

**COURSE OUTCOME FOR PHYSICS HONOURS  
CBCS SEMESTER SYSTEM**

SEMESTER	COURSE PAPER	COURSE OUTCOME
SEM-I	CC-1	<ul style="list-style-type: none"> <li>• Students get an overview of basic Calculus, Vector algebra and calculus, curvilinear coordinates and Matrices.</li> <li>• They learn basic computation using Python and 2D graph plotting using GNUPLOT.</li> </ul>
SEM-I	CC-2	<ul style="list-style-type: none"> <li>• Fundamentals of translational and rotational dynamics along with general properties of matter including fluid dynamics.</li> <li>• Also experimental acquaintance of some of the above.</li> </ul>
SEM-II	CC-3	<ul style="list-style-type: none"> <li>• Concepts of electrostatics and magnetostatics with electromagnetic induction along with AC circuits and network theorems</li> <li>• Related experiments.</li> </ul>
SEM-II	CC-4	<ul style="list-style-type: none"> <li>• Elaborate study of waves and oscillations and related experiments.</li> <li>• Fundamentals of physical optics and related laboratory work.</li> </ul>
SEM-III	CC-5	<ul style="list-style-type: none"> <li>• Knowledge of Fourier series, some methods of solving second order differential equations, Laplace's transformations and special functions.</li> <li>• Lagrangian and Hamiltonian formulation of mechanics.</li> <li>• Application of above in computational problems using NUMPY and SCIPY. 3D graph plotting.</li> </ul>
SEM-III	CC-6	<ul style="list-style-type: none"> <li>• Overall study of Heat and Thermodynamics and Kinetic theory of gases.</li> <li>• Related experiments.</li> </ul>

SEM-III	CC-7	<ul style="list-style-type: none"> <li>• Basic concept of digital and integrated circuits, Boolean algebra and data processing units.</li> <li>• Experiments to study the above.</li> </ul>
SEM-IV	CC-8	<ul style="list-style-type: none"> <li>• Advanced mathematical physics including Fourier transformation and complex analysis.</li> <li>• Introduction to special theory of relativity.</li> <li>• Handling numerical problems involving solution of ODEs and PDEs, complex analysis etc. using a programming language and introduction to OCTAVE.</li> </ul>
SEM-IV	CC-9	<ul style="list-style-type: none"> <li>• Old quantum theory and Schrodinger's equation.</li> <li>• Basic nuclear physics and radioactivity.</li> <li>• Basic concept of LASERs.</li> <li>• Experiments to study some of the above.</li> </ul>
SEM-IV	CC-10	<ul style="list-style-type: none"> <li>• Thorough study of semiconductor devices</li> <li>• Related experiments.</li> </ul>
SEM-V	CC-11	<ul style="list-style-type: none"> <li>• Applications of Schrodinger's equation and theoretical as well as numerical solutions.</li> <li>• Hydrogen atom problem.</li> <li>• Study of Atomic spectra.</li> </ul>
SEM-V	CC-12	<ul style="list-style-type: none"> <li>• Overall study of crystallography and solid state physics.</li> <li>• Experiments to study related properties.</li> </ul>
SEM-VI	CC-13	<ul style="list-style-type: none"> <li>• Detailed study of Maxwell's equations and electromagnetic theory leading to wave optics and polarisation.</li> <li>• Experimental observation of phenomena related to polarisation.</li> </ul>
SEM-VI	CC-14	<ul style="list-style-type: none"> <li>• Concepts of classical and quantum Statistical mechanics.</li> <li>• Related computational problems including plotting of some important laws and functions.</li> </ul>

## **Programme Outcome- Physics(Honours)**

### **PO 1: Critical Thinking**

Students develop their logical reasoning skills through the numerous derivations that they have to make during the course. Solving problems or proving laws, theoretically as well as experimentally, make the students' critical thinking abilities strong and everlasting.

### **PO 2: Effective Communication**

The students learn to write answers through proper logical reasoning. They also have to record experiments performed in the laboratory in an elaborate manner in their notebooks. This automatically enhances their writing skills and helps in developing effective communication skills.

### **PO 3: Social Interaction**

Students are encouraged to participate in workshops and seminars in outside institutions which in turn develop their social interaction skills in addition to exposing them to the latest developments in the subject.

### **PO 4: Ethics**

Students are always advised to perform and write their experiments ethically by not manipulating data. They are also made aware of how plagiarism and wrong ethics can be disruptive in one's scientific career and advised to stay away from such malpractices.

### **PO 5: Environment and Sustainability**

Students learn about alternative energy resources that is a prima face issue in today's world that faces acute energy crisis and are encouraged to do research in on these topics that would enable them to play an effective role in protection of environment and its sustainability.

### **PO 6: Self directed and Lifelong Learning**

The logical reasoning and critical thinking that is inculcated in the student helps in making his/her learning procedure self directed. Elaborate problem solving methods using computer programming is included in the course which further assists in research at a higher level as well as helps them pursue any career outside academics too.

## CO-PO Mapping (Physics Hons)

	PO1	PO2	PO3	PO4	PO5	PO6
CO1	*	*	*	*		*
CO2			*	*		*
CO3		*		*		*
CO4		*	*	*		*
CO5	*	*	*	*		*
CO6			*	*	*	*
CO7	*		*	*		*
CO8	*		*	*		*
CO9	*		*	*	*	*
CO10	*	*	*	*	*	*
CO11			*	*		*
CO12			*	*		*
CO13			*	*		*
CO14	*		*	*	*	*

## Programme outcomes: Mathematics (Honours)

### **P01 Critical Thinking**

Acquired the knowledge with facts and figures related to mathematics. Demonstrate mathematical thinking, skills, progressing from a procedural and computational understanding of mathematics to logical reasoning, abstraction, generalization, formal proof and pattern recognition.

### **P02 Effective Communication**

Improve communication with precision, clarity, organization, proper terminology and notation. Develop the ability of mathematics to communicate scientific information and research results in written and oral formats.

### **P03 Social Interaction**

Provide knowledge about mathematical properties and its application for developing technology to ease the problems related to the society. Learn professionally including the ability to work in teams and apply basic ethical principles in society.

### **P04 Ethics**

Imbibe of mathematical knowledge and skills appropriately it gives us professional activities and demonstrate highest standard of ethical issues in mathematics.

### **P05 Environment and Sustainability**

Understood the basic concepts, fundamental principles, and the scientific theories related to various mathematical phenomena and their relevancies in the day-to-day life automatically enhance our awareness about social evils, blind faith etc.

### **P06 Self directed and Lifelong Learning**

Continue to increase the knowledge of mathematics we realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life

## CO1

- Its acquainted applications of differentiation in business, economics in life sciences.

How

- to integrate of a function by reduction formula if needed.
- Preliminary concept of two dimensional and three dimensional geometry.
- Vector analysis and graphical demonstration.

## CO2

- Elaborate discussions on complex number, inequality, and linear difference equation upto 2<sup>nd</sup> order.
- Concept of relations, mapping, integers.
- Applications of linear systems.

## CO3

- Intuitive idea of real numbers and concept of neighbourhood of a point.
- Discussions on sequence of real number and behaviour of infinite series.
- Graphical demonstration.

## CO4

- Preliminary idea of group theory.
- Properties of cyclic groups.
- Normal subgroups and its properties.

## CO5

- Limit and continuity of functions.
- Differentiability of functions.
- Mean value theorems and consequence of L' Hospital's rule.
- Elaborate discussions on local maximum and minimum of functions

## CO6

- Elaborate discussions on Ring theory.
- Concept of vector spaces.
- Linear transformation.
- Cayley-Hamilton theorem and its use in finding inverse of a matrix.

## CO7

- Discussions about ordinary differential equations.
- Multivariate calculus-I

## CO8

- Concept of Riemann of integration.
- Fundamental theorem of integral calculus.
- Discussions on improper integral.

### CO9

- Fundamental idea of partial differential equations.
- Cauchy problem of finite and infinite string.
- Multiple integrals.
- Intuitive idea of vector field.

### CO10

- Coplanar forces in general and equilibrium in the presence of sliding frictional forces.
- Concept of virtual work and stability of equilibrium.
- Discussions on kinematics of a particle and principle of momentum and energy.

### CO11

- Elaborate discussions on Probability:
- Discussions on Statistics.
- Graphical demonstration.

### CO12

- Elaborate idea on automorphism.
- External direct product and its properties.
- Concept of inner product space.
- Eigen spaces and minimal polynomial of a linear operator.

### CO13

- Preliminary idea of metric space.
- Concept of Stereographic projection.
- Fundamental concept of limit and continuity of functions of complex variables.
- Complex integration.

