**Govt. Naveen College Bori, Dist. Durg (C.G.)**

**Program Outcomes: Faculty**- **Science**

After successful completion of graduation in science faculty a student should be able to:

**PO-1**. Acquire the theoretical and practical knowledge with facts of subjects in science such as Chemistry, Botany, Zoology, Physics, Mathematics etc.

**PO-2**. Understand the basic concepts of science and able to correlate them with their daily life.

**PO-3.** Develop the critical and scientific thinking to deal with a problem to find out some new solutions.

**PO-4.** Develop skill of handling instruments, performing experiments and logical analysis of the experimental results.

**PO-5.** Analyse the every situation of day to day life with scientific approach and able to draw objective conclusion for the betterment of society and humanity.

**PO-6.** Correlate the knowledge of science with other disciplines such as humanities, social science etc. for development of better approach to solve an issue of society.

**PO-7.** Develop the scientific attitude for innovative research in various field of science.

**PO-8.** Develop the communication skill to express and convey the ideas and views to others in impressive manner.

**PO-9.** Develop moral, ethical and social values in life for overall development of personality.

**PO-10.** Find out environmental friendly approach for sustainable development.

**PO-11.** Pursue for higher education such as M.Sc. in chemistry, botany, zoology for B.Sc. (Bio) students and M.Sc. in chemistry, physics and maths for B.Sc. (Maths) students.

**PO-12.** Perform jobs in various fields such as Indian Civil Services (IAS, IFS, IPS, IRS), Indian Army, Indian Navy, Indian Air Force, Multinational companies, Medical representatives in pharmaceutical industries, marketing, banking sectors, government sectors as well as can develop their own industry.

