC OUTCOMES
(Under Graduate)

PSO-1 .Understand the core concept of Physics subjects.
PSO-2 .Acquire analytical and logical skill for higher Education.
PSO- 3. Excel in Experimental and Theoretical Physics.
PSO- 4.Trained to take up jobs in applied fields.
PSO-5. Confident to take up competitive exams

COURSE OUTCOMES
(Under Graduate)

S. No.	Name of Course	Year/ Semester	Name of Subject/Paper	Course Outcome (After going through the course, the student should be able to)
1.	B.Sc.	Part-I (Paper-I)	Mechanics, Oscillations and Properties of Matter	*Understand laws of motion and their application to various dynamical situations, motion of inertial frames and concept of Galilean invariance. *Understand the analogy between translational and rotational dynamics. *Understand the phenomena of collisions and idea about centre of mass and laboratory frames and their correlation. *Understand the principles of elasticity through the study of modulus of rigidity. *Understand simple principles of fluid flow and the equations governing fluid dynamics and the phenomena of simple harmonic motion and the

				properties of systems executing such motions. *In the laboratory course, the student shall perform experiments related to mechanics (compound pendulum), rotational dynamics (Flywheel), elastic properties (Young Modulus and Modulus of Rigidity) and fluid dynamics (verification of Stokes law, Searle method) etc.
2.	B.Sc.	Part-I (Paper-II)	Electricity, Magnetism and electromagnetic theory	*Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges. *Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential. *Understand the dielectric properties, magnetic properties of materials and the phenomena of electromagnetic induction. *Apply Kirchhoff's rules to analyze AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor. *In the laboratory course the student will get an opportunity to verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments.
3.	B.Sc.	Part-II (Paper-I)	Thermodynamics, Kinetic theory and Statistical Physics	*Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics, the concept of entropy and the thermodynamic potentials and their physical interpretations. *Learn about Maxwell's thermodynamic relations. *Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion. *Learn to calculate the Maxwell, Bose Einstein, and Fermi Dirac Statistics. *In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determinations of Stefan's constant, coefficient of thermal conductivity, temperature coefficient of resistant etc.
4.	B.Sc.	Part-II (Paper-II)	Waves, Acoustic and Optics	*Recognize and use a mathematical oscillator equation and wave equation, and derive these equations for certain systems *Apply basic knowledge of principles and theories about the behaviour of light and the physical environment to conduct experiments. Use the principles of wave motion and superposition to explain the Physics of polarisation, interference

				and diffraction. *Understand the working of selected optical instruments like biprism, interferometer, diffraction grating. *Distinguish the different types of aberrations and achromatism. *.Use different types of eyepieces according to their application. *Familiar with Basics of Laser Physics. *In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Laser Beam. Resolving power of prism and grating etc.
5.	B.Sc.	Part-III (Paper-I)	Relativity, Quantum Mechanics, Atomic Molecular and Nuclear Physics	*Understand the basic concept of Reference System. *To get familiar with inadequacies of classical mechanics in explaining microscopic phenomena, quantum theory formulation is introduced through Schrodinger equation *Through understanding the behavior of quantum particle encountering a i) barrier, ii) potential, the student gets exposed to solving non-relativistic hydrogen atom, for its spectrum and eigen functions. *Learn the ground state properties of nucleus and know about the nuclear model, nuclear reaction and the process of radioactivity.
6.	B.Sc.	Part-III (Paper-II)	Solid State Physics and Electronics	*A brief idea about crystalline and amorphous substances, about lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones and diffraction of X-rays by crystalline materials *Basic knowledge of N- and P- type semiconductors, mobility, drift velocity, fabrication of P-N junctions; forward and reverse biased junctions. *Application of PN junction for different type of rectifiers and voltage regulators. *NPN and PNP transistors and basic configurations namely common base, common emitter and common collector, and also about current and voltage gain. *Biasing and equivalent circuits, coupled amplifiers and feedback in amplifiers and oscillators. *To characterize various devices namely PN junction diodes, LEDs, Zener diode, solar cells, PNP and NPN transistors. Also construct amplifiers and oscillators using discrete components.

PROGRAMME OUTCOMES
(POST GRADUATE)

PO-1. Demonstrate, solve and an understanding of majorconcepts in all disciplines of

physics.
PO-2. Solve the problem 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 Physics experiments.
PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.
PO-5. To inculcate the scientific temperament in the students and outside the scientific community.
PO-6. Use modern techniques, decent equipments and Phonics software"s

PROGRAMME SPECIFIC OUTCOMES (POST GRADUATE)

PSO-1. Gain the knowledge of Physics through theory and practical"s.
PSO-2. Understand good laboratory practices and safety.
PSO-3. Develop research oriented skills.
PSO-4. Make aware and handle the sophisticated instruments/equipments.

