

## PROGRAMMED OUTCOME :: EDUCATION

Bachelor in Education The Department of Education is offering three year Bachelor in Education Programme comprises of total 6 (six) semesters viz. 1st, 2nd, 3rd, 4th, 5th and 6th for both Major and General Course. For imparting the programme based learning experiences, the syllabus of Gauhati University is being adopted.

### PROGRAMME OUTCOMES (BACHELOR IN EDUCATION) MAJOR & GENERAL COURSE

After completion of the programme, it is expected that the students will be -

- able to Know the meaning, concept and aims of education. They will be able to know the philosophical and sociological bases of education,
- able to Know the meaning, concept and different branches of psychology. They will possess in-depth knowledge of educational psychology to deal with the complex human behaviour in educational set up.
- able to Learn how to construct and administer different psychological tests, conduct psychological experiments along with the measurement and evaluation.
- able to Know the historical background of education, development of education in pre independent and post-independent India.
- able to Get knowledge about the hierarchy and systems involved in educational administration, management and planning. They will also be able to know the interrelationships between education and economy.
- able to Know the prevailing educational systems in other developed nations and the best practices adopted by them.
- able to Possess qualities to some extent of a guide or a counsellor to cope up with the psychological, societal or career related issues in educational environment those may affect the pupils' mental health and hygiene.
- able to Know the constitutional provisions, recent trends and reforms in policy matters of education with special reference to holistic and inclusive education.
- able to acquaint themselves with the best teaching skills.
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### PROGRAMME SPECIFIC OUTCOMES MAJOR & GENERAL COURSE

#### SEMESTER WISE PROGRAMME OUTCOMES

SEMESTER		
1 <sup>st</sup> Semester	1.01 Foundation of Educational Theories and Principles	Learner will be acquainted with 'scientific' and sound principles of education, the concept, nature, aims and scope of education, it focuses dimensions of education such as the learner, the teacher and the curriculum. It also helps the learner to know the concept of discipline and freedom. It creates awareness among the students about the latest trends and current educational thoughts.
	1.02 Educational Psychology	This paper will enable the students to understand

		the relation between education and psychology and different methods of educational psychology, learning, process, memory, attention, instinct and emotion, personality, type and trait theories, the concept of intelligence - nature and different theories, nature of creative talent and processes and of creative individuals and the implication for indentifying and nurturing such talent, Understand the concept and process of adjustment and mental health and hygiene .
2 <sup>nd</sup> semester	2.01 Development of Education in India	This programmed specific course will acquaint the students with the ancient and medieval system of education in India, development of education in India during the Pre & Post Period independence period, and development of education in Assam in a detail manner.
	2.02 Sociological Foundations of Education	Acquaint the students with education as a social process. education as a determinant of social change and development, develop social habits and attitudes in the students and to make them socially adjustable
3 <sup>rd</sup> Semester	3.01 Emerging Issues and Education	Ddevelop awareness and understanding about different literacy programmes, women empowerment, Human rights, globalization, vocationalization of secondary education, understanding regarding students indiscipline –its causes and remedies, about national integration and International understanding and the role of education in promoting them, importance and means of life skill education, methods and programmes of Peace Education.
	3.02 Measurement and Evaluation in Education	Acquire knowledge of the concept of measurement and evaluation in education, different types of educational tests and their uses, procedure of constructing educational and psychological tests, about intelligence test, personality test, aptitude, interest and attitude test, and educational achievement test, and also about new trends in evaluation
4 <sup>th</sup> Semester	4.01 Educational Technology	Enable the students to understand the concept and scope and objectives of Educational Technology, teaching technology, behavioural technology and instructional technology, communication, process, teaching aids, system approach and use of computer and internet in educational technology, innovations in Education through Educational Technology –Team Teaching, E-Learning and E-Library
	4.02 Environmental and Population Education	Enable the students to understand the concept, scope and importance of environmental education, environmental education at different levels of