Programme specific outcomes

**Course Outcomes – Science**

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| **Department of Chemistry** | |
| **Course Outcomes** | |
| Course | Outcomes  After completion of the course the student should be able to |
| Part I - Paper I – Inorganic Chemistry | CO – 1. Know the structure of atom and periodicity in the properties of elements  CO – 2. Know the process of formation of ionic bond and properties of ionic solids  CO – 3. Know the theories of covalent bond formation  CO – 4. Understand the salient features of s and p block elements  CO – 5. Understand the chemistry of noble gases and theoretical principles involved in qualitative analysis |
| Part I - Paper II – Organic Chemistry | CO – 1. Understand the basic concepts and electronic effects of organic chemistry.  CO – 2. Understand the stereochemistry of organic molecules  CO – 3. Understand the conformational analysis of alkanes  CO – 4. Know the chemistry of alkane, alkene and alkyne  CO – 5. Understand the concept of aromaticity and electrophilic substitution reaction in aromatic compounds |
| Part I - Paper III – Physical Chemistry | CO – 1. Understand the basic mathematical concept used in chemistry  CO – 2. Know the kinetic molecular model of gas and understand the behaviour of real gases  CO – 3. Know the intermolecular forces and understand colloid and surface chemistry  CO – 4. Understand the symmetry, crystal system and crystal defects  CO – 5. Understand the rate of reaction, factors affecting it and theories of reaction rate and catalysis. |
| Part I - Chemistry Practical | CO – 1. Analyse the inorganic mixtures by the Semi-micro qualitative analysis  CO – 2. Estimate the strength of unknown solution by titrimetric method  CO – 3. Detect the elements (N, S and halogens) and functional groups in organic compounds  CO – 4. Measure the composition of a binary liquid mixture by surface tension method  CO – 5. Measure the composition of a binary liquid mixture by viscometer |
| Part II - Paper I – Inorganic Chemistry | |  | | --- | | CO – 1. Understand the chemistry of transition series elements |   CO – 2. Understand the redox potential data & its application and chemistry of coordination compounds  CO – 3. Understand the valance bond theory and crystal field theory  CO – 4. Understand the chemistry of lanthanides and actinides  CO – 5. Know the theories of acid and bases and physical properties & chemical reactions of non-aqueous solvents |
| Part II - Paper II – Organic Chemistry | CO – 1. Understand the mechanism of nucleophilic substitution and elimination reactions  CO – 2. Understand the preparation, properties and reactivity of alcohol and phenol  CO – 3. Know the nomenclature, structure and reactivity of carbonyl group  CO – 4. Understand the chemistry of carboxylic acid and its derivatives  CO – 5. Know the reactivity, structure and properties of organic compounds of nitrogen |
| Part II - Paper III – Physical Chemistry | CO – 1. Understand the laws of thermodynamics and know the meaning of various thermodynamic terms  CO – 2. Understand the concept of spontaneity, entropy and free energy  CO–3.Know chemical & ionic equilibrium and equilibrium constant  CO – 4. Understand the phase rule and its application to one, two and three component system  CO–5. Understand the characteristics of electromagnetic radiation, laws of photochemistry and quantum yield |
| Part II - Chemistry Practical | CO – 1. Qualitative semi micro analysis of mixtures containing interfering radicals.  CO – 2. Determine the strength of solution by volumetric method  CO – 3. Identify given organic compound  CO – 4. Determine Rf value and identify organic compound through paper chromatography  CO – 5. Determine the enthalpy of chemical reactions |
| Part III - Paper I – Inorganic Chemistry | CO – 1. Understand the metal-ligand bonding in transition metal complexes  CO – 2. Understand the magnetic properties of transition metal complexes  CO – 3. Know the classification, properites, bonding and applications of organometallic compounds  CO – 4. Know the essential and trace elements in biological processes  CO – 5.Understand the cocept of hard and soft acid and base and inorganic polymers |
| Part III - Paper II – Organic Chemistry | CO – 1. Understand organometallic compounds, organosulphur compounds and enolates  CO – 2. Understand the properties and structure of biomolecules  CO – 3. Understand the chemistry of synthetic polymers and dyes  CO – 4. Understand the principle and applications of Mass, IR and UV – Visible spectra  CO – 5. Understand the principle of NMR spectra |
| Part III - Paper III – Physical Chemistry | CO – 1. Understand the basic concept of quantum mechanics along with Schrodinger’s equation & its applications  CO – 2. Know the quantum mechanical approach of molecular orbit theory  CO – 3. Understand the principle and applications of Microwave, Infrared and Raman spectra  CO – 4. Understand the concept of Electronic spectra and photochemistry  CO – 5.Understand the thermodynamics, molecular and magnetic properties of substance |
| Part III - Chemistry Practical | CO – 1. Synthesis of inorganic complexes  CO – 2. Gravimetric estimation of element  CO – 3. Synthesis of Organic Compounds  CO – 4. Analysis of an organic mixture containing two solid components  CO – 5. Determine the strength of acid or base by conductometric titration |