COURSE OUTCOMES (POST GRADUATE)

On completetion of programme the student will able to:

7.	M.Sc. Physics	Semester-I	(Paper-I) Mathematical Method-1	*To understand the vector spaces and matrices. *To obtain the series solution by Legendre and Laguerre polynomial. * Study the Generating function for Bessels and Hermite polynomials. *To obtain the solution of integral transform and fourier series.
8.	M.Sc. Physics	Semester-I	(Paper- II) Classical Mechanics	*Understand Mechanics of system of particles. *Understand the concept of D'Alembert principle. *Solve Langrangian and Hamiltonian formulation. *Learn Canonical Transformation and Poisson"s Bracket.
9.	M.Sc. Physics	Semester-I	(Paper-- III) Numerical Method and C-Programming	*Identify methods to solve numerical algebraic and transcendental equations. *Computes solutions to simultaneous linear algebraic equations. *Understands the concepts of finite differences. * Gains knowledge about to interpolation for equal intervals and unequal intervals. * Understand the Computer fundamentals and the C programming language concepts. *Study the concept of C character set, identifiers and keywords, variable names. *Choose the Loops and Decision Making Statements to solve the problem. *Use Functions to solve the given problem.
10.	M.Sc. Physics	Semester-I	(Paper- IV) Electronics- I	*Know the special purpose of Diode like MIS, MOS CCD. *To study the Microwae devices. *To understand the FET, JFET,MOSFET. *To understand the process of modulation and demodulation.

11.	M.Sc. Physics	Semester-II	(Paper- I) Mathematical Method—II	*Understand the Tensor and their transformation law. *Solve the problem using Green's Function and Boundary value problem. *Understand the Cauchy integral theorem and their evaluation.
12.	M.Sc. Physics	Semester-II	(Paper- II) Quantum Mechanics—I	*Understand the behavior of quantum particle through schrodinger equation and their applications. *Understand the Uncertainty relation and Learn the matrix representation of an operator. *Know the motion in Central force problem. *Study theTime independent perturbation theory and its application such as Zeeman effect and Stark effect.
13.	M.Sc. Physics	Semester-II	(Paper- III) Electrodynamics	*Derive Maxwell equation and wave equation. *Study the Frensel equation and propogation of EW through different media. *Study the Special theory of relativity and Lorentz transformation. *Get extended knowledge of Electromagnetic scalar and vector potential.
14.	M.Sc. Physics	Semester-II	(Paper- IV) Electronics-- II	*Know the principle of LDR and LED. *Know the purpose of Photo detector and Bipolar transistor. *Study the OP-AMP and their types. *Study the Multivvibrators.
15.	M.Sc. Physics	Semester-III	(Paper- I) Quantum Mechanics- II	*To study the application of Time-dependent Perturbation Theory. *To understand the WKB approximation. *Know the application and validity of Born Approximation. *To study the Symmetry in Quantum Mechanics.
16.	M.Sc. Physics	Semester-III	(Paper- II) Statistical Mechanics	*To learn Postulates of statistical mechanics. *To learn statistical interpretation of thermodynamics micro canonical, canonical and grand canonical ensembles *To study the methods of statistical mechanics are used to develop the statistics for Bose-Einstein and Fermi-Dirac statistics. *To understand cluster expansion and Thermodynamic fluctuation.
17.	M.Sc. Physics	Semester-III	(Paper- III) Condensed Matter Physics- I	*Study the Crystalline and Amorphous solids. *Understanding the concept of Defects or imperfection in crystal. *Study the Band theory and hall effect. *Get Knowledge of Weiss theory of ferromagnetism.
18.	M.Sc. Physics	Semester-III	(Paper- IV) Electronics- III	*Understand different Number systems, Codes, Logic Gates, Boolean laws & Theorems. *Simplify the Boolean functions to the minimum number of literals using Karnaugh Map. *Gain knowledge about combinational circuits and sequential circuits. *Can design various synchronous and asynchronous circuits using flip flop. *Design Counters, Shift Registers using J-K / D Flip Flop. *Understand the A to D and D to A converter.
19.	M.Sc. Physics	Semester-IV	(Paper- I) Condensed	*Study the Superconductiity. *Understand the Polarization.

			matter Physics-II	*Study the Semiconductor and its types. *Understand the Nano-structure and their classification.
20.	M.Sc. Physics	Semester-IV	(Paper- II) Nuclear Physics	*Know the properties of nucleus likes binding energy, magnetic dipole moment and electrical quadrapole moment. *To study achievement of Nuclear Models of Physics and its limitations. *To give an extended knowledge about nuclear reactions such as nuclear fission and fusion. *To understand the basic concept of Particle Physics.
21.	M.Sc. Physics	Semester-IV	(Paper- III) Atomic and Molecular Physics	*Know the Spectra of hydrogen, helium, alkali, and alkaline earth metal. *Understand the complete description of Continous X-ray spectra. *Study the Types of molecules. *Study the Diatomic molecule and principle of Frank Condon.
22.	M.Sc. Physics	Semester-IV	(Paper- IV) Electronics-IV	*Explain Microcontroller Architecture *Write simple programs for addition, subtraction, multiplication and division. *Understand the basic concepts of memory interfacing and circuit. *Comprehend a suitable Input and Output peripheral. Study the Optical fibres.