### CO14

- Concept of errors, polynomial approximation, and method of interpolation.
- Numerical differentiation and integration.
- Numerical solution of non-linear and ordinary differential equations.
- Solution of the system of linear algebraic equations.

### PO/CO MAPPING (MATHEMATICS)

	P01	P02	P03	P04	P05	P06
C01			*			
C02	*					
C03	*					
C04	*					
C05	*			*		
C06	*			*		*
C07		*				
C08	*				*	
C09			*			
C10			*			
C011	*	*				
C012	*					*
C013	*					
C014		*				

**PSO1 :** Mathematics will able to apply critical thinking skills to solve problems that can be modelled mathematically, to critically interpret numerical and graphical data.

**PSO2 :** The Department of Mathematics offers excellent opportunities for analyze complex mathematical problem in both pure and applied mathematics.

**PSO3 :** Propose new mathematical questions, to read and construct mathematical arguments and proofs, to use computer technology appropriately to solve problems and to promote understanding, to apply mathematical knowledge to a career related to mathematical sciences or in post-baccalaureate studies.

**PSO4 :** Mathematics offers excellent opportunities for research in both pure and applied mathematics to PhD students. They may choose from a wide variety of topics: Algebra and Number Theory, Analysis, Differential Equations and Numerical analysis, Discrete mathematics, Geometry, Probability and its applications. The students after completing the PhD program, depending on their choice of the research area, are well prepared for a variety of jobs both in the industry and in academic institutions all over the world.

## Program Outcome-Statistics (General)

Sl. No.	Outcome	Remarks
PO1	<b>Domain Knowledge</b>	Students get a clear and comprehensive understanding of the basic concepts and fundamental principles of the subject. Simultaneously they are also being able to logically and empirically process the various theoretical frameworks.
PO2	<b>Critical Thinking</b>	Students are engaged in rational, objective and independent thinking so as to identify, define and logically evaluate methods to solve problems systematically and detect inconsistencies in analysis.
PO3	<b>Communication Skill</b>	Students are able to clearly and successfully deliver, receive and disseminate statistical concepts - oral, written or otherwise.
PO4	<b>Spirit of Enquiry and Lifelong Learning</b>	Students develop a curious logical open mind, willing to accept and initiate new and innovative ideas that will motivate them to continue the process of learning even after the completion of this course.
PO5	<b>Spirit of Research and Innovation</b>	Students develop a scientific gesture that would inculcate a spirit of research and enquiry to develop new models and methods.
PO6	<b>Social Concerns and Ethics</b>	Students nurture a value based approach to various social conditions and situations such that scientific objectivity and research finds a social acceptability.
PO7	<b>Problem Analysis</b>	Students are able to apply fundamental principles, basic concepts and statistical methods to specified problem and layout.

**MAPPING OF PO AND CO FOR STATISTICS**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	✓	✓	✓	✓	✓	✓	✓
CO2	✓	✓	✓		✓		
CO3	✓	✓	✓		✓	✓	✓
CO4	✓			✓	✓	✓	✓
CO5		✓			✓	✓	✓
CO6	✓				✓	✓	✓
CO7	✓			✓	✓	✓	✓
CO8	✓	✓	✓	✓	✓	✓	✓
CO9		✓	✓		✓		✓
CO10		✓	✓		✓		✓
CO11		✓	✓	✓	✓	✓	✓
CO12		✓	✓		✓		✓

## Program Outcome-Computer Science (General)

The **Program Outcome** for B. Sc. in Computer Science is as follows:

<b>PO1</b>	<b>Subject Knowledge:</b> This course prepares students with the basic understandings in the theoretical and practical aspects of computer science discipline necessary for further study.
<b>PO2</b>	<b>Problem Analysis:</b> Students are able to apply fundamental principles and methods of Computer Science to a wide range of applications. They can design and implement software systems that meet specified design and performance requirements.
<b>PO3</b>	<b>Critical Thinking:</b> Students can apply mathematical and scientific reasoning to a variety of computational problems. They can also formulate, analyze and compare alternative solutions to computing problems. They can acquire inquisitive attitude and skill to enable creating an original discovery or design related to computing.
<b>PO4</b>	<b>Effective Communication:</b> Students are able to present their ideas flawlessly, not only in English, but also in Mathematical/Algorithmic Terms.
<b>PO5</b>	<b>Social Interaction:</b> Students learn how to deal with criticism of their ideas in a professional manner, and also use it to improve their designs.
<b>PO6</b>	<b>Ethics:</b> Students can learn the ethical and social responsibilities required for a professional in this field.
<b>PO7</b>	<b>Self directed and life-long learning:</b> Students can acquire a life-long interest in the field of Computer Science, which will motivate them to continue the process of learning even after the completion of this course.

MAPPING OF PO AND CO FOR COMPUTER SCIENCE DEPARTMENT							
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	✓						✓
CO2	✓	✓	✓				✓
CO3			✓	✓			✓
CO4	✓	✓	✓		✓		✓
CO5	✓	✓	✓	✓	✓	✓	✓
CO6	✓	✓	✓				✓
CO7	✓	✓	✓	✓	✓	✓	✓
CO8	✓	✓	✓			✓	✓
CO9	✓	✓	✓				✓
CO10	✓	✓	✓	✓	✓	✓	✓
CO11	✓	✓	✓			✓	✓
CO12	✓	✓	✓	✓	✓	✓	✓
CO13	✓	✓	✓	✓	✓	✓	✓
CO14	✓	✓	✓			✓	✓
CO15		✓	✓				✓
CO16	✓	✓	✓	✓	✓	✓	✓
CO17	✓	✓	✓			✓	✓

**Course Outcome for B.Sc.**  
**Statistics (General) (Under**  
**CBCS) 2018-19**

**Core Course (and Generic Elective for  
Honours Course)**

### **CC-1 Sem-1 Descriptive Statistics (STS-G-CC-1-1-TH) & (STS-A-GE-1-1-TH):**

Upon successful completion of this course, students should be able to:

CO1.1: Develop basic concepts and methods to collect information and compilation of data (quantitative and qualitative) and present the data in diagrammatic, graphical and tabular form.

CO1.2: Learn measures and methods to analyse the arranged data.

CO1.3: Handle the relationship between two or more variables by suitable methods.

### **CC-2 Sem-2 Elementary Probability Theory (STS-G-CC-2-2-TH) & (STS-A-GE-2-2-TH):**

Upon successful completion of this course, students should be able to:

CO2.1: Learn classical, statistical and axiomatic definition of probability and apply them to find the probability of an event.

CO2.2: Find Expectation and Variance of a random variable and learn about the different probability functions related to such a variable.

CO2.3: Learn the standard probability distributions and compute their moments and areas under the probability curves.

### **CC-3 Sem-3 Introduction to Statistical Inference (STS-G-CC-3-3-TH) & (STS-A-GE-3-3-TH):**

Upon successful completion of this course, students should be able to:

CO3.1: Differentiate between a population and its samples; learn the procedures for making prediction and drawing conclusion about population characteristics based on the data collected; gain knowledge about some more probability distributions.

CO3.2: Learn in details the process of inferencing and to take decisions regarding population parameters with certain level of confidence both parametrically and non-parametrically.

CO3.3: Provide widely applicable tools for data analysis and identify the different sources of variations out of total variation; make proper planning of statistical enquiries so that valid and reliable conclusions can be devised from them.

## **CC-4 Sem-4 Applications of Statistics (STS-G-CC-4-4-TH) & (STS-A-GE-4-4-TH):**

Upon successful completion of this course, students should be able to:

CO4.1: Apply different sampling procedures to collect data and estimate the needed parameters.

CO4.2: Learn and apply statistical tools for econometric data.

CO4.3: Deal with vital statistics data and construct life-table to judge the population growth.

## **Discipline Specific Electives**

### **DSE-A Sem-5 Operations Research (STS-G-DSE-A-5-1-TH):**

Upon successful completion of this course, students should be able to:

CO5.1: Form linear programming problems (LPP) from a given situation and solve them graphically.

CO5.2: Solve LPP analytically and formulate the dual LPP.

CO5.3: Learn various methods of solving transportation and assignment problems.

### **DSE-B Sem-6 Survival Analysis (STS-G-DSE-B-6-2-TH):**

Upon successful completion of this course, students should be able to:

CO6.1: Learn the different notations, definitions and distributions related to survival data.

CO6.2: Learn different censoring techniques associated with survival data.

CO6.3: Learn methods of estimation related to such data.

### **DSE-A Sem 5 Econometrics (STS-G-DSE-A-5-1-TH):**

Upon successful completion of this course, students should be able to:

CO7.1: Learn objectives and models in econometrics.

CO7.2: Learn problems and analysis related to multicollinearity.