		education, knowledge on disaster management education. It also enable the students to understand the effect of population growth on poverty, health and hygiene and the importance of population education in school levels.
5 <sup>th</sup> Semester	5.01 Philosophy of Education	Gives the philosophical ideas , relationship between philosophy and education, knowledge about Idealism, Naturalism and Pragmatism and familiarise with the Indian schools of philosophical thought — Vedic, Buddhist and Islamic thought.
	5.02 Educational Thinkers- Oriental and Occidental	Students will be able to understand the philosophy of life of different educational thinkers eastern and western and their contribution to present day educational thought.
	5.03 Teacher Education	Students will be able to understand the concept, aims, scope and development of teacher education in India, different policies and practices and quality assurance in Teacher education, importance of in-service and pre-service training programmes, and professional ethics and accountability of teacher, and different organizations involved in teacher education
	5.04 Teaching –Learning Method and Pedagogy	Students will be able to know the teaching learning process, the principles, maxims fundamental of teaching, various methods , strategies, models and devices of teaching and it will form a positive attitude towards the teaching profession
	5.05 Statistics in Education	This course will enable the students to understand the basic concept of statistics, different statistical procedures used in Education, about the Normal Probability Curve and its applications in Education.
	5.06 Practical paper	Enable the students to understand the concept of experimental psychology, methods of conducting various psychological experiments and tests and develop scientific attitude amongst students
	6.01 Developmental Psychology	Enable the students to understand the basic concepts relating to development, about heredity and environmental factors affecting pre-natal Development, development aspects during infancy and childhood, development aspects of adolescence, importance of adolescence period and problems associated with this stage.
	6.02 Continuing Education and Distance Education	Enable the students to understand the concept of continuing education , methods and techniques of continuing education, development of Adult Education in India, major problems confronting adult education, meaning, characteristics, merits and demerits of distance, different forms of instructional strategies in

6 <sup>th</sup> Semester		distance education along with the distance mode of learning.
	6.03 Special Education	Enable the students to understand the meaning and importance of special education, different types of special children with their behavioural characteristics, different issues, education provisions and support services of special children.
	6.04 Guidance and Counselling	Enable the students to understand the concept, nature, scope, need and importance of Guidance and counseling its types, programmes and organizations.
	6.05 Educational Management and Administration	This course will enable the students to understand the basic concepts of management, organization and Administration and supervision , its Types, Principles and Functions and institutional planning .
	6.06 Project Work	Students will be able to conduct survey in different areas by following the research format such as - <ul style="list-style-type: none"> <li>- Identification of the problem/topic</li> <li><input type="checkbox"/> Formulating the objectives</li> <li><input type="checkbox"/> Review the relevant / related literature (if any)</li> <li><input type="checkbox"/> Writing the hypotheses (wherever possible)</li> <li><input type="checkbox"/> Field identification-scope and delimitations</li> <li><input type="checkbox"/> Nature of information / data required — their sources</li> <li><input type="checkbox"/> Collection and organization of data, analysis and drawing conclusion</li> <li><input type="checkbox"/> Reporting</li> </ul>

**\*Course number 1.01, 1.02, 2.01, 2.02, 3.01, 3.02, 4.01, 4.02 are same for General Course also.**

## **COURSE OUTCOME**

The Programme of B.A Education Major & General equips the student for competitive exams like, Teacher Eligibility Test (TET), SSC, RAIL, P.O. etc. and enhances employability. It also motivates the students for professional courses like, D.L.Ed., B.Ed., L.L.B., B.L.I.S., Computer, Guidance & Counselling, Fashion Design, Inclusive Education courses, Psychological Counsellor, Montessori Teacher Training etc.