Programme Outcome

Department of Zoology, Govt TCL PG College Janjgir

What is Zoology?

Zoology is one of the most popular branches in Science that involves the study of animals and their biological processes. Zoology courses are offered at the graduate and postgraduate levels. Candidates in this discipline are basically taught regarding animal anatomy, physiology, biochemistry, genetics, evolution, ecology, behavior, and conservation.

Career options after pursuing a BSc, MSc in Zoology are varied. Candidates find opportunities in government departments, environmental agencies, universities, colleges, biotechnological, pharmaceutical, environmental/ecological fields.

Zoology Courses– Eligibility & Entrance Exams

The eligibility criteria for Zoology courses are given below –

- **UG Courses –** The minimum eligibility for admission in BSc in Zoology is Class 12 pass in Science Stream. Candidates must have studied Physics, Chemistry, and Biology in Class 12.
- **PG Courses –** Candidates must have passed BSc/BSc (Hons) in Zoology. Candidates who have passed BSc/BA in medical and allied medical sciences/biosciences/life sciences are also eligible to apply.

Top Entrance Exams for Zoology courses

The admission for BSc courses in Zoology is based on the cutoff list released by college. Candidates are offered admission in MSc courses based on ther marks.

Zoology Syllabus

The syllabus for Zoology is different for different courses and is divided into various semesters. The course teaches candidates regarding the function, structure, and evolution of animals. Candidates also study the beginning, origin, and development of species, their behaviors, their habits, and interactions. The subjects taught in Zoology are as follows –

Morphology	Biochemistry
Physiology	Immunology
Cell and Molecular Biology	Embryology
Biotechnology	Genomics
Genetics Evolution	Ecology
Biosystematics, Structure, and Functions of Invertebrates	Biosystematics, Structure, and Functions of Invertebrates
Tools and Techniques in Biology	Animal Physiology and Ethology
Genetics and Evolution	Structure and Function of Vertebrates
Environmental Biology	Biology of Parasitism
Chronobiology	Proteins- Structure, Functions, and Evolution
Structure and Function of Genes	Animal Behaviour

Zoology Courses – Career Prospects

There are numerous career opportunities for candidates completing their BSc, MSc, and Ph.D. in Zoology in the public and private sectors. Candidates find jobs as Animal Behaviourist, Conservationist, Wildlife Biologist, Zoo Curator, Wildlife Educator, Zoology faculty, Forensic experts, lab technicians, Veterinarians. The salary offered to these posts are given below.

Job Profile	Salary (Per Annum)
Veterinarians	Rs 5 lakh and above
Wildlife Biologist	Rs 5 lakh and above
Conservationist	Rs 5 lakh and above
Wildlife Educator	Rs 4 lakh and above
Zoology faculty	Rs 4 lakh and above
Forensic experts	Rs 4 lakh and above

PROGRAMME SPECIFIC OUTCOMES
DEPARTMENT OF ZOOLOGY
GOVT. T.C.L. P.G. COLLEGE JANJGIR

B.Sc. ZOOLOGY

After successfully completing **M. Sc. Zoology** Programme students will be able to:

1. **PSO1.** Ability to connect and apply biological knowledge to other disciplines and to integrate knowledge into their personal and professional lives.
2. **PSO2**. Explain the origin of life with context to the origin of eukaryotic cell and endosymbiotic theory of origin., fossil records, Darwinism and Neo-Darwinism, experimental evidences. And evolution of horse.
3. **PSO3.** Illustrate zoological science for its application in branches like medical entomology, apiculture, aquaculture and agriculture etc
4. **PSO4.** Understand animal interactions with the environment and identify the major groups of organisms with an emphasis on animals and classify them within a phylogenetic framework.

M.Sc. ZOOLOGY

After successfully completing **M. Sc. Zoology** Programme students will be able to:

1. **PSO1.** Explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system and develop theoretical and practical knowledge in handling the animals and using them as model organism

2. **PSO2**. Illustrate physiological adaptations, development, reproduction and behaviour of different forms of life.

3. **PSO3.** Illustrate zoological science for its application in branches like medical entomology, apiculture, aquaculture and etc.

4. **PSO4.** Develop proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization and relate concepts of comparative biology to explain evolution and success to live in varied environment
5. **PSO5.** To know the detail knowledge about fish and fisheries. The structure and function, adaptation, reproduction, development, special organs like luminous, poison organs of different types of fishes.