CO7.3: Learn problems and analysis related to autocorrelation.

CO7.4: Learn problems and analysis related to heteroscedasticity.

## **DSE-B Sem-6 Project Work (STS-G-DSE-B-6-2-P):**

Upon successful completion of this course, students should be able to:

CO8.1: Deal with data emanating from some real life situation and propel them to dwell on some theory or relate it to some theoretical concepts.

# **Skill Enhancement Courses**

### **SEC-A1 Sem-3 Statistical Data Analysis Using R (STS-G-SEC-A-3-1-TH):**

Upon successful completion of this course, students should be able to:

CO9.1: Install R on their computer system and learn and compute basic operations using the software.

CO9.2: Learn different numbers defined in R, form variables and vectors and use simple statistical analytical tools to summarize the data contained in them.

CO9.3: Learn matrix operations.

### **SEC-B1 Sem-4 Data Base Management Systems (STS-G-SEC-B-4-2-TH):**

Upon successful completion of this course, students should be able to:

CO10.1: Culminate an idea about the the languages used in this system.

CO10.2: Creat table statement using SQL.

CO10.3: Modify table statements and learn about the advantages and disadvantages of relational Database System.

CO10.4: Learn the different structures associated with database.

### **SEC-A2 Sem-5 Research Methodology (STS-G-SEC-A-5-3-TH):**

Upon successful completion of this course, students should be able to:

CO11.1: Understand the meaning and objective of research and develop the basic tools to embark on the journey of research.

CO11.2: Learn the survey methodology related to data collection.

## **SEC-B2 Sem-6 Monte Carlo Method (STS-G-SEC-B-6-4-TH):**

Upon successful completion of this course, students should be able to:

CO12.1: Generate random numbers.

CO12.2: Use simulation as a technique to generate data related to different situations.

CO12.3: Use Monte-Carlo integration.

CO12.4: Generate data and compare with their corresponding PMFs.

## **Programme Outcome: Department of Zoology**

### **For General Course (ZOOG)**

**PO1. Acquiring in-depth knowledge** – Upon completion of the advanced programme in Zoology students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms, understands the complex evolutionary processes and behaviour of animals, can correlate the physiological processes of animals.

**PO2. Analysis and corroboration** – Be able to analyse complex interactions among the various life processes of several animals belonging to different phyla and be able to corroborate the ideas to draw the relationship among the animals as well as with environment.

**PO3. Laboratory skills and Instrumentation** – On completion of advanced course in Zoology students gain laboratory skills to handle animals, animal tissue, any biological specimen, chemicals and can handle instruments related to laboratory experiments as well as field study.

**PO4. Skill Enhancement** – Upon completion of the course students gather theoretical as well as practical knowledge which help them to enhance their skill in several applied fields of animal sciences such as ornamental fish keeping, sericulture, apiculture, aquaculture, medical diagnostics and biotechnological instrumentation.

**PO5. Design and Performance of Experiments**- The programme in Zoology teaches the students to design an experiment and perform the experiment by the students themselves.

**PO6. Analysis with statistical inference**- The course teaches the students to observe, collect and analyse real-time data with statistical inference.

**PO7. Building of Environmental ethics, Sustainability and Conservation** –Zoology programme inducts the students regarding the value of environment and its exploration in a sustainable way. Students learn to handle environmental issues with proper care and always build a positive approach towards the conservation of nature and its resources.

**PO8. Communication, bonding and learning through group activity** - As the programme in Zoology contains several field study, presentation and submission of field project report it inevitably engages the students into effective communication, peer bonding and learning through group activities.

## **Programme Specific outcome in Zoology**

**PSO1:** To Develop in-depth understanding of key concepts of biology at organismic, ecological, behavioural, physiological, biochemical and molecular levels.

**PSO2:** Building a true and clear concept of genetic and molecular principles of traits from human and non-human organisms. Description of several molecular event for controlling gene expression in several physiological processes including sex determination.

**PSO3:** Application of the knowledge of internal structure of cell, its functions in controlling of various metabolic pathways of organisms.

**PSO4:** Generating knowledge regarding animal-animal, animal-plant, animal-microbe interactions and their consequences to environment with special emphasis on conservation. Understanding of environmental conservation process and its importance, pollution control and biodiversity and protection of endangered species.

**PSO5:** To gather knowledge of internal structure of cell, its functions and control of various metabolic functions of organisms.

**PSO6:** Development of an understanding of zoological science for its application in medical entomology, apiculture, aquaculture, sericulture and medical diagnostics, animal cell biotechnology and modern biotechnological tools.

**PSO7:** Development of theoretical and practical knowledge in handling the animals and their role in environment.

**PSO8:** To Maintain high standards of learning in animal sciences and to develop multidisciplinary approach among students to work with a collaborative manner to gather a whole knowledge of biological processes.

## Course Outcome: Department of Zoology

Programme – General Course (ZOOG), For the Session - 2018-2019, 2019-2020, 2020-2021

Year	Semester	Paper	Course	Outcome
<b>Part – I</b>	<b>Semester – I</b>	CC1-1-TH	CO1	<p>CO1.1: Familiar with the non-chordate world that surrounds us.</p> <p>CO1.2: To appreciate the process of evolution in non-chordates from unicellular cells to complex, multicellular organisms.</p> <p>CO1.3: To identify the invertebrates and classify them up to the class level with the basis of systematics.</p> <p>CO1.4: Learn the evolution, hierarchy and classification of different classes of chordates.</p> <p>CO1.5: To understand the basis of life processes in the non-chordates and chordates.</p> <p>CO1.6: To understand the evolutionary relations between non-chordates and chordates through Protochordates.</p>
		CC1-1-P		<p>CO1.7: To acquaint students with the general characters and classification of animals from Protozoa to higher vertebrates.</p> <p>CO1.8: Practical involving animal material will be conducted using models/charts/e-resources.</p> <p>CO1.9: To enhancement the dissection skills.</p> <p>CO1.10: To build knowledge base about the animals commonly observed in their surroundings through preparation of Animal Album.</p> <p>CO1.11: The Practical are in accordance with the guidelines of UGC.</p>
	<b>Semester – II</b>	CC2-2-TH	CO2	<p>CO2.1: Integumentary System - The integument is one of the most dynamic and important of organs. Having a unique role as a first line of defence against numerous environmental stress, this chapter provides structure, function and derivatives of integument in birds and mammals with special emphasis on skin glans.</p> <p>CO2.2: Digestive System - This unit provides comparative anatomy of stomach; dentition in vertebrates, both have importance in digestive mechanism.</p> <p>CO2.3: Respiratory System - This unit provides comparative anatomy of respiratory organs in fish, birds and mammals and their evolutionary significance.</p> <p>CO2.4: Circulatory System - This unit provides general plan of circulation, evolution of heart and aortic</p>

			<p>arches and their significance.</p> <p>CO2.5: Urinogenital System - This unit provides, evolution of urino-genital ducts and succession of kidney in different vertebrate groups.</p> <p>CO2.6: Early Embryonic Development - This unit gives fundamental idea about gametogenesis, fertilization, cleavage and blastulation in non-chordate and chordate animals. Gives an idea about morphogenetic movements and fate mapping.</p> <p>CO2.7: Gives idea about late embryonic development such as formation of extra-embryonic membrane, implantation process and placental development.</p>
		CC2-2-P	<p>CO2.8: This unit helps to study differences between the mammalian skulls of one herbivore (Guineapig) and one carnivore (Dog) animal through identification. It will help to understand the evolution and significance of jaw development and dentition pattern with respect to their food habit.</p> <p>CO2.9: Osteology - This unit provides study of disarticulated skeleton of Pigeon and Guineapig (limb, vertebrae and girdle bones).</p> <p>CO2.10: This unit provides study and identification of larval forms, types of placenta and developmental stages of chick embryo with the help of permanent slides/models/pictures.</p>
Part – II	Semester – III	CC3-3-TH	<p>CO3.1: Nerve &amp; Muscle - This unit helps to understand about structure and function of nerve and muscle.</p> <p>CO3.2: Digestion - To understand physiology of digestion.</p> <p>CO3.3: Respiration - To understand physiology of respiration and transportation of oxygen and carbon-di-oxide.</p> <p>CO3.4: Cardio-vascular system - To understand composition of blood, structure of heart.</p> <p>CO3.5: Excretion - To understand excretion system.</p> <p>CO3.6: Reproduction and Endocrine glands - To understand reproduction and effect of endocrine glands in reproduction.</p> <p>CO3.7: To understand metabolism of carbohydrate, lipid and protein.</p> <p>CO3.8: To understand the classification and action of enzymes.</p>
		CC3-3-P	<p>CO3.9: It develops the idea of histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland, duodenum, liver, lung, kidney.and qualitative test of carbohydrate samples.</p>