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## COURSE OUTCOME : SUBJECT- HISTORY

SEMESTER	COURSE CODE	COURSE NAME	COURSE OUTCOME
1	101	INTRODUCTION TO HISTORY	After the completion of this paper students will be able to understand the basics of the discipline of History and development of history writing in different country as well as in India.
	102	HISTORY OF INDIA (UPTO AD 300)	After the completion of this paper , the students will be able to explore and effectively use historical tools in reconstructing the remote past of ancient Indian pre and proto history
2	203	HISTORY OF INDIA (300-1200AD)	After the completion of this paper, the students will also be able to explain the emergence of state system in North India , development of imperial state structure and state formation in South India in early period. They will be able to to understand the changes and transformation in polity, economy and society in early India and linkages developed through contacts with outside world.
	204	HISTORY OF ANCIENT CIVILIZATIONS OF THE WORLD	From this segment of the syllabus student learn about the history of Ancient Civilization like Mesopotamia,China , Greece , Roman.
3	305	INDIA UNDER THE TURKO- AFGHANS	After completion of this course students will be able to explain the political and administrative history of India under the turkey - Afghans. They will also be able to analyse the sources of history, regional variations, social, cultural and economic set up of the period.
	306	HISTORY OF ASSAM(5 <sup>TH</sup> CENTURY A.D. TO 1228)	This paper will give a general outline of the history of Assam from the5 <sup>TH</sup> century A.D. to the advent of the Ahoms in the 13th century. Upon completion, students will be acquainted with major stages of developments in the political, social and cultural history of Assam during the early times.
4	407	INDIA UNDER THE MUGHALS	At the completion of this course, the students will be able to analyse the circumstances and historical shifts and foundations of a variety of administrative and political setup in India under the Mughals.
	408	HISTORY OF EUROPE(1453-1789)	On completion of this course, the students will be able to explain the major trends and developments in Europe from 1453-1789)They will be able to explore and analyse the significant historical shifts and events and the Resultant effects on the civilizations of Europe

			in the period.
5	509	INDIA UNDER THE EAST INDIA COMPANY	After the completion of this course, the students will be able to relate the circumstances leading to the consolidation of colonial rule over India and their consequences. They will also be able to explain the orientation of the indigenous population and the masses towards resistance to the colonial exploitation. The course will also enable the students to analyse popular uprisings among the tribal, peasant and common people against the British policies.
	510	HISTORY OF ASSAM (1228-1826)	On completion of this paper, students will be able to identify major stages of developments in the political, social and cultural history of Assam during the medieval times. This paper will enable the student to explain the history of Assam from the 13th century to the occupation of Assam by the English East India Company in the first quarter of the 19th century.
	511	HISTORY OF EUROPE (1789-1870)	After the completion of this course the students will be able to evaluate the historical evolution and political developments that occurred in Europe in the period between 1789-1870. They will also be able to analyse the political development in Italy and Germany and nationalist sentiment in Europe..
	512	HISTORY OF SCIENCE AND TECHNOLOGY IN PRE- COLONIAL INDIA	After the completion of this course the students will be able to understand about the development of indigenous science and technology of India before the advent of East India Company.
	513	HISTORY OF GREAT BRITAIN (1485-1820)	After the completion of this course the students will be able to analyse political, constitutional and economic developments that occurred in Great Britain in the period between 1485-1820.
	514	HISTORY OF CHINA (1839-1949)	After the completion of this course the students will be able to understand about the political changes in China from its opening to outside world to the foundation of the republic.
6	615	INDIA UNDER THE CROWN	At the completion of this course, the learners will be able to analyse the course of British colonial exploitation, the social mobilizations during the period between 1857 to 1950 and also the techniques of Indian resistance to British policies.
	616	HISTORY OF ASSAM (1826-1947)	Upon completion of this course, students will be able to describe the period of British rule in Assam after its annexation by the imperialist

			forces. They will also be able to situate the development of nationalism in Assam and its role in India's freedom struggle. The course would enable the students to analyse the main currents of the political and socio-economic developments in Assam during the colonial period.
617	HISTORY OF EUROPE (1871-1945)		After the completion of this course, the students will be able to analyse the historical developments in Europe between 1871-1945. Students will also be able to understand about the internal developments in France, Germany, Italy and Russia.
618	WORLD SINCE 1945		Upon completion of this course, students will be able to understand about the cold war and its consequences, problem of third world countries, foundation and role of UNO
619	HISTORY OF JAPAN (1853-1941)		After the completion of this course, the students will be able to analyse about the political development in Japan between the period 1853-1941. They will also be able to acquire knowledge about the circumstances which helped Japan to emerge as world power.
620	PROJECT		