COURSE OUTCOME
DEPARTMENT OF ZOOLOGY
GOVT. T.C.L. P.G. COLLEGE ,JANJGIR

B.Sc. Part-I

Cell Biology: -

1. On completion of the course, students are able to:
2. Understand the Scope of cell biology, because cell is the basic unit of life.
3. Understand the Main distinguishing characters between plant cell and animal cell.
4. To study and understand the whole cell organelles with their structure and function.
5. Understand the cell cycle and know the importance of various cells in body of organisms.
6. Understand the various applications of cells by using cell biology like study of various types of tumour.

Non-Chordates: -

On completion of the course, students are able to:

1. Understand about the Non-Chordate animals.
2. To study the external as well as internal characters of non-chordates.
3. To study the distinguishing characters of non-chordates.
4. Understand the economical importance of Molluscs.
5. Understand the Characters of class Asterias with help of animal Sea star.
6. Understand the internal as well as external morphology of that animal.
7. To study and understand the concepts-Metamorphosis, regeneration and autotomy.
8. Understand the Mouthparts of insects.
9. Understand the Canal system in sponges.
10. Understand the Locomotion in Protozoa.
11. To observe and study the Foot in Mollusca.

Chordate: -

On completion of the course, students are able to:

1. Understand the phylum Chordate.
2. Understand the evolution, history of phylum
3. Understand the evolution, history of phylum.
4. Understand the basic concepts about chordates.
5. Understand the external morphology and sexual dimorphism in chordates.
6. Study and understand the various systems, adaptation and dentition in Mammals.

General Embryology: -

After successfully completing this course, students will be able to:

1. Identify the developmental stages
2. Describe the key events in early and systematic embryological development.
3. Describe the process of gametogenesis.

4. Describe the chick development up to 96 hours of incubation and extra embryonic membranes.
5. Explain the theories of preformation, and concepts like growth, differentiation and reproduction.
6. Explain the principles and process of fertilization and cleavage.
7. Prepare the flow chart of gametogenesis process.

Practical Paper: -

After successfully completing this course, students will be able to:

1. Identify the life cycle stages of few parasites.
2. Identify and explain the cleavage blastulae and grastrulae
3. Identify the age of chick embryo.
4. Identify the phases of cell division.
5. List the household Pest and social insects.
6. Explain the pathogenicity and morphology of few ectoparasites.
7. Explain the diseases spread by vectors.
8. Explain the interrelationship of insects and human with examples.
9. Explain the effects of household insects on human health.
10. Demonstrate rectal parasites in cockroach.
11. Demonstrate Mitochondria/ mitotic and meiotic stages by stained preparations.
12. Illustrate the social organization in insects.
13. Prepare temporary slide of chick embryo to identify the stage and age.
14. Prepare mounting of mouth parts of few common insects

B.Sc. Part-II

Structure and Function of Vertebrates:-

After successfully completing this course, students will be able to:

1. Understand the classes of vertebrates: fishes, Amphibia, Reptilia, Aves and Mammals.
2. Study of endoskeleton of vertebrates.
3. Comparative Study of skin of vertebrates.
4. Understand the comparative account of urogenital system, nervous system, digestive system heart and aortic arches and its evolution in vertebrates.

5. Understand the physiology of nerve impulse and signalling mechanism and digestion.

Vertebrate endocrinology and reproductive biology:-

After successfully completing this course, students will be able to:

1. define endocrine grands and hormone.
2. Understand the general idea about hormone roles in animal body.
3. Understand the types of hormone, synthesis, secretion and its function.
4. Understand the mechanism of hormone action and its termination.
5. Understand the reproductive system of animal and its function.
6. Understand the role of hormone in animal reproduction and reproductive cycle.
7. Understand the disease and disorder of imbalance of hormones.
8. Reproductive behaviour in animal like courtship pattern.

Ethology:-

After successfully completing this course, students will be able to:

Define the term ethology/animal behaviour.

Understand the reproductive behaviour in animals.

Understand about orientation behaviour in animal, like taxis, reflexes.

Understand about drugs, hormones and behaviour.

Organic Evolution:-

After successfully completing this course, students will be able to:

1. Define organic evolution.
2. Explain the theories of organic evolution.
3. Describe the concept of origin of life and theories of origin of life.
4. Describe evolution of horse .
5. Illustrate the presence of organisms at various geological time scale.
6. Apply the knowledge in relevant experimentations.
7. Categorize different zoogeographical realms.
8. Compare animal distribution in different zoogeographical realms.

Applied Zoology:-

After successfully completing this course, students will be able to:

1. Introduce the term apiculture to the students.
2. To aware the students and provides the economical importance of Apiculture.
3. Understand the Bee keeping equipments and apiary management.
4. To study and understand the various species of Bees.