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| **Department of ZOOLOGY** | | | |
| **Course Outcomes** | | | |
| Course | | | Outcomes |
| B.Sc. | Paper | Name of Paper |  |
| Part I | Paper I | Cell biology and invertebrates | * Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles * The course will cover Invertebrates, which is the science that studies the animals without backbone. Introduce students to the difference between invertebrates and vertebrates. Study the link between vertebrates and invertebrates. |
| Part I | Paper II | Vertebrates and Embryology | * Vertebrate zoology is the biological discipline that consists of the study of Vertebrate animals, i.e., animals with a backbone, such as fish, amphibians, reptiles, birds and mammals. * To develop youth interest in the science of embryology. To provide learning experiences in incubation, hatching and brooding. To provide learning of a life cycle through the beginning stages. |
| Part I | Practical |  | * understand the structures and purposes of basic components of prokaryotic and eukaryotic cells. * Different species museums provide us with snapshots of biodiversity and organisms' traits through time. * Dissection study help to determine classification and identify of organisms. |
| Part II | Paper I | Anatomy & Physiology | * The purpose of the teaching and learning of discipline "Human Anatomy" is the acquisition by students of scientific knowledge about the structure of the human body to be used as the study of the following disciplines, as well as for use in professional activities. * This Course is to ensure that students understand how the body works. ... State the functions of each organ system of the body, explain the mechanisms by which each functions, and relate the functions and the anatomy. |
| Part II | Paper II | Vertebrates Endocrinology, Reproductive biology, Behaviour,  Evolution & Applied Zoology | * endocrinology is concerned with the study of hormones and their actions. This field is rooted in the comparative study of hormones in diverse species, which has provided the foundation for the modern fields of evolutionary, environmental, and biomedical endocrinology. * This (Reproductive biology) in turn provides an important foundation to consider sexual differentiation and development, contraception, infertility and current reproductive technologies. * A behavioral objective is a learning outcome stated in measurable terms, which gives direction to the learner's experience and becomes the basis for student evaluation. ... Affective objectives emphasize feeling and emotion, such as interests, values, attitudes, appreciation, and methods of adjustment. * In evolutionary study They can study how two species that used to be the same became separate species. * To motivate the students for   self employment in various applied branches of Zoology. |
| Part II | Practical |  | * Practical work can in fact facilitate learning in the classroom. * Using  practical activity can help structure a lesson and improve engagement and knowledge retention: “Many students learn more easily by actually "doing" activities. Like study of limb girdles & vertebrates of rabbit etc. * Usin help in self employment from apiculture,aquaculture,sericulture etc. |
| Part III | Paper I | Ecology,environmental-biology,toxicology,microbiology,&  Medical zoology | * Ecology is the scientific analysis and study of interactions among organisms and their environment. ... Environmental science focuses on the interactions between the physical, chemical, and biological components of the environment, including their effects on all types of organisms. * The goal of toxicology is to contribute to the general knowledge of the harmful actions of chemical substances, to study their mechanisms of action, and to estimate their possible risks to humans on the basis of experimental work on biological test systemhey study the epidemiology, pathogenesis, processing, clinical diagnosis and prevention including vaccine development of the different microorganisms. He/She investigates the virulence factors and microbial physiology, as well as, the physiopathology and immunological responses of the host to the microorganisms.s. |
| Part III | Paper II | Genetics, cell physiology, biochemistry,  Biotechnology &biotechnique | * Study of human genetics can answer questions about human nature, can help understand diseases and the development of effective disease treatment, and help us to understand the genetics of human life. * The course biochemistry aims to provide students with a basic understanding of: the molecular architecture of eukaryotic cells and organelles, * Biotechnology is a broad area of biology, involving the use of living systems and organisms to develop or make products and biotechniques are use for measuring or detect it by various equipment or technology. |
| Part III | Practical |  | * Biochemical Analytical Methods to Detect Microorganisms etc. * Experiment of blood group detection to find out our blood type sitting at home with the help of a Blood Group Test Kit. * ph meter,colorimeter,centrifuge and microscopes are equipment for measure of different types of functions like sepration of bio molecules etc. |
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| **Department of Botany** | |
| **Course Outcomes** | |
| Course | Outcomes  After completion of the course the student should be able to |
| Part – I - Paper –I - Bacteric, virwers, fungi, lichens & Algae. | 1. Understand the diversity among algae, fungi, bacteria, and viruses. 2. Understand theeconomic importance of algas, fungi, bactria and mycoplasma lichenis 3. Understand the role of blue green alga in nitrogen economy of sort and reclamation of usher land 4. Understand the mushroom biotechnology 5. Understand the recombination procers in bacteria. |
| Part I - Paper –II - Bryophytes pteridophytas Gymnosperms and palacobotany. | 1. Understand the morphological diversity of bryophyte pteridophyta and gymnosperm. 2. Know the evolution of Bryophytis pterictophytes and Gymnosperms. 3. Know the scope of pateobotany type of fossils and geological time scals 4. Understand the various fossil genera presenting different fossil growth |
| Part . – II - Paper –I - Diversity of seed plants and their systematic. | 1. Know the conceptual development of taxonomy and systematic 2. Understand the phylogeny of angio sperms 3. Trace the history of development of systems of classification 4. Learn about the charaters floral formula and floral diagrams of different families 5. Understand various rules, principles and recommendations og plants nomen culture produces pn plant indentification. |
| Part . – II - Paper –II - Structure development and reproduction in flowering plants. | 1. Understand the various plants of the angioospermic plants (root, shoot, teaf flowers) 2. Know the various tissues and their arrangement in monocol and dicot angiospermic plants. 3. Understand the secondary growth in plants 4. Know the method of pollination and fertilization & development types of fruits in anguospermic plants 5. Understand the process of vegetative propagation & seed dispersal method. 6. Understand the process of triple fusion Or double fertilization |
| Part . – III - Paper –I - Plant physiology, Biochemistry and biotechnology | 1. Know the importance and scope of plant physiology biochemistery and biotechnology 2. Learn and understand the mineral netrition absorption of will traslocation of soluties transpiration photosynthersis respirulson & N2 metabolism in plants. 3. Understand the lipical metabolism in plants 4. Understand the fundamentals of recombinant technology 5. Understand the principles and basic protocols for plant tissue cultures. 6. Understand the structure and function of plants harmones 7. Learn about enzymology 8. Understand the process of physiology of flowering. |
| Part . – III - Paper –II - Ecology and utilization of plants. | 1. Understand plant communities and ecological adoptaions in plants 2. Understand the role of plants in human walfare 3. Gain knowedge about various plants of economic users 4. Understand the properties of community ecology ecosystem 5. Understand the biographical regtion of india vegalation types grassland and forest type of india 6. Understand biochemical Cycles. 7. Know the process of succession |