## **COURSE OUTCOME: PHILOSOPHY**

### **Programme Outcome**

The primary goal of philosophy course is to address some of those ultimate questions so as to enable students to lead a more substantive and meaningful life and have a reasoned foundations conducive to support for human values; to an awareness of a duty to work for justice, compassion, and peace; and to the integrated and rich human life worth living, thus providing students the abilities and opportunities to be more responsible for the interdependent world in which they find themselves. The philosophy program seeks to promote the development of the person as an individual and as a meaningful contributor to the society. Moreover, philosophical training is intrinsically as well as extrinsically valuable. It seeks to foster in students the skills they need to develop, establish, reconstruct, and evaluate arguments in any field. Philosophical training also helps students seek general explanatory principles, reflect upon what really matters, look for alternatives to widely-accepted views, and learn to distinguish what is significant from what is not. Students will develop ability in critical thinking and understanding of concepts of right, wrong, good and bad and an understanding of moral principles and their application in everyday life.

## Programme Specific Outcome

To develop in students a sense of the value and limits of philosophy, a reflective attitude and sensitivity to the difficulties and complexities of philosophical judgments, and a life-long commitment to learning and inquiry. The course acquaints students with Greek Philosophy, Indian and Western Philosophy, Ethics, Philosophy of Religion, Political Philosophy and Social Philosophy, Analytic Philosophy, Logic etc. Students also become familiar with some of the major figures and schools of thought in the intellectual tradition, and develop an appetite for further study and learning.

Papers	Course	Outcome
M. 104	LOGIC-I	The aim of this paper is to acquaint students of traditional form of logic with the development of symbolic logic, the concepts of variables and constant, uses of symbols, logical connectives, truth table, truth function, construction of truth table method. In addition, students also learn how to translate an ordinary sentence into a strict logical form, technique of formal proof of validity of an argument and the concept of set.
M.105	EPISTEMOLOGY & METAPHYSICS-I	The paper concentrates on the fundamental notions of knowledge and truth. The student can explore the important philosophical theories like realism, idealism, It helps to develop a strong knowledge base of philosophical enquiry and criticism.
M.204	LOGIC-II	In this paper students acquaint with shorter truth table method, formal proof of validity, standard form of categorical syllogism, Venn-diagram, and testing syllogism. Moreover students also learn about the concept of Quantification and symbolization of Universal and Existential proposition.
M. 205	EPISTEMOLOGY & METAPHYSICS	This paper concentrates on the theories of truth (correspondence, coherence, pragmatic), substance, causality, space and time. In addition, it also intends to acquaint with Freedom and Determinism and the rejection of metaphysics of Ayer.
M.304	INDIAN PHILOSOPHY-I	This paper intends to acquaint the students with the ancient Indian Texts-Vedas, Upanisadic philosophy. It also concentrates on various schools of Indian philosophy system i.e, Carvaka, Jainism and Buddhism.
M. 305	HISTORY OF MODERN WESTERN PHILOSOPHY-I	This paper aims to acquaint the students with various theories of Descartes, Spinoza and Leibniz.
M.404	INDIAN PHILOSOPHY-II	This paper concentrates on different theories of the Nyaya, Vaisesika, Sankhya, and Yoga