Practical Paper:-

After successfully completing this course, students will be able to:

1. Identify the organs by studying the histological slides.
2. Identify hormonal disorders using pictures.
3. Explain the anatomical features of brain, heart, kidney and skin of vertebrates.
4. Explain the anatomical features of brain, heart, kidney and skin of vertebrates.
5. : Identify the fossil types/ adaptations in animals.
6. Explain the evidences of evolution

7. Identify the age of chick embryo.
8. Illustrate the social organization in insects.

B.Sc. III year

Environmental Biology & Toxicology:-

After successfully completing this course, students will be able to:

1. List the environmental challenges and their remedies.
2. Describe the nature of ecosystem, productivity, food webs, energy flow,
3. Describe the resilience of ecosystem and ecosystem management.
4. Explain Biosphere, biomes and impact of climate on biomes.
5. Explain wildlife management in India and conservation of wildlife.
6. Explain the three necessary and sufficient conditions i.e. struggle for existence; variation; and inheritance.
7. Illustrate the toxic effects of chemicals in the environment on human and his
8. livestock.
9. Discuss natural resources, causes of their depletion and their conservation.

Microbiology:-

After successfully completing this course, students will be able to:

1. Understand about general and applied microbiology.
2. Uses of microbes to making for useful product in industries.
3. Microbiology of domestic water and sewage.

Medical microbiology:-

After successfully completing this course, students will be able to:

1. Define the basic terms in parasitology.
2. List common ectoparasites and endoparasites.
3. Explain animal associations and their types.
4. Discuss the life cycle and importance of major parasites.
5. Illustrate transmission routes of animal and zoonotic parasites
6. Classify parasites.
7. Justify the control measures of arthropod vectors.
8. Convince the importance of hygiene with respect to epidemic diseases.

Genetics & Molecular biology:-

After successfully completing this course, students will be able to:

1. Define the basic terms in genetics.
2. Discuss the linkage groups and gene frequency.
3. Explain the concept of mutation.
4. Paraphrase the Central dogma of molecular biology.
5. Illustrate the mechanism of replication, transcription and translation.

Biological Chemistry:-

After successfully completing this course, students will be able to:

1. Define the basic terms in biochemistry.
2. Explain the structure, functions and reactions of the various biomolecules.
3. Give examples of each group type of biomolecules.
4. Correlate the changes in the levels of these biomolecules with the diseases in human
5. Calculate pH and pOH of buffer solution.
6. Classify the biomolecules. And enzyme.
7. Draw the structures of major biomolecules.

Biological techniques:-

After successfully completing this course, students will be able to:

1. Describe the techniques used in hematology.
2. Explain the principle of separation techniques.
3. Illustrate the working of microscopes.
4. List the separation techniques.
5. Demonstrate the principle, working, applications of centrifugation.

Practical Paper:-

After successfully completing this course, students will be able to:

1. Count total leucocytes from blood samples.
2. Estimate the Hb. level in blood samples.
3. Measure the pH of given samples.
4. Identify the life cycle stages of few parasites.
5. Explain the pathogenicity and morphology of few ectoparasites.
6. Explain the importance and applications of techniques in biochemistry

M.Sc. zoology-I sem.

Non-chordate: -

After successfully completing this course, students will be able to:

1) Understand about the Non-Chordate animals.
2) To study the external as well as internal characters of non-chordates.
3) To study the distinguishing characters of non-chordates.
4) Understand the economical importance of Molluscs.
5) Understand the Characters of class Asterias with help of animal Sea star.
6) Understand the internal as well as external morphology of that animal.
7) To study and understand the concepts-Metamorphosis, regeneration and autotomy.
8) Understand the Mouthparts of insects.
9) Understand the Canal system in sponges.
10) Understand the Locomotion in Protozoa.
11) To observe and study the Foot in Mollusca.

Animal behaviour: -

After successfully completing this course, students will be able to:

1) Define the term ethology/animal behaviour.
2) Understand the reproductive behaviour in animals.
3) Understand about orientation behaviour in animal, like taxis, reflexes.
4) Understand about drugs, hormones and behaviour.

Biostatistics:

After successfully completing this course, students will be able to:

1. Explain the application of sampling in biological sciences.
2. Explain standard Probability distributions.
3. Understand the Applications and uses of Statistics.
4. Understand the Data Classification: Frequency, Relative frequency, class limits, class
5. width, inclusive and exclusive method of classification.
6. Understand the mean, mode and median.
7. Understand the Computation of Variation.
8. Understand the Correlation and Regression.
9. Understand the testing of hypothesis.
10. Understand the Statistical hypothesis, Null Hypothesis, Alternative hypothesis etc.
11. Understand the t-test, F-test.
12. Understand the analysis of variance, meaning of ANOVA. One way and two way classification.
13. Explain the concept and types of central tendency.
14. Explain the concept of correlation and regression with their properties.
15. Classify the given data.
16. Graphically represent the given data.
17. Illustrate the measures of dispersion with examples.
18. Solve statistical problems.