		SEC-A-3-1-TH	CO4	<p>CO4.1: Morphology of bees and their social behaviour.</p> <p>CO4.2: Understand the culture methods of honey bees and introduce with different modern instruments.</p> <p>CO4.3: Gain idea about disease of honey bees and control measures.</p> <p>CO4.4: Understand about the apiary products and their uses.</p> <p>CO4.5: Knowing about the modern methods introduce to improve bee industry.</p>
Semester – IV		CC4-4-TH	CO5	<p>CO5.1: This unit gives the concept of procedure of genetic inheritance, concept of alleles with special reference of White eye locus (<i>Drosophila</i>) &amp; Thalassemia (Human).</p> <p>CO5.2: It explains crossing over techniques and linkage of genes.</p> <p>CO5.3: It covers types of gene mutation and procedure of gene mutation.</p> <p>CO5.4: It provides sex determination process in <i>Drosophila</i>.</p> <p>CO5.5: It tells about origin of life (chemical).</p> <p>CO5.6: It provides evolutionary theories like Lamarckism, Darwinism and Neo-Darwinism.</p> <p>CO5.7: This part describes about isolation mechanism and natural selection.</p> <p>CO5.8: It describes speciation procedure like Sympatric, Allopatric and Parapatric.</p> <p>CO5.9: This teaches verification of Mendelian ration through Chi- square test.</p>
		CC4-4-P		<p>CO5.10: This teaches verification of Mendelian ration through Chi- square test.</p> <p>CO5.11: Through karyotypes it helps to identify aneuploidy.</p> <p>CO5.12: It teaches phylogeny of horse by diagram of skull and limb.</p> <p>CO5.13: It teaches adaptive radiation through studying the photographs of Darwin's finches.</p> <p>CO5.14: Visiting to natural history museum and submission of report teaches tracking the fossil record, and evolutionary mechanism of life.</p>
		SEC-B-4-2-TH	CO6	<p>CO6.1: Introduces with Aquarium fishery, its potential, candidate fishes.</p> <p>CO6.2: Gives a basic idea of the biology of some indigenous as well as exogenous ornamental fishes.</p> <p>CO6.3: Imparts knowledge of use of live feed in aquarium culture, feed formulation and larval control by ornamental fishes.</p> <p>CO6.4: Provides knowledge about fish handling techniques, transport and packaging.</p> <p>CO6.5: Practical knowledge regarding the set-up of an aquarium and its budget.</p>

Part – III	Semester – V	DSE-A-5-1-TH	C07	<p>C07.1: It provides the idea of types of parasites, types of host and their interactions.</p> <p>C07.2: It tells about epidemiology of diseases, transmission processes and their prevention.</p> <p>C07.3: It provides life History and pathogenicity of <i>Entamoeba histolytica</i>, <i>Plasmodium vivax</i> and <i>Trypanosoma gambiense</i>.</p> <p>C07.4: It teaches life cycles of parasitic helminths.</p> <p>C07.5: It teaches biology, control and damage (of economically important plants) created by insect pests.</p> <p>C07.6: It teaches medical importance and control of mosquito (<i>Anopheles</i> sp.).</p> <p>C07.7: It provides concepts of animal husbandry.</p> <p>C07.8: Poultry Farming - It provides principles of poultry breeding, management of breeding stock and broilers, Processing and preservation of eggs.</p> <p>C07.9: Fish Technology - It teaches the procedures of genetic improvements in aquaculture industry, induced breeding and transportation of fish seed.</p>
		DSE-A-5-1-P		<p>C07.10: Study of <i>Plasmodium vivax</i>, <i>Entamoeba histolytica</i>, <i>Trypanosoma gambiense</i>, <i>Ancylostoma duodenale</i> and <i>Wuchereria bancrofti</i> and their life stages through permanent-slides/photomicrographs or specimens.</p> <p>C07.11: Study of arthropod vectors associated with human diseases: <i>Pediculus</i>, <i>Culex</i>, <i>Anopheles</i>, <i>Aedes</i>.</p> <p>C07.12: Study of insect damage to different plant parts/stored grains through damaged products/photographs.</p> <p>C07.13: Identifying feature and economic importance of <i>Helicoverpa</i>; <i>Heliothis armigera</i>, <i>Papilio demoleus</i>, <i>Pyrilla perpusilla</i>, <i>Callosobruchus chinensis</i>, <i>Sitophilus oryzae</i> and <i>Tribolium castaneum</i>.</p> <p>C07.14: Visit to poultry farm or animal breeding centre. Submission of visit report.</p> <p>C07.15: Demonstration of maintenance of freshwater aquarium.</p> <p>C07.16: This above practical works provides basic ideas of pisciculture, parasitology, and interaction of host, parasite and vectors and their characteristic features, and medical and economical importance of some insects.</p>
		DSE-A-5-2-TH	C08	<p>C08.1: Gather knowledge about aquatic ecosystem.</p> <p>C08.2: Learn about the lake ecosystem.</p> <p>C08.3: Familiar with marine life.</p>

				<p>C08.4: Learn about the aquatic pollution and its effects on aquatic bodies.</p> <p>C08.5: Acquire knowledge about different aquatic microorganisms.</p>
		DSE-A-5-2-P		<p>C08.6: Ability to estimate dissolve O<sub>2</sub> and CO<sub>2</sub>.</p> <p>C08.7: Learn about aquatic ecosystem and its parameter measuring technique</p>
		SEC-A-5-3-TH	C09	<p>C09.1: Basic idea about taxonomy, morphology and distribution silk moth.</p> <p>C09.2: To know the life history of <i>Bombyx mori</i>.</p> <p>C09.3: Understand the culture of mulberry plant.</p> <p>C09.4: To know the rearing of silk moth and harvesting of silk.</p> <p>C09.5: Gather knowledge about pest and disease of silk moth.</p> <p>C09.6: To develop the ability of entrepreneurship in sericulture.</p>
	Semester – VI	DSE-B-6-1-TH	C010	<p>C010.1: Basic knowledge about insect and their morphology.</p> <p>C010.2: Familiar with vectors and their adaptation.</p> <p>C010.3: Understanding the taxonomy of insects, with special emphasis to insect vectors.</p> <p>C010.4: Learn about the Dipterans and its negative role in human pathology.</p> <p>C010.5: Understanding various disease vectors.</p> <p>C010.6: Learning about the Siphunenlata and its harmful effect in human population.</p> <p>C010.7: Introduction with different bugs their harmful effects and control measures.</p>
				DSE-B-6-1-P
		DSE-B-6-2-TH	C011	<p>C011.1: Gather knowledge about biotic and abiotic components of ecology and environment.</p> <p>C011.2: Learning about the population ecology.</p> <p>C011.3: Acquire data about the community structure. Species diversity.</p> <p>C011.4: Ability to learn about ecosystem, its composition, energy flow, development, growth etc.</p> <p>C011.5: Introduction about wild life, its conservation, methodology, types etc.</p>
				DSE-B-6-2-P

			<p>in the field.</p> <p>CO11.8: Hands-on training on different instruments for ecological study.</p> <p>CO11.9: Learn to measure different water parameters.</p>
		SEC-B-6-4-TH	<p>CO12</p> <p>CO12.1: It teaches about Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentation Rate (E.S.R.).</p> <p>CO12.2: It teaches Urine Analysis: Physical characteristics; Abnormal constituents, Urine culture.</p> <p>CO12.3: It teaches causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), and Testing of blood glucose using Glucometer/Kit.</p> <p>CO12.4: It teaches causes, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis. Microscopic and ELISA based study of Malarial parasite.</p> <p>CO12.5: It helps to study Lipid profiling, Liver function test. PSA test.</p> <p>CO12.6: It teaches Antibiotic Sensitivity Test.</p> <p>CO12.7: It provides the idea of types (Benign/Malignant), detection and metastatic condition of tumours. Study of X-Ray image of Bone fracture.</p> <p>CO12.8: Visit to a pathological laboratory helps to gain a hands-on knowledge of the techniques and submission of a project report enhances the ability to document and represent data.</p>

### Mapping of PO and CO for the General Course of Zoology

PO1. Acquiring in-depth knowledge	PO2. Analysis and corroboration	PO3. Laboratory skills and Instrumentation	PO4. Skill Enhancement	PO5. Design and Performance of Experiments	PO6. Analysis with statistical inference	PO7. Building of Environmental ethics , Sustainability and Conservation	PO8. Communication, bonding and learning through group activity
CO1	CO1	CO1	CO4	CO5	CO3	CO9	CO1
CO2	CO2	CO2	CO9	CO6	CO5	CO11	CO2
CO3	CO3	CO3	CO12	CO7	CO8		CO3
CO4	CO5	CO5		CO10	CO11		CO5
CO5		CO7					CO8
CO7		CO11					CO10
CO8							CO11
CO11							CO12
CO12							