		philosophy, It also aims to acquaint students with Samkara and Ramanuja's philosophy.
M. 405	HISTORY OF MODERN WESTERN PHILOSOPHY-II	This paper aims to acquaint the students with various theories of empiricist philosophers such as Locke, Hume. Kant's concept of knowledge, categories, space & time are also included in this paper.
M.501	GREEK PHILOSOPHY-I	It intends to acquaint students with the philosophical doctrine of primary stuff of Thales, philosophy of Flux of Heraclitus, the Pythagorean Number theory, the Atomism of Democritus including the Eleatic school of philosophy.
M.502	CONTEMPORARY INDIAN PHILOSOPHY-I	The paper aims to acquaint the learners of various philosophical thoughts of different contemporary Indian Philosophers i.e, Vivekananda's Practical Vedanta, Aurobindo's Evolution, Tagore's concept of Humanism and Radhakrishnan's views on Intellect and Intuition.
M.503	CONTEMPORARY WESTERN PHILOSOPHY-I	In this paper the main focus is to acquaint the learners with the nature of analytic philosophy. In addition to, it also aims to acquaint with the philosophical thoughts of different Contemporary Western Philosophers i.e Russell, Moore, Wittgenstein and Ryle etc.
M.504	ETHICS-I	This course seeks to acquaint students with the nature of Ethics and its scope. It also intends to acquaint students with the Fact and Value, Concepts of Normative Ethics, Meta-Ethics, Practical Ethics and Teleological theories such as Hedonism and Utilitarianism.
M. 505	PHILOSOPHY OF RELIGION-I	This course helps the students to understand the different religious traditions and their implications, the nature and scope of Philosophy of Religion. Its outcome is to understand the Freud's Theory of Origin of Religion, Animism, Totemism, Mana, Fetishism, Magic, and various foundations of religious beliefs
M. 506	SOCIAL PHILOSOPHY	This course covers the primary concept of social philosophy, like society and individual. The students become familiar with the theories of terrorism, the concept of Globalization, feminism and various aspects of Marx's philosophy.
M.601	GREEK PHILOSOPHY-II	This paper intends to comprise the philosophical theories of Socrates, Plato and Aristotle. Students are able to understand the concept of Virtue, Plato's theory of knowledge and Aristotle's metaphysical concept.

M. 602	CONTEMPORARY INDIAN PHILOSOPHY-II	This paper is specially designed for students to give various concept of Gandhi's political, economic philosophy including his views on religion.
M.603	CONTEMPORARY WESTERN PHILOSOPHY-II	The chief aim of this paper is to disseminate the knowledge of existentialism. This paper helps students to gather knowledge of different doctrines put forward by Existentialist Philosophers such as Kierkegaard, Nietzsche, Husserl and Sartre.
M. 604	ETHICS-II	This paper concentrates with Deontological Ethics of Kant, the ethical theories of Moore, A.J.Ayer etc. It also interpretes some Indian ethical concept such as the law of Karma.
M. 605	PHILOSOPHY OF RELIGION-II	The course helps the students to learn some key concept of Philosophy of religion. Arguments for the existence of God, the peculiarity of religious language are some of the topics in this paper. It also aims to give knowledge of Sankaradeva's Vaishnavism and his entire philosophy.
M. 606	PROJECT/DISSERTATION	The Project paper is in the form of a brief dissertation of the length between 10,000-12,000 words. It may be either on a particular philosopher or on a particular topic relevant to the course carried out under the guidance of a teacher. This research based paper intends to inculcate research attitudes of student community.

### COURSE OUTCOME :: ASSAMESE

Course Structure : Syllabus and course structure provided by G.U. for UG level are

Major : The major course covers as many as three streams—(a) Literature  
(b) Language (c) Culture.

(A) Literature

- (i) History of Assamese literature and script
- (ii) Studies of selected texts of ancient, medieval and modern Assamese literature.
- (iii) Special study of selected works of an author.

(B) Language

- (i) General theories of language and linguistics.
- (ii) History and development of Assamese language.
- (iii) Dialectical variations of Assamese language
- (iv) Other languages of Assam and its neighbouring states
- (v) Descriptive Grammar of Assamese Language.
- (vi) MIA texts and grammar.

### (C) Culture

- (i) Culture of Assam.
- (ii) Aspects of diverse cultural tradition of Assam with particular reference to music dance, drama, sculpture, folklore, festivals etc.
- (iii) Studies of characteristic features of different ethnic groups of Assam and its neighboring areas.

Elective Assamese : The course of elective Assamese also covers the same areas as in major course but in a brief manner

Assamese MIL : Students admitted in the TDC Arts stream are required to study MIL as compulsory subject. In Assamese, the course covers selected pieces of early and modern prose, poetry and drama. However with the introduction of semester system the syllabi have been altered

After completion of this course , a student can get employment in different fields e.g. Radio, Press, T.V., and they can engage themselves in tourism department also.