Environmental Biology & Toxicology:-

After successfully completing this course, students will be able to:

1. List the environmental challenges and their remedies.
2. Describe the nature of ecosystem, productivity, food webs, energy flow,

3. Describe the resilience of ecosystem and ecosystem management.
4. Explain Biosphere, biomes and impact of climate on biomes.
5. Explain wildlife management in India and conservation of wildlife.
6. Explain the three necessary and sufficient conditions i.e. struggle for existence; variation; and inheritance.
7. Illustrate the toxic effects of chemicals in the environment on human and his livestock.
8. Discuss natural resources, causes of their depletion and their conservation.

Practical I sem. zoology :-

After successfully completing this course, students will be able to:

1) Identify the adaptations in animal.
2) Demonstrate physical and chemical properties of water and soil samples.
3) Explain the interrelationship of insects and human with examples.
4) Explain the effects of household insects on human health.
5) Demonstrate rectal parasites in cockroach.
6) Understand the various internal systems like Digestive system, nervous system with the help of charts.
7) Understand the functions of Gemmules and spicules.
8) Understand the economical importance of Molluscan shells.
9) To study and understand the classification of whole phyla includes in Non chordates
10) with the help of charts/models/pictures.
11) Understand the evolutionary history of Non chordates.

M.Sc. II sem.

Endocrinology and reproductive physiology :-

After successfully completing this course, students will be able to:

1. Discuss the roles of Pituitary gland and pineal body.
2. Explain hormonal regulation of biomolecules and mineral metabolism.
3. Describe the role of osmoregulatory and gastrointestinal hormones.
4. Explain the role of hormones in moulting, change in body colour of crustaceans; yolk synthesis in amphibians; insect development.
5. Illustrate the mechanism of hormone action and role of hormone receptors.
6. Justify hormones as coordination molecules
7. Sex determination in animals
8. Reproductive cycle and maturity in human being
9. Compare and contrast spermatogenesis and oogenesis.
10. Illustrate the histology of endocrine glands.

Cell and Molecular Biology:

After successfully completing this course, students will be able to:

1. Explain the DNA structure & types, topology, Physical properties; chromatin structure and organization.
2. Discuss genome organization.
3. explain the mobile DNA elements.
4. Explain mechanism of DNA damage and repair.

5. Illustrate the process of DNA replication, transcription, translation and their regulations.
6. Schematically represent the processes of central dogma.
7. Justify the post translational and post transcriptional modifications.
8. Aware the students for Cancer.
9. Understand the Aging, Apoptosis

Tools and techniques :-

After successfully completing this course, students will be able to:

1. Explain the importance and applications of techniques in biochemistry.
2. Explain the principle and applications of various chromatographic techniques with
3. examples.
4. Explain the principle, working, materials used and applications of electrophoresis
5. Demonstrate the principle, working, applications of centrifugation.
6. Understand about cryopreservation, and cell culture.
7. Understand about media for cell and tissue culture method.

Practical II sem. Zoology:-

On completion of the course, students are able to:

1. Understand the Animal cells and various cell organelles by using microphotographs.
2. Understand the concept vital staining , distinguishing points between nuclear stain and cytoplasmic stain.
3. Understand the techniques using for the study of blood corpuscles.
4. Understand the meaning of Osmotic pressure, isotonic, hypotonic, hypertonic.
5. explain the principle of Colorimetry and Spectrophotometry.
6. Use the basic equipment in biochemistry lab.

M.Sc. III sem. Zoology

Vertebrate structure and function:-

On completion of the course, students are able to:

1. Understand the terms Histology and Physiology
2. Understand the cell, tissue, organ, system and organisms.
3. Study the derivatives of skin- horns, nails, hairs.
4. Understand the General Topics like Accessory respiratory organs in fishes.
5. Understand and study the various systems like Digestive systems
6. To study and understand the Scales, Fins, Arial adaptation and Dental formula.
7. Understand the Classification various classes of phylum Chordate i.e.Pisces, Reptiles,
8. Aves and Mammals.

Biosystematics and biodiversity:-

After successfully completing this course, students will be able to:

1. State the outline of chordate classification.
2. Classify the higher vertebrate groups.
3. Categorize the diversity found in the vertebrate groups of animals like reptiles,birds and mammals.

4. To know the Biodiversity.
5. Understand the principles and methods of taxonomy.

Immunology and developmental biology:-

After successfully completing this course, students will be able to:

1. List the primary and secondary immune organs.
2. Explain the concepts of immunity, self-nonself immune response, autoimmune
3. disease.
4. Explain the theories of antibody synthesis and generation of antibody diversity.
5. Illustrate the events and dynamics of inflammation
6. Compare the MHC molecules and diseases associated with HLA.
7. Differentiate between active and passive immunization.
8. Compare the three pathways of complement fixation pathway.
9. Define the terms in developmental biology
10. Explain model organism for developmental studies.
11. Explain the concept of fertilization.
12. Explain the concept of mesoderm induction and pattern formation with examples.
13. Explain the concept of growth and differentiation.
14. Illustrate the types of eggs and cleavage pattern.

