**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 | OutcomesAfter 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 elementsCO – 2. Know the process of formation of ionic bond and properties of ionic solidsCO – 3. Know the theories of covalent bond formationCO – 4. Understand the salient features of s and p block elementsCO – 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 moleculesCO – 3. Understand the conformational analysis of alkanesCO – 4. Know the chemistry of alkane, alkene and alkyneCO – 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 chemistryCO – 2. Know the kinetic molecular model of gas and understand the behaviour of real gasesCO – 3. Know the intermolecular forces and understand colloid and surface chemistryCO – 4. Understand the symmetry, crystal system and crystal defectsCO – 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 methodCO – 3. Detect the elements (N, S and halogens) and functional groups in organic compoundsCO – 4. Measure the composition of a binary liquid mixture by surface tension methodCO – 5. Measure the composition of a binary liquid mixture by viscometer |
| Part II - Paper I – Inorganic Chemistry |

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| CO – 1. Understand the chemistry of transition series elements  |

CO – 2. Understand the redox potential data & its application and chemistry of coordination compoundsCO – 3. Understand the valance bond theory and crystal field theoryCO – 4. Understand the chemistry of lanthanides and actinidesCO – 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 reactionsCO – 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 termsCO – 2. Understand the concept of spontaneity, entropy and free energyCO–3.Know chemical & ionic equilibrium and equilibrium constantCO – 4. Understand the phase rule and its application to one, two and three component systemCO–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 methodCO – 3. Identify given organic compoundCO – 4. Determine Rf value and identify organic compound through paper chromatographyCO – 5. Determine the enthalpy of chemical reactions |
| Part III - Paper I – Inorganic Chemistry | CO – 1. Understand the metal-ligand bonding in transition metal complexesCO – 2. Understand the magnetic properties of transition metal complexesCO – 3. Know the classification, properites, bonding and applications of organometallic compoundsCO – 4. Know the essential and trace elements in biological processesCO – 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 enolatesCO – 2. Understand the properties and structure of biomoleculesCO – 3. Understand the chemistry of synthetic polymers and dyesCO – 4. Understand the principle and applications of Mass, IR and UV – Visible spectraCO – 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 applicationsCO – 2. Know the quantum mechanical approach of molecular orbit theoryCO – 3. Understand the principle and applications of Microwave, Infrared and Raman spectra CO – 4. Understand the concept of Electronic spectra and photochemistryCO – 5.Understand the thermodynamics, molecular and magnetic properties of substance |
| Part III - Chemistry Practical | CO – 1. Synthesis of inorganic complexesCO – 2. Gravimetric estimation of elementCO – 3. Synthesis of Organic CompoundsCO – 4. Analysis of an organic mixture containing two solid componentsCO – 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.
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| 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.
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| 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.
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| 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.
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| 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.
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| 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.
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| 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.
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| 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 | OutcomesAfter 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.
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| 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.
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| 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.
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| 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 | OutcomesAfter 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 systemCO – 2. Understand the rigid body motionCO – 3. Understand the Bifilar oscillationCO – 4. Understand the E as an accelerating fieldCO – 5. Understand the elasticity |
| Part I – Paper II – Electricity, Magnetism and Electro magnetic theory | CO – 1. Know the Repeated integralsCO – 2. Know the Coulombs lawCO – 3. Know the Dielectric constantCO – 4. Know the Magnetisation currentCO – 5. Know the Electromagnetic induction |
| Part I – Practical | CO – 1. Determination of surface tension of liquidCO – 2. Determination of viscosity of fluidCO – 3. Study of decay of current in LR and RC circuitCO – 4.Response curve for LCR circuitCO – 5. Study of magnetic field due to current |
| Part II – Paper I | CO – 1. Know the laws of thermodynamicsCO – 2.Know the Thermodynamic relationships CO – 3. Understand the Maxwellien distribution of speeds in an ideal gasCO – 4. Know the statistical basis of thermodynamicsCO – 5. Understand the indistinguishability of particles and its consequences |
| Part II – Paper II | CO – 1. Know the waves in mediaCO – 2. Know the Fermat's Principle of extremum path, the aplanatic points of a sphere and other applications.CO – 3. Know the interference of lightCO – 4. Understand the Fresnel half-period zones & Fraunhefer diffractionCO – 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 framesCO – 2. Know the origin of the quantum theoryCO – 3. Understand the Quantum Mechanics & its applicationsCO – 4. Understand the spectra of hydrogen, deuteron and alkali atomsCO – 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 solidsCO – 2. Know Free electron model of a metalCO – 3. I Know intrinsic semiconductors, carrier concentration in thermal equilibriumCO – 4. Know Half and full wave rectifierCO – 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 systemCO – 4. Study of a regulated power supply |

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| **Department of Mathematics** |
| **Course Outcomes** |
| Course | OutcomesAfter completion of the course the student should be able to |
| Part I – Paper I - Algebra and Trigonometry | CO – 1. Know the Elementary operations on matricesCO – 2. Know the Application of matrices to a system of linear (both homogeneous and nonhomogeneous) equationsCO – 3. Know the Mappings, Equivalence relations and partitionsCO – 4. Know the Homomorphism and Isomorphism of groupsCO – 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 functionCO – 2. Understand the Asymptotes. CurvatureCO – 3. Understand the Integration of transcendental functionsCO – 4. Understand the Degree and order of a differential equationCO – 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 vectorsCO – 2. Know the Vector integrationCO – 3. Know the General equation of second degreeCO – 4. Know the Sphere. Cone. Cylinder.CO – 5. Know the Central Conicoids. Paraboloids |
| Part II – Paper I | CO – 1. Know the sequenceCO – 2. Know the Continuity & Sequential continuityCO – 3. Know the limit and continuity of functions of two variablesCO – 4. Know the Envelopes, Evolutes, Maxima, minima and saddle points of functionsCO – 5. Understand the Beta and Gamma functions |
| Part II – Paper II | CO – 1. Understand the Series solutions of differential equationsCO – 2. Know the Laplace TransformationCO – 3. Know the Partial differential equations of the first orderCO – 4. Know the Partial differential equations of second and higher ordersCO – 5. Know the Calculus of Variations |
| Part II – Paper III | CO – 1. Know the Analytical conditions of EquilibriumCO – 2. Know the Forces in three dimensionsCO – 3. Know the Simple harmonic motionCO – 4. Know the Kepler's laws of motionCO – 5. Know the Motion in a resisting medium |
| Part III – Paper I - Analysis | CO – 1. Know the Series of arbitrary terms. Convergence, divergence and OscillationCO – 2. Understand Riemann integralCO – 3. Know geometric representation of Complex numbersCO – 4. Know definition and examples of metric spacesCO – 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 automorphismCO – 2. Know Ring theory-Ring homomorphismCO – 3. Know Definition and examples of vector spacesCO – 4. Know Linear transformations and their representation as matricesCO – 5. Know Inner Product Spaces-Cauchy-Schwarz inequality |
| Part III – Paper III - Discrete Mathematics | CO – 1. Understand Sets and PropositionsCO – 2. Understand Sets and PropositionsCO – 3. Understand Finite State MachinesCO – 4. Understand Recurrence Relations and Recursive AlgorithmsCO – 5. Understand Boolean Algebras |