## **Programme Outcome: Department of Botany**

### **For General Course (BOTG)**

- PO1. Acquiring in-depth knowledge** – Upon completion of the advanced programme in Botany, students gain knowledge and skills in the fundamentals of plant sciences, understands the complex interactions among various living organisms and understands the complex evolutionary processes .
- PO2. Analysis and corroboration** – Be able to analyse complex interactions among the various life processes of several plants belonging to different families and be able to corroborate the ideas to draw the relationship among the plants as well as with environment.
- PO3. Laboratory skills and Instrumentation** – On completion of advanced course in Botany students gain laboratory skills to handle plants, plants tissue, any plants specimen, chemicals and can handle instruments related to laboratory experiments as well as field study.
- PO4. Skill Enhancement** - Upon completion of the course students gather theoretical as well as practical knowledge which help them to enhance their skill in several applied fields of plants sciences such as biodiversity, pathology, plant tissue culture , mushroom culture, medical diagnostics and biotechnological instrumentation.
- PO5. Design and Performance of Experiments** - The programme in Botany teaches the students to design an experiment and perform the experiment by the students themselves.
- PO6. Analysis with statistical inference** - The course teaches the students to observe, collect and analyse real-time data with statistical inference.
- PO7. Building of Environmental ethics, Sustainability and Conservation** – Botany programme inducts the students regarding the value of environment and its exploration in a sustainable way. Students learn to handle environmental issues with proper care and always build a positive approach towards the conservation of nature and its resources.
- PO8. Communication, bonding and learning through group activity** - As the programme in Botany contains several field study, presentation and submission of field project report it inevitably engages the students into effective communication, peer bonding and learning through group activities.

## **Programme Specific outcome in Botany**

- PSO1:** To Develop in-depth understanding of key concepts of biology at organismic, ecological, behavioural, physiological, biochemical and molecular levels.
- PSO2:** Building a true and clear concept of genetic and molecular principles of traits from plants and micro organisms. Description of several molecular event for controlling gene expression in several physiological processes including sex determination.
- PSO3:** Application of the knowledge of internal structure of cell, its functions in controlling of various metabolic pathways of organisms.
- PSO4:** Generating knowledge regarding, plant- animal, plant-microbe interactions and their consequences to environment with special emphasis on conservation. Understanding of environmental conservation process and its importance, pollution control and biodiversity and protection of endangered plant species.
- PSO5:** To gather knowledge of internal structure of cell, its functions and control of various metabolic functions of organisms.
- PSO6:** Development of an understanding of botanical science for its application in plant tissue culture, mushroom culture and medical diagnostics, plant biotechnology and modern biotechnological tools.
- PSO7:** Development of theoretical and practical knowledge in handling the plants and their role in environment.
- PSO8:** To Maintain high standards of learning in plants sciences and to develop multidisciplinary approach among students to work with a collaborative manner to gather a whole knowledge of biological processes.

## Course Outcome: Department of Botany

Programme –General Course (BOTG), For the Session - 2018-2019, 2019-2020, 2020-2021

Year	Semester	Paper	Course	Outcome
<b>Part – I</b>	<b>Semester – I</b>	CC1-1-TH	CO1	CO1.1: Familiar with the plant world that surrounds us.
				CO1.2: To understand the basis of life history and classification of algae and their role in the environment, agriculture, bio technology and industry.
		CO1.3: Concept of life process and classification of fungi and their economic importance. At the same time fungal symbiosis and their importance.		
		CO1.4: Familiar with the plant disease and their control measures.		
				CO1.5: To understand the life history of Bryophytes and their amphibian nature, ecological and economic importance.
				CO1.6: To understand the anatomical features of monocots and dicots. Stelar evolution and anomalous secondary growth.
		CC1-1-P		CO1.7: To acquaint students with the microscopic plants.
				CO1.8: Practical involving plant material will be conducted using microscope and staining method.
				CO1.9: To enhancement the dissection skills.
				CO1.10: To build knowledge base about the plants commonly observed in their surroundings through preparation of Field report.
				CO1.11: The Practical are in accordance with the guidelines of UGC.
	<b>Semester – II</b>	CC2-2-TH	CO2	CO2.1: Concept of life history, classification and economic importance of Pteridophyte and Gymnosperm.
				CO2.2: Brief idea of fossil, its process and geological time scale. Palynology – idea and applications.
				CO2.3: Familiar with taxonomy, classification and morphology of angiosperm.
		CC2-2-P		CO2.4: Dissection of floral parts of angiospermic plants.
				CO2.5: Familiar with the macroscopic specimens of Pteridophytes and Gymnosperms, inflorescence types and

				<p>anatomical structure of angiospermic plant parts.</p> <p>CO2.6: Spot identification of different angiospermic plants with their scientific names and families.</p>
<b>Part – II</b>	<b>Semester – III</b>	CC3-3-TH	CO3	<p>CO3.1: Cell biology and Genetics - This unit helps to understand about the ultra structure and function of nucleolus &amp; Nucleolus concepts.</p> <p>CO3.2: Chromosomal aberrations to understand deletion, duplication &amp; polyploidy -types, importance and role in evolution.</p> <p>CO3.3: Central Dogma - To understand transcription and translation</p> <p>CO3.4: Genetic Code - Brief idea about the properties of genetic Code.</p> <p>CO3.5: linkage group and genetic map - To understand the linkage three-point test cross.</p> <p>CO3.6: mutation- To understand types of mutation and mutagen.</p> <p>CO3.7: Brief concept of split gene and transposons.</p> <p>CO3.8: Microbes- Discovery, structure and replication of DNA and RNA virus and bacteria and economic importance</p>
		CC3-3-P		<p>CO3.9: It develops the idea of mitotic stages and index from onion root tip.</p> <p>CO3.10: To understand the gram staining process of microbes.</p>
		SEC-A-3-1-TH	CO4	<p>CO4.1: Plant breeding and biometry</p> <p>CO4.2: Understand the plant biotechnology.</p> <p>CO4.3: Gain idea about biofertilizers</p> <p>CO4.4: Understand about the plants diversity and human welfare.</p> <p>CO4.5: Knowing about the mushroom culture technology.</p> <p>CO4.6: Brief idea about nursery and gardening.</p> <p>CO4.7: Concept of ethnobotany.</p>
	<b>Semester – IV</b>	CC4-4-TH	CO5	<p>CO5.1: This unit gives the concept of plants physiology and metabolism.</p> <p>CO5.2: It explains structure of protein and nucleic acid.</p> <p>CO5.3: It covers transport in plants transpiration, photosynthesis and</p>

				respiration. C05.4: It provides the idea about nitrogen metabolism, plants growth regulators, photoperiodism and senescence.
		CC4-4-P		C05.5 This teaches about plasmolysis. C05.6It helps the idea about the transpiration. C05.7:It teaches about imbibation, evolution of oxygen and carbondioxide.
		SEC-B-4-2-TH	C06	C06.1: Plant breeding and biometry C06.2: Understand the plant biotechnology. C06.3: Gain idea about biofertilizers C06.4: Understand about the plants diversity and human welfare. C06.5: Knowing about the mushroom culture technology. C06.6: Brief idea about nursery and gardening . C06.7: Concept of ethnobotany.
Part – III	Semester – V	DSE-A-5-1-TH	C07	C07.1: It provides the idea about phyto chemistry and medicinal botany. C07.2:It tells about pharmacognosy and organoleptic evaluation of crude drugs. C07.3:It provides the idea about pharmacologically active constituents . C07.4: It teaches ethno botany and folk medicine .
		DSE-A-5-1-P		C07.10:Preparation of solution and buffers . C07.11: Acquaintance with different laboratory instruments . C07.12: Qualitative test for proteins and carbohydrates C07.13:chemical test for tannin and alkaloid. C07.14:Identification of medicinal plants
		DSE-A-5-2-TH	C08	C08.1: Gather knowledge about economic botany. C08.2: Learn about the origin of cultivated plants . C08.3: Familiar with Rice – origin , morphology and uses. C08.4: Learn about the legumes and beverages. C08.5:Acquire knowledge about different economically importance plants.
		DSE-A-5-2-P		C08.6: Study of economically importance of Rice –Jute- Tea . C08.7: Study of cultivation practices in field.
		SEC-A-5-3-TH	C09	C09.1: Plant breeding and biometry C09.2: Understand the plant biotechnology.