Population Genetics and evolution:-

After successfully completing this course, students will be able to:

1. To know about evolutionary forces.
2. Can construct a phylogenetic tree.
3. To know about inbreeding.
4. Explain the principles of Population genetics.
5. Illustrate the modified Mendelian laws of inheritance.
6. Justify the inheritance of qualitative and quantitative traits.
7. Solve the problems based on gene frequency.
8. Solve the problems based on Hardy-Weinberg law.

Practical III sem. zoology:-

After successfully completing this course, students will be able to:

1. Identify the pattern of identity of antigen- antibody reaction.
2. Identify the microscopic structure of the lymphoid organs.
3. Demonstrate immunoelectrophoresis technique.
4. Detect the human blood groups by antigen -antibody reactions.
5. Understand the classification of Pisces, and tetrapodes .
6. Understand the classification of Amphibia, Reptilia , Aves, Mammals.
7. Understand the Axial skeleton of mammal.
8. Understand the urinogenital system of vertebrates.
9. Understand the cell culture techniques and separation techniques in biology.
10. Understand the function of Biosensors.
11. Understand the locomotory and respiratory adaptations in amphibians and reptiles.
12. Explain the principle and application of the common techniques used in Immunology.

Neurophysiology Physiology and general physiology :-

After successfully completing this course, students will be able to:

1. Demonstrate the effect of body size and salinity on oxygen consumption in given animal.
2. Understand the nervous system its part and structure with significant function.
3. Understand the synapse , receptor , nerve ending, and synaptic transmission.
4. EEG and ECG.
5. Demonstrate the effect of starvation on liver and muscle glycogen in given animal.
6. Detect the normal and abnormal constituents in human urine.
7. Find the absorption spectra of blood pigment.
8. Estimate serum uric acid from given sample.

Biochemistry :-

After successfully completing this course, students will be able to:

1. Define basic terms in biochemistry.
2. Explain the chemistry of life.
3. Explain the structure and functions of various biomolecules.
4. Explain the importance of vitamins and coenzymes and disorders related to them.
5. Illustrate the importance of pH, buffer and water in living systems.
6. Draw the structures of various carbohydrates and amino acids.
7. Classify enzymes with examples.
8. Define basic terminologies of metabolic pathways.
9. Explain the laws of thermodynamics, concept of free energy and ATP as currency molecule.
10. Describe the Concepts and regulation of metabolism.
11. Discuss the oxidation of fatty acids and its significance.
12. Illustrate the electron transport chain and oxidative phosphorylation.
13. Illustrate the reactions, energetics and regulation of glycolysis, glycogen biosynthesis,
14. TCA cycle, Purine and Pyrimidine metabolism
15. Write the general reactions of various metabolic pathways.
16. Justify the role of enzymes in metabolism

Ichthyology (specialization):-

After successfully completing this course, students will be able to:

1. Know all about fishes and there general as well as special characters.
2. Understand the classification of fishes
3. Understand the adaptation in stress condition.
4. Structure and function of fishes special organs
5. Understand the reproduction and growth of fishes
6. Understand the behaviour of fishes
7. Understand the distribution fishes in the world .
8. To know the indigenous and exogenous fishes.
9. Understand the diseases of fishes due to different parasites.

Practical IV semester zoology :-

After successfully completing this course, students will be able to:

1. Identify the organs by studying the histological slides.
2. Demonstrate the structure of tissues by making temporary slides.

3. Use techniques like chromatography,
4. Prepare blood smear and identify the various cells.
5. Process animal tissues and prepare permanent histological slides.
6. Count total leucocytes from blood samples.
7. Estimate the Hb.level in blood samples.
8. Identify commercially important freshwater fish.
9. Separate biomolecules by chromatographic methods.
10. Use the basic equipment in biochemistry lab.

PGDCA Department, Govt. T.C.L. P.G. College Janjgir (C.G.)

PROGRAMME OUTCOMES, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES

PROGRAMME OUTCOMES

PO1: It will equip the students with skills required for designing, developing applications in Information Technology.

PO2: Students will able to learn the latest trends in various subjects of computers & information technology.

PO3:The PG Diploma is aimed at graduates with acomputing background and provides a detailed coverage of the key concepts and challenges in data and resource protection and computer software security.

PO4:To give hands on to students while developing real life IT application as part of the study.

PO5: To train graduate students in basic computer technology concepts and information technology applications.

PO6: Design and develop applications to analyze and solve all computer science related problems.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Understand Basic concept,and Programming language like procedure oriented language, Object oriented programming ,event driven programming.

PSO2: To expose the students to open Source technologies so that they become familiar with it and can seek appropriate opportunity in trade and industry.

PSO3: Able to provide socially acceptable technical solutions to real world problems with the application of modern and appropriate programming techniques.