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| **Department of Physics** | |
| **Course Outcomes** | |
| Course | Outcomes  After completion of the course the student should be able to |
| Part I – Paper I – Mechanics, oscillation and properties of matter | CO – 1. Understand the Cartesian, cylindrical and spherical coordinate system  CO – 2. Understand the rigid body motion  CO – 3. Understand the Bifilar oscillation  CO – 4. Understand the E as an accelerating field  CO – 5. Understand the elasticity |
| Part I – Paper II – Electricity, Magnetism and Electro magnetic theory | CO – 1. Know the Repeated integrals  CO – 2. Know the Coulombs law  CO – 3. Know the Dielectric constant  CO – 4. Know the Magnetisation current  CO – 5. Know the Electromagnetic induction |
| Part I – Practical | CO – 1. Determination of surface tension of liquid  CO – 2. Determination of viscosity of fluid  CO – 3. Study of decay of current in LR and RC circuit  CO – 4.Response curve for LCR circuit  CO – 5. Study of magnetic field due to current |
| Part II – Paper I | CO – 1. Know the laws of thermodynamics  CO – 2.Know the Thermodynamic relationships  CO – 3. Understand the Maxwellien distribution of speeds in an ideal gas  CO – 4. Know the statistical basis of thermodynamics  CO – 5. Understand the indistinguishability of particles and its consequences |
| Part II – Paper II | CO – 1. Know the waves in media  CO – 2. Know the Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications.  CO – 3. Know the interference of light  CO – 4. Understand the Fresnel half-period zones & Fraunhefer diffraction  CO – 5. Know the Laser system and Application of lasers |
| Part II – Practical | CO – 1. Study of Brownian motion  CO – 2. Determine heating efficiency of electrical kettle with varying voltages.  CO – 3. Know the characteristics of a microphone-loudspeaker system.  CO – 4. Determine the principal points of a combination of lenses  CO – 5. Use of diffraction grating and its resolving limit. |
| Part III – Paper I - Relativity, Quantum Mechanics, Atomic Molecular  And Nuclear Physics. | CO – 1. Know the Reference systems, inertial frames  CO – 2. Know the origin of the quantum theory  CO – 3. Understand the Quantum Mechanics & its applications  CO – 4. Understand the spectra of hydrogen, deuteron and alkali atoms  CO – 5. Know the interaction of charged particles and neutrons with mater |
| Part III – Paper II - Solid State Physics, Solid State Devices and Electronics | CO – 1. Know Amorphous and crystalline solids  CO – 2. Know Free electron model of a metal  CO – 3. I Know intrinsic semiconductors, carrier concentration in thermal equilibrium  CO – 4. Know Half and full wave rectifier  CO – 5. Know Introduction to computer organisation, time sharing and multi programming systems |
| Part III – Practical | CO – 1. Know the characteristics of transistor  CO – 2. Characteristics of a tunnel diode  CO – 3. Study of voltage regulation system  CO – 4. Study of a regulated power supply |