				<p>C09.3: Gain idea about biofertilizers</p> <p>C09.4: Understand about the plants diversity and human welfare.</p> <p>C09.5: Knowing about the mushroom culture technology.</p> <p>C09.6: Brief idea about nursery and gardening.</p> <p>C09.7: Concept of ethnobotany.</p>
Semester – VI	DSE-B-6-1-TH	C010	<p>C010.1: Basic knowledge about horticultural practices and post harvest technology.</p> <p>C010.2: Familiar with ornamental plants.</p> <p>C010.3: Understanding some fruits and vegetable plants .</p> <p>C010.4: Learn about horticultural techniques .</p> <p>C010.5: Understanding about disease control and management</p>	
			<p>C010.8: Field trips to garden ,crop sites , nurseries , vegetable gardens , horticultural field and cold storages.</p>	
	DSE-B-6-1-P			
	DSE-B-6-2-TH	C011	<p>C011.1: Gather knowledge about natural resource managements .</p> <p>C011.2: Learning about land utilization , soil degradation and management .</p> <p>C011.3: Acquire knowledge about different types of water .</p> <p>C011.4: Ability to learn about biodiversity.</p> <p>C011.5: Introduction about major and minor forest products &amp; waste management.</p>	
			<p>C011.6: estimation of solid wasted generated by a domestic system .</p> <p>C011.7: Measurement of dominant woody species by DBH.</p> <p>C011.8: Study of community structure by quadrat method..</p> <p>C011.9: Determination of chemical properties of soil.</p>	
	DSE-B-6-2-P			
SEC-B-6-4-TH	C012	<p>C012.1: Plant breeding and biometry</p> <p>C012.2: Understand the plant biotechnology.</p> <p>C012.3: Gain idea about biofertilizers</p> <p>C012.4: Understand about the plants diversity and human welfare.</p> <p>C012.5: Knowing about the mushroom culture technology.</p> <p>C012.6: Brief idea about nursery and gardening.</p>		

				C012.7: Concept of ethnobotany.
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## BENGALI

CO1

History of Bengali Literature [upto 1800AD], will say the various forms of literature from the derivation of Bengali language and literature till 1800 AD.

CO2

Descriptive Philology & Bengali language will describe the innate grammar of Bengali language.

CO3

History of Bengali Literature [19<sup>th</sup> Century] helps to know the colonial modernism and the effects on thoughts, the lifestyles and the literature of Bengal and the Bengalees.

CO4

Bengali Literature : Initial Stage, tells the preliminary knowledge of Bengali literature & language and the bliss to read this type of literature of this age.

CO5

Bengali Literature : [20<sup>th</sup> Century] says about the trend and the ideas of 20<sup>th</sup> century Bengali Literature.

CO6

Historical Philology shows the characteristics of the derivation of Bengali Language and follow-ups of the ideas of literature from Old Indian Language till Modern Indian Language.

CO7

Novels and Short Stories shows the complexity, the effect of women in Bengali families, the thoughts on environment and the struggle of human being on Bengali Literature.

CO8

Pre – Modern Literature shows the society and the religious scenario of Bengal and its effect on Bengali literature of this age

CO9

Rhetoric and Prosody and 'Kabyatatto' helps to learn poetry by its grammar.

CO10

Essays and Writings of Bengali Literature, shows the philosophical point of view of different writers mentioning the society, state, education, science and literature, religion and thoughts of Bengal. Also 'Chhinnopetro' of Rabindranath Tagore shows a different view to look and describe the world.

CO11

Types of Bengali Literature shows the different types and structure of Bengali literature.

CO12

Drama and Theatre of Bengal, shows the basic of Bengali Drama and the history of Bengali Theatre.

CO13

Modern Bengali Poetry means the colonial modernism and its effect on poetry having the modernism in Bengali literature

CO14

The history of Sanskrit, English and Hindi [neighbourhood] literature, shows the history of these three languages and literatures

## HINDI , PSO

### 1. Culture: Contemporary and Tradition:

The new curriculum will help the students to be aware of their Native society and cultural ethos, its philosophy and literature through the exposure of ancient to modern hindi literature in translation. The course will enable them to be rooted in their rich Native tradition and culture and will awaken their pride for the Nation.

### 2. Literature, Culture and History:

Through the new curriculum, students will gain a profound understanding of the cultural, Historical and social background of a text and the varied nuances of decoding a text by unraveling of the silent and repressed marginal voices. Students will awaken as impartial readers where they can question the role of the author, its authority and his relation to society.

### 3. Literature and Critical Discourse:

The newly revised syllabus will enable the students to develop a rational bent of mind and how they can explore the hidden horizons of a 'readerly text'. They will come to understand how the reader plays an active role in critical dissemination of the text rather than the author emerging as a creative 'dictator'.

### 4. Literature and Allied Arts:

The differences between literary texts and other allied arts- Like architecture, sculpture, painting, music and film will be broken and students will gain a profound understanding of literature being a conglomerated study of diverse disciplines.

### 5. Indian Dalit and stree vimarsh Literature

based society of India. It traces the conditions of the Indian social factors that surround the Dalits for their interactions with Dalits and non-Dalits. It explores how Dalit community and womens struggled for equality and liberty .

### 6. Value Education:

The designed curriculum will enhance the pupils' aesthetic and humane understanding to life, enlarge scientific and rational bent of mind, imagination and vision. This will help them grow into mature and sensible human beings, will awaken their individuality. They will be able to move out of their 'narrow domestic walls' and will readily discover their self which is distinct and one with the larger world.

## HINDI

CO1

### History of Hindi Literature [Ancient And Medieval period from 993 AD to 1643 AD]

will say the initial stage and various forms of hindi literature including derivation ,religious attachment, effect of Arabic and Persian languages on hindi language and literature till 1643 AD.

CO2

### History of Hindi Literature [Modern period ,upto 1980 AD]

will say the various trends reforms and awareness of society reflecting in hindi literature of Modern period .

CO3

### Ancient And Medieval Period Poetry

Reflects the various social and religious changes and reforms of indian –mainly hindi belts –society .

CO4

### Modern hindi poetry 1857 to 1936 AD

New ideas , concepts , reforms in hindi literature , importance of self expression and closeness with nature are the main points reflecting through the hindi literature of this duration .

CO5

### Post Romanticism Poetry [1936 AD to 1980 AD]

- i. Within this, progressive poetry will be studied. Poets have based their poetry on low class people and their problems.
- ii. Poets have tried to reflect in their poetry India, after independence, and its basic problems.

## **CO6**

### **Indian Poetics**

In this portion, students will study the theory of Indian Poetics and its basic tools to help their understanding regarding theory and poetry basic forms. Rasha siddhant ,dhwani siddhant , alankar siddhant, ritti siddhant etc.

## **CO7**

### **Western Poetics**

In this portion, students will study the theory of Western Poetics and its basic tools to help their understanding regarding theory and poetry.

Marxist Analysis, New Analysis, Modernity, Reality, Post-Modernity, etc are also to be studied.

## **CO8**

### **Linguistics and Hindi Language**

As part of this, along with the definition of language, linguistics, syntax and semantics will be studied.

Along with rajbhasha, rashtrabhasha and sampark bhasha, the specialities of Devnagari script will also be studied

## **CO9**

### **Hindi Novels**

In this portion, students will study hindi most famous Novels like Gaban, Tyagapatra ,Mahabhoj etc , on the behalf of these famous novels We need to cultivate a habit amongst the new generation to read Hindi novels and books, we need to promote them better, make it a point to protect our cultural heritage.

## **CO10**

### **Hindi Story**

In this portion, students will study different dimensions of hindi story i.e push ki raat, paajeb, teesri kasam, Akash deep etc. , on the behalf of these famous stories We need to cultivate a habit amongst the new generation to read Hindi stories, we need to promote them better and make it a point to protect our cultural heritage.

### **CO11**

#### **Hindi Drama and One-act play**

Being creative and learning to make creative choices helps students to be better at thinking of new ideas, allowing them to view the world around them in new ways. When the students are performing will develop the ability and skills to be able to focus the mind

### **CO12**

#### **Hindi essay and another prose proesedure,**

In this portion, students will study different dimensions of hindi essay and prose procedure . for its students should actively reorder society in a way that is conducive to such developments.

### **CO13**

#### **Hindi literary magazines**

In this portion, students will study different time period magazines 1857 to 1980 . Bharatendu yug, dwivedi yug ,prem chand yug magazines etc.

### **CO14**

#### **Prayojanmulak hindi**

In this portion, students will study origin of hindi language to rajbhasha ,rastriya bhasha ,sanpark bhasha. Nowadays a huge number of Hindi jobs opportunities are available across india in both Govt/ Private sectors. Students benefits to take hindi related jobs.