### **PROGRAMME OUTCOME :: BODO**

Programme outcome :- After completion of this programme the students with obtaining more information about the history of bodo literature, ancient social law, folk customs, ritual, religion, political, culture and traditional of the bodo society. It will make the students well educated in the bodo language and every side of the society.

Programme Specific Outcome:- This programme provides skill in creative writing and competence in the language will empower them with communicative skill. After the passing undergraduate the students can admission for the post graduate in literature, Linguistics, culture studies etc. Then they can engage themselves as teachers and also as entrepreneurs in various side.

Course Outcome:- After completion of the course in Bodo at undergraduate level develop students with the knowledge of linguistics and the history of Bodo literature including Western and Eastern Literature, culture. The history of the bodo literature, Bodo folk culture, social folk customs of the Bodos paper require knowledge. Different prose, poetry, drama, criticism of the writers and their creation and comparative literature with other ethnic language are also main topics covered in the syllabus.

## **COURSE OUTCOME: POLITICAL SCIENCE**

### **Program Outcomes, Program Specific Outcomes and Course Outcomes,**

#### **Programme Outcome:**

- At the conclusion of the Bachelors degree programme, students acquire substantial knowledge of political theories both western and Indian.
- The program also ensures that the students learn the functioning of the Indian political system and various aspects of the Indian constitution.
- The students acquire an understanding of International relations through an analysis of the events of contemporary world history.
- It also enables students to comparatively analysis the constitution of certain countries.
- The programme also enables students to acquire knowledge of public administration theories. It is also intended to enable students to have an understanding of human rights and sociology.

#### **Programme Specific Outcome:**

- It enables the students to achieve an understanding of the Indian Constitution and political system.
- It encourages and orients the students to prepare for civil service examinations at the National and State levels.
- Many students interested in International relations opt to work for international organizations such as United Nations Organization and its allied institutions, World Bank and World Trade Organization.
- It enables students to pursue higher studies in law and legal affairs. Many students also opt to work for human rights institutions, organisations and Nongovernmental organizations.

#### **Course Outcome:**

- The Course outcome of the discipline of political science is varied. It has old as well as contemporary topics. At the conclusion of the course, the students develop an understanding of important political theories.
- The Course also enables students to acquire knowledge of Indian Constitution and various aspects like fundamental rights, Centre-State relations and significance of Indian judiciary.

- The course also does a comparative analysis of the constitution of certain countries which enables students to understand the functioning of different political systems such as United Kingdom, Canada, China and Switzerland.
- The Course enables students to gain knowledge about the various concepts of International relations and modern world history, significance and importance of human rights, different aspects of public administration theories and their roles and sociology.

## **COURSE OUTCOME :: ECONOMICS**

### **PAPER 104 MICRO ECONOMICS I**

This course is designed to expose the students to the basic principles of microeconomic theory. It enables students to understand consumer behavior, theory of production and cost, output decisions and profit maximization.

### **PAPER 105 MACRO ECONOMICS I**

This course aims to introduce the students to the basic concepts of Macroeconomics. Macroeconomics deals with the aggregate economy. This course discusses the preliminary concepts associated with the determination and measurement of aggregate macroeconomic variable like National Income, theories of output and employment and investment function.

### **PAPER 204 MICRO ECONOMICS II**

This course is designed to expose the students to different market structure, theories of distribution, welfare economics and financial Microeconomics.

### **PAPER 205 MACRO ECONOMICS II**

This course introduces the students to goods and money market equilibrium. It discusses about different phases of business cycle, quantity theory of money and inflations impact on the economy.

### **PAPER 305: THE MONEYTARY SYSTEM**

It enables the students to know the basic concepts of money, functions of commercial banking and central banking. It also discusses about the performance of financial system and markets.

### **PAPER 404: MATHEMATICAL APPLICATIONS IN ECONOMICS:**

It imparts knowledge of mathematical tools used in economic analysis. It discusses about the calculus in economic applications, maxima and minima variables, elements of linear programming and game theory.

### **PAPER 501 ELEMENTS OF PUBLIC FINANCE:**

It imparts the role of the govt. in an economy. This course explains the different concepts of public revenue, public expenditure and public debt. It will be able to interpret the effects of public expenditure, public debt on the economy.