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| **Department of Mathematics** | |
| **Course Outcomes** | |
| Course | Outcomes  After completion of the course the student should be able to |
| Part I – Paper I - Algebra and Trigonometry | CO – 1. Know the Elementary operations on matrices  CO – 2. Know the Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equations  CO – 3. Know the Mappings, Equivalence relations and partitions  CO – 4. Know the Homomorphism and Isomorphism of groups  CO – 5. Know the De-Moivre’s theorem and its applications |
| Part I – Paper II - Calculus | CO – 1. Understand the 𝜀 − 𝛿 definition of the limit of a function  CO – 2. Understand the Asymptotes. Curvature  CO – 3. Understand the Integration of transcendental functions  CO – 4. Understand the Degree and order of a differential equation  CO – 5. Understand the Linear differential equations of second order. |
| Part I – Paper III - Vector Analysis and Geometry | CO – 1. Know the Scalar and vector product of three vectors  CO – 2. Know the Vector integration  CO – 3. Know the General equation of second degree  CO – 4. Know the Sphere. Cone. Cylinder.  CO – 5. Know the Central Conicoids. Paraboloids |
| Part II – Paper I | CO – 1. Know the sequence  CO – 2. Know the Continuity & Sequential continuity  CO – 3. Know the limit and continuity of functions of two variables  CO – 4. Know the Envelopes, Evolutes, Maxima, minima and saddle points of functions  CO – 5. Understand the Beta and Gamma functions |
| Part II – Paper II | CO – 1. Understand the Series solutions of differential equations  CO – 2. Know the Laplace Transformation  CO – 3. Know the Partial differential equations of the first order  CO – 4. Know the Partial differential equations of second and higher orders  CO – 5. Know the Calculus of Variations |
| Part II – Paper III | CO – 1. Know the Analytical conditions of Equilibrium  CO – 2. Know the Forces in three dimensions  CO – 3. Know the Simple harmonic motion  CO – 4. Know the Kepler's laws of motion  CO – 5. Know the Motion in a resisting medium |
| Part III – Paper I - Analysis | CO – 1. Know the Series of arbitrary terms. Convergence, divergence and Oscillation  CO – 2. Understand Riemann integral  CO – 3. Know geometric representation of Complex numbers  CO – 4. Know definition and examples of metric spaces  CO – 5. Know dense subsets. Baire Category theorem. Separable, second countable and first countable spaces. |
| Part III – Paper II - Abstract Algebra | CO – 1. Know group-Automorphisms, inner automorphism  CO – 2. Know Ring theory-Ring homomorphism  CO – 3. Know Definition and examples of vector spaces  CO – 4. Know Linear transformations and their representation as matrices  CO – 5. Know Inner Product Spaces-Cauchy-Schwarz inequality |
| Part III – Paper III - Discrete Mathematics | CO – 1. Understand Sets and Propositions  CO – 2. Understand Sets and Propositions  CO – 3. Understand Finite State Machines  CO – 4. Understand Recurrence Relations and Recursive Algorithms  CO – 5. Understand Boolean Algebras |