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## DEPARTMENT OF ENGLISH

### PROGRAMME SPECIFIC OUTCOME

English Literature courses in the Department of English and enables the students to develop a humane yet rational understanding of the world around them. It is designed to inculcate in them a spirit of exploration and critical thinking through modes of introducing literatures from various parts of the world – British, American, Indian and other Post Colonial literatures as well. Students are expected to seek information, to be imaginative, rhetorically adept and develop their communication skills through these courses of study. With the introduction of the new syllabus under CBCS from the current academic session, which expands the spectrum and scope of exploration of literary studies in terms of the cross currents of influences- cultural, historical and political in shaping literature, UG syllabus at Acharya Jagadish Chandra Bose College will help the students in determining the various prospects and aspects of studying literature and equip them with tools of literary proficiency, skills of analysis and interpretation and critical insight. Also the various Language courses and Ability Enhancement courses are designed to improve their technical skills in styles of writing, drafting, revising, modes of effective communication and soft skills development They will learn not only to read and write but also to think, analyse ,strategise and channelize their knowledge in shaping their world view- qualities that are crucial to choose careers in a society which as at the milieu of new modes of beliefs and thinking.

**Specific learning outcomes for English Courses include the following:**

**PO1.Critical thinking:** Students are encouraged to develop critical insight sand independent thinking which will not only enhance their research abilities but also grant them a better understanding of various fundamental issues.

**PO2.Effective Communication:** The designed curriculum will help the students to grow as Global citizens as they are made aware of the role of Media and Communication in contemporary society. They learn to use language as an effective tool in today's world and it empowers the students with the knowledge of technical and creative aspects of language.

**PO3 .Social Interaction:** In course of an interaction, discussion and seminars, students are able to express their views clearly in rational and logical terms without disrespecting the views of others and accept various cross currents of thought.

**PO4. Effective Citizenship :** In this age of globalisation and virtual reality, Students can connect to more human areas of existence and experiences of realities not their own. They will connect to the vast conglomeration of cultural constructs and identities in the wide spectrum of the world. The power of the written word can equip them with a different vantage point and help them to synergise with the lives of the people around them and beyon

**PO5. Ethics:** The designed curriculum will enhance the pupils' aesthetic and humane understanding to life and the world, enlarge scientific and rational bent of mind, imagination and vision. This will help them grow into mature and sensible human beings, and integrate morality and ethics in the very fiber of their personality..

**PO6: Environment and Sustainability:** After the completion of course students are more aware and alert about the various environmental issues and hazards such as pollution, global warming, ozone layer depletion, conservation of natural resources etc.

**PO7: Self Directed and Life – Long Learning:** The various components of the course aim to groom and nurture the students so that they can learn to apply their knowledge in the practical aspects of life ,thrive as intellectual and empathetic human beings in the society and bring positive changes in the world around them.

## COURSE OUTCOME

### 1. HISTORY OF ENGLISH LITERATURE, PHILOLOGY,(CC1)

After completion of this course students will be able to:

- Know the History of English Literature vis a vis the socio-political and cultural context and major reforms of the ages. It spans from the Anglo Saxon age to the Modern age.
- Know the growth and development of English Language and the influences of other languages in shaping the present day English. Methods of word formation are also discussed for a better understanding of semantics.
- Comprehend the relation between literature and language.

### 2. CLASSICAL LITERATURE (CC2)

After completion of this course students will be able to:

- Read and understand the Social and Intellectual background of Classical Europe and the rich plethora of Classical texts.
- Apply the modern theories of reading to these texts and determine their relevance in the present day literature.
- Appreciate these texts as legacy from the past and valuable archives of knowledge about their age.

### 3. INDIAN WRITING IN ENGLISH,MODERN INDIAN WRITING IN ENGLISH TRANSLATION(CC3,DSE A1)

After completion of this course students will be able to:

- Know about the emergence and impact of Indian Writings in English as an indigenous genre from the canonical British Literature.

- Know the points of confluence, divergence and break from British Literature and their significance as documents of nationalist and patriotic sentiments and as unifying medium.
- Discuss and understand the debate concerning the 'Indianness' of these works and the social and cultural issues present in these forms of literature.

#### 4. BRITISH LITERATURE (CC4,CC7-CC10,CC12,GE1,GE2,SEC A2)

After completion of this course students will be able to:

- Show familiarity with major literary works by writers from Medieval age to Modern age including poetry, prose, essays and drama.
- Learn various methods of reading texts of different genres.
- Learn to read these texts as representative works of their age encompassing the socio-cultural, political, religious and historical context.

#### 5. AMERICAN LITERATURE (CC5)

After completion of this course students will be able to :

- Know the emergence and development of American Literature from just another "colonial" literature to an authentic script of life and history of the American people, their dreams and despair, their quest and struggle to carve an identity of their own.
- Know the various representative texts outlining the periods of American Literature.
- Identify the heterogeneous voices of African American writes and their works voices of dissent and anguish.
- Trace the journey of America from a "new found land" to a global icon.

#### 6. POPULAR LITERATURE (CC6)

After completion of this course students will be able to:

- Know the characteristics and premises of Popular Culture.
- Probe into the various forms of popular literature such as Crime Fiction, Comics, Non Sense Verse and Children fiction etc.
- Understand how Popular Culture creates an alternate reality and erases the boundaries of imagination and limitations of canonical literature.

#### 7. WOMEN'S WRITINGS (CC11)

After completion of this course students will be able to:

- Be aware of the position of women in the society, the marginalisation and oppressions that they suffer at the hands of patriarchy and their subaltern identity.
- Learn that the condition of women and their experiences are specific to their geographical location and cultural constructs.

- Read these texts as being different from that of male authors: presenting their typical situation in language and expression of their own.

#### 8. MODERN EUROPEAN DRAMA (CC13)

After completion of this course students will be able to:

- Read European drama as markers of significant literary movements in Europe such as Absurdism, Existentialism, Feminism and the influence of these ideas on the Modern day existence and its crisis.
- Learn about the aesthetics that formulate the psyche of a “modern” human being.

#### 9. POST COLONIAL LITERATURE (CC14)

After completion of this course students will be able to:

- Identify the paradigms of Post Colonialism as a movement as well as a way of life.
- Read how the Post Colonial world functions in the after math colonialism and what distinguishes it from its predecessor. Whether it is a continuum of colonialism or a hyphenated break from colonialism will also be discussed.
- Read how language acts as a trope to seek liberation from colonisers and how is it a tool of resistance against colonial oppression.
- Read how “Black” functions as a significant other of their “White” colonial (British) counterparts, how it struggles to find a voice and create an identity and their psychology in trying to situate themselves in the cultural demography.

#### 10. LITERARY THEORY AND LITERARY CRITICISM – DSE A2

After completion of this course students will be able to:

- Learn the history of Literary Criticism and the varied theories that emerge as modes of thought.
- Learn to apply the theories to attempt a critical reading of the texts.
- Realise how ideas are de stabilised and new currents of thought stream out.
- Know that life and existence are fluid entities and so is meaning- there are no fixatives in the true sense. The locus shifts according to the intellectual discourse germinating in the very lives of people.
- Develop an aptitude for research and critical thinking.

#### 11. PARTITION LITERATURE- DSE A3

After completion of this course students will be able to:

- Read the holocaust of partition and how it completely altered not only the cartography but also culture and every essential aspect of life; their rehabilitation and struggle to find an altered identity.
- See the partitioned world as a “mirror” entity of the undivided “whole”: the partition acting as a “shadow line” between countries, the realities of life in an alien place and the memories of “home”.
- Read Partition literature as a social document and as Memory Literature.

## **12. MEDIA AND COMMUNICATION STUDIES– DSE A4**

After completion of this course students will be able to:

- Comprehend the meaning of mass communication, its importance in the age of globalisation.
- Understand the concepts of advertisement and how to create an advertisement for consumers.
- Learn to create pamphlets and posters in generating mass awareness and social propaganda.

## **13. LITERARY TYPES, RHETORIC AND PROSODY-DSE-B1**

After completion of this course students will be able to:

- Read Tragedy, Comedy and Short story as literary types, the theories both classical and contemporary involving them.
- Identify the figures of speech in texts and how they are used to enhance the meaning and also to ornament the language.
- Learn to scan the prose and poetry passage and decipher the rhyme scheme and cadence of language.

## **14. CONTEMPORARY INDIA : WOMEN AND EMPOWERMENT (DSE – B2)**

After completion of this course students will be able to:

- Read how gender is a social and cultural construct, how it differs from biological identity.
- Learn the history of Women's movement in India (Pre-Independence and Post-Independence).
- Learn the various laws concerning the issues of women such as Domestic Violence, Female Foeticide, Sexual harassment.
- Probe into the text and context of Dalit women as doubly marginalised.