PSO4: Design applications for any desired needs with appropriate considerations for any specific need on societal and industrial aspects.

COURSE OUTCOME

Fundamentals of Computers and Introduction to Information Technology

(Paper-I)

CO1: This course helps students to understand fundamentals of computer.

CO2: The course also gives students an idea about various components of computer hardware and its working.

CO3: Students will also be able to learn about Internet and popular internet services like e-mail.

PC PACKAGES AND COMPUTERIZED ACCOUNTING SYSTEM

(Paper-II)

CO1: To make students understand the importance and use of operating systems.

CO2: To make students understand about MS Word, MS Excel and MS Power Point.

CO3: After studying this course, students will be able to understand procedure of financial accounting for any organization and able to interact with accounting or information system.

DATA COMMUNICATION AND COMPUTER SYSTEM

(Paper-III)

CO1: Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.

CO2: Gain core knowledge of Network layer routing protocols and IP addressing.

CO3: Understand the concept of Analog and Digital signal and Multiplexing.

SYSTEM ANALYSIS AND DESIGN

(Paper-IV)

CO1: Understand the concept of system.

CO2: Gain basic knowledge of system planning and investigation.

CO3: Learn about implementing and maintenance software.

PROGRAMMING IN C AND C++

(Paper-V)

CO1: Students can develop programming knowledge

CO2: Students can solve any kind of problems using C++ language.

CO3: Data Structure based problems can be solved based on c++ programming.

RELATIONAL DATABASE MANAGEMENT SYSTEM (ORACLE)

(Paper-VI)

CO1: To make student understand basic concepts of Database management systems, especially relational database.

CO2: To make student able to design good database design with implementation of various constrains.
CO3: To make student effectively using database for storing, managing and retrieving data from DBMS like MS-ACCESS, MySQL, Oracle and DB2 via SQL statements.

PROJECT

CO1: To help students develop their practical ability and knowledge about practical tools/techniques in order to develop software.

CO2: Prerequisite Knowledge of programming methodology and GUI tools.

CO3: Student will be able to develop software applications.

DCA, Govt. T.C.L. P.G. College Janjgir (C.G.)

PROGRAMME OUTCOMES, PROGRAMME SPECIFIC OUTCOMES AND COURSE OUTCOMES

PROGRAMME OUTCOMES

PO1: To work effectively both as an individual and a team leader on multi disciplinary projects.

PO2: Inculcates the ability to analyze, identify, formulate and develop computer applications using modern computing tools and techniques.

PO3: Improves communication skills so that they can effectively present technical information in oral and written reports.

PO4: Prepares to create design innovative methodologies for solving complex/ real life problems for the betterment of the society.

PO4: To integrate ethics and values in designing computer application

Program Specific Outcomes (PSO)

PSO1: To shape the students to meet the requirement of Corporate world and Industry standard.

PSO2: To engage in professional development and to pursue post graduate education in the fields of Information Technology and Computer Applications.

PSO3: To provide the students about computing principles and business Practices in software solutions, outsourcing services, public and private sectors.

PSO4: Develop practical skills to provide solutions to industry, society and business. Understand the concepts of key areas in computer science

Course Outcomes (CO)

CO1: The curriculum prepares students for a career in software industry by equipping the students with the latest revolution in technology.

CO2: The program aims to educate students in Computer Science and Information Technology with emphasis on hands-on practical training in software development.

CO3: Creates the ability to design a computer application by considering realistic constraints such as safety, security and applicability.

CO3: Prepares students to work professionally.

COMPUTER SCIENCE.

Program Outcomes - BSc Computer science/PGDCA DCA

1. Scientific knowledge: Apply the knowledge of mathematics, science, and computing to the solution of complex scientific problems.
2. Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
3. Environment and sustainability: Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
4. Communication: Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
5. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Course Outcomes - BSc Computer Science/PGDCA DCA

1. Programming Principles And Abstraction Using C and Object Oriented System Design.
    a. Manipulate values of variables, arrays, pointers, structures, unions and files.
    b. Create the function that can receive variables, arrays, pointers and structures.
    c. Define functions that can receive variables, arrays, pointers and structures.
    d. Create open, read, manipulate, write and close files
2. Fundamentals Of Information Technology
    a. Understand different Computer Peripherals
    b. Understand and apply different Software components
    c. Learn WWW & Browsers
3. Project Implementation
    - Develop a functional application based on the software design
    - Apply coding, debugging and testing tools to enhance the quality of the software
    - Construct new software system based on the theory and practice gained through this exercise
    - Prepare the proper documentation of software projects following the standard guidelines
    - Learn technical report and oral presentation skills

Programme Specific Outcomes - BSc Computer Science /PGDCA DCA

1. Demonstrate mastery of Computer Science in the following core knowledge areas
    - Data Structures and Programming Languages
    - Databases, Software Engineering and Development
    - Computer Hardware and Architecture PSO2.