## **15. AUTOBIOGRAPHY (DSE-B3)**

After completion of this course students will be able to:

- Read the autobiography as “metaphor of the self”; its journey from the private world to the public sphere.
- Read Women's autobiographies as records and confessions of their domestic space and public “appearances” in the world of men.

## **16. TEXT AND PERFORMANCES (DSE-B4)**

After completion of this course students will be able to:

- Gain a historical overview of the Indian and Western theatre, Classical, Modern and Contemporary theatres.
- Learn the historical developments of theatrical forms.
- Learn about Folk traditions and folk theatre as typical of indigenous tradition and culture.

## **17. TRANSLATION STUDIES (SEC- A1)**

After completion of this course students will be able to:

Learn the different facets of Translation: Literal Translation, Free Translation and Transcreation.

- Learn the theories of translation and their importance in a multi-linguistic, multi-lingual society.
- Identify and appreciate Translated texts as independent texts and their reach in the contemporary world.

### **18. ENGLISH COMMUNICATION AND CREATIVE WRITING(AECC1,SEC A-2,SEC B1)**

After completion of this course students will be able to:

- Know the various innovative ways of using English language in verbal and non verbal communication.
- Learn the technical aspects of Business Communication and how to write clearly and effectively both in print medium and e-correspondence.
- Be trained in modes of creative writing thereby encouraging them to develop their individual style and creative thought.

### **19. ACADEMIC WRITING AND COMPOSITION (SEC-B2)**

After completion of this course students will be able to:

- Get an introduction to the correct technical aspects and of academic writing.
- Differentiate academic writing from other styles of writing and composition.
- Enrich their idea about how to write an effective summary and frame a critical note.

### **20. LANGUAGE SOCIETY AND PERSONALITY AND LANGUAGE CREATIVITY AND ANALYSIS (LCC L2-1, L2-2)**

After the completion of this course the students will be able to :

- Understand the inter relation between language and society.
- Understand how language has been shaped by various influencers and personalities such as Mahatma Gandhi, Rabindranath Tagore, Ishwar Chandra Vidyasagar.
- Understand and analyse the language and also the creative aspects of various texts including the translated literary pieces.

## **COURSE OUTCOME : EDUCATION (GENERAL)**

### **CO 1 Introduction to Education**

- To explain the factors of education and their relationships
- To become aware of different agencies of education that influence education.
- To be acquainted with the concept of child centric and play-way education.

### **CO 2 Psychological Foundation of Education**

- To understand the meaning of Psychology and be acquainted of with different aspects.
- To know the patters of different aspects of human development and relate this knowledge with education.
- To be acquainted with the cognitive approach of development and to understand the process and factors of cognition.

### **CO 3 Sociological Foundations of Education**

- To understand the relation between Sociology and Education, nature, scope of Sociology.
- To explain the concept of Social Groups and Socialization process.
- To enable students to understand the concept of Social change and social interaction in education.
- To become aware of social Communication in Education.

### **CO 4 Inclusive Education**

- To understand the meaning of Inclusion and Exclusion.
- To know the types of Exclusion and their causes.
- To know how to bring about inclusion in different spheres of education.

### **CO 5 Peace and Value Education**

- To know the concept of peace education.
- To understand peace and non-violence
- To develop the concept of value education.
- To understand peace, value and conflict resolutions.

### **CO 6 Educational thought of Great Educators.**

- To develop an understanding of educational ideas of Indian and Western Educators.
- To understand pedagogical concepts given by Indian and Western educational thinkers.

### **CO 7 Human Rights Education**

- To know the concepts of Human Rights.
- To know the role of United Nations and human rights.
- To understand enforcement mechanism in India.
- To know the role of advocacy groups.

### **CO 8 Women Education**

- To know the historical perspective of Women Education.
- To know the Policy Perspectives and Committees and Commissions on Women Education.
- To know the role Indian thinkers towards Women Education.
- To identify major constraints of Women Education and Women Empowerment.

### **CO 9 Communication Skills**

- To understand the basic elements of Communication.
- To acquire Listening skills.
- To acquire Speaking skills.
- To acquire Reading and Writing Skills.

### **CO 10 Skill for Democratic Citizenship**

- To have an idea about their duties as citizen.
- To have an idea about their rights as citizen
- To have an idea about child violence and child rights.
- To have an idea about domestic violence and domestic rights.

### **CO 11 Teaching Skills**

- To know the basic concept of teaching.
- To know the types of teaching.
- To understand the skills of teaching.
- To learn the Concepts of Learning Design(LD)

### **CO 12 Life Skill Education**

- To understand meaning of life skills.
- To be acquainted with the different types of life skills.
- To find the ways in which individuals personality can be built through the development of these life skills.

# **CO OF POLITICAL SCIENCE**

## **Introduction to political theory(CC1)**

After reading this the students will be able to know the basic knowledge about politics, its history of inception, and origin.

## **Comparative Govt and Politics (CC2)**

The students will be able to know the basic differences of different constitutions and their implementation.

## **Govt and Politics in India(CC3)**

The students will learn the origin and evaluation of their own country's constitution.

## **International Relations (CC4)**

The students will learn the political socialisation process and the inputs of the foreign diplomacy of different countries.

## **Public Administration (DSE1A)**

Prepare the students for the administrative jobs and its basic policies.

## **Indian Foreign Policy (DSE1B)**

It helps the students to understand the basic relationship of India with other parts of the nation.

## **Feminism(DSE2A)**

Makes the students understand the basic quality of different kinds of feminism history of the world.

## **Human Rights(DSE2B)**

The students learn the concept of humanism and the rules and regulations regarding the protection of their rights.

## **Legal Literacy(SECA1)**

Makes the students learn the basic codes of laws and regulations.

## **Understanding the Legal System (SECA2)**

The procedure of legal bindings and findings are known here.

## **Elementary Dimensions of Research (SECB1)**

It is the basic study for the research findings to be carried afterwards by a student of political science.

## **Basic Research Methods (SECB2)**

The students get prepared for their research methodology in future.

The **Course Outcome** for **B. Sc. in Computer Science** is as follows:

### **Semester - 1**

Upon Successful completion of this course, students should be able to

**CO1:** Develop an understanding about the fundamental building blocks of a Computer.

**CO2:** Develop an understanding about the various Number Systems used in Computer Science, building blocks of digital circuits, and use them to create bigger combinational and sequential circuits.

**CO3:** Learn the basics of HTML/CSS and Word/Excel/PPT.

### **Semester - 2**

Upon Successful completion of this course, students should be able to

**CO4:** Develop an understanding about the Data structure and Algorithms related to Computer Science, Array, Linked List, stack, queue and different searching and sorting algorithm.

**CO5:** Learn how to program in C Language.

### **Semester - 3**

Upon Successful completion of this course, students should be able to

**CO6:** Learn about the various components of a digital computer, understand how they are integrated to create a Computer System and compare the various types of Control units and Architectures.

**CO7:** Learn how to program in Python.

**CO8:** Develop an understanding about the various components of software engineering, software life cycle models, software requirement specification, data flow diagram, coupling, cohesion, software cost estimation modelling, software testing, white box and black box testing, software quality assurance.

#### Semester - 4

Upon Successful completion of this course, students should be able to

**CO9:** Develop an understanding about the Operating System, File System related to Computer, Processor Management, I/O Management, and Memory Management.

**CO10:** Learn how to program in Linux operating system environment.

**CO11:** Develop an understanding about multimedia system, text, speech, audio, still image and video, video conferencing, multimedia services.

#### Semester - 5

Upon Successful completion of this course, students should be able to

**CO12:** Develop an understanding about the Database Management System, database architecture, Database languages, Entity Relationship Model, Relational algebra, Integrity Constraints and Database Normalization.

**CO13:** Learn how to program in Database Design and Application

**CO14:** Develop an understanding about computer network, network topology, OSI and TCP/IP model, bandwidth, bit rate, transmission media, analog transmission, multiplexing, internet.

#### Semester - 6

Upon Successful completion of this course, students should be able to

**CO15:** Develop an understanding about computational mathematics, Interpolation, Linear equations, Gaussian elimination, Gauss-Jordan elimination, Newton-Raphson method, Trapezoidal and Simpson's  $1/3^{\text{rd}}$  rule, graph theory, euler and Hamiltonian paths, trees.

**CO16:** Learn how to program in Graph theory and numerical methods using C/Python.

**CO17:** Learn about information security, cryptography, network security management, firewalls, euler's theorem, roles of firewall, types of firewall, e-mail security, IP security, web security.

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