### **PAPER 502: BASIC STATISTICS FOR ECONOMICS:**

(For Arts) It imparts statistical tools necessary for Economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It then develops the notion of probability, followed by probability distributions of discrete and continuous random variables and of joint distributions.

### **PAPER 503: ENVIRONMENTAL ECONOMICS:**

It looks at how economic activity and policy affect the environment in which we live. This course focuses on economic causes of environmental problems. Economic implications of environmental policy are also addressed as well as valuation of environmental quality, market failure, externality, Global environment issues and environmental impact assessments.

### **PAPER 504 INTERNATIONAL ECONOMICS:**

It helps in assessing economic and political effects and the implication to the international trade for goods and services, finance and foreign investment.

### **PAPER 505 HISTORY OF ECONOMIC THOUGHT:**

It helps us to understand the origin of economics and to avoid the mistakes committed by earlier economic thinkers. It discusses about early and classical period followed by socialist thoughts.

### **PAPER 506: DEVELOPMENT POLICY AND INDIAN ECONOMY:**

It imparts the policy of Indian govt. It helps students to understand the trends and composition of National Income and per capita Income, discusses about the role of agriculture in economics development and the role of Industries in the Development process.

### **PAPER 601: PUBLIC ECONOMICS**

It will look into the efficiency and equity aspects of taxation, Government budget of the centre, states and the local governments and the issues of fiscal and fiscal federalism and decentralization in India. The course will be useful for students aiming towards careers in the government sector, policy analysis, business and journalism.

### **PAPER 602: APPLIED STATISTICS (For Arts)**

It explains the concepts and uses of Index number followed by time series analysis and vital statistics.

### **PAPER 603: ECONOMICS OF NATURAL RESOURCES AND SUSTAINABLE DEVELOPMENT**

his course focuses on economic causes of environmental problems. In particular, economic principles

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are applied to environmental questions and their management through various economic institutions, economic incentives and other instruments and policies. It has also explains the renewable and non renewable resources, sustainable development.

#### **PAPER 604: INTERNATIONAL ECONOMICS**

This course develops a systematic exposition of models that try to explain the composition, direction and consequences of Balance of payments, foreign exchange market and exchange rates. It concludes with an analytical account of the causes and consequences of Economic Integration and International Institutions.

#### **PAPER 605 HISTORY OF ECONOMIC THOUGHT II**

This course aims to introduce the students to the famous schools of thought, Keynesian economics and Indian economic thought.

#### **PAPER 606 PLANNING FOR DEVELOPMENT: INDIA AND THE NORTHEAST**

This is the second module of the economic development sequence. It begins with basic planning concepts and their evolution during the process of development. The course explains the reflections on the role of globalization and increased international dependence on the process of development. The course ends with the economic problems and comparative development experience of North-east India vis-à-vis all India average.

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**COURSE OUTCOME :: ENGLISH**

<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcome</b>
Paper- 1	The Social and Literary Context: Medieval and Renaissance	This paper acquaints students with contexts of the English literary tradition. It increases knowledge about one of the earliest periods in English history, the medieval period and how this period influenced the development of a refreshingly different literary wave.
Paper -2	Medieval and Renaissance: Poetry and Plays	This paper enables the students to inculcate and cultivate the culture of Renaissance, as represented in Drama. At the end of the course students will be firmly grounded in understanding and appreciation of the importance of the so- called Dark Age. This paper will empower them to dig into the Renaissance with sharper sensibilities provided by their introduction to what came before. Students will be able to appreciate and analyse the poems and plays in the larger socio-political and religious context of the time.
Paper- 3	The Social and Literary Context: Restoration to the Romantic Age	This paper introduces students the English literary tradition of 17th and 18th century, a time-period which sees the emergence and establishment of greatly diverse kinds of writings. The students are made familiar with the Restoration of Charles II and the reopening of the theatres in 1660 to the Age of Romanticism. The selected texts encourage the students to look at the economic, political and social changes in Britain during this period. The students are also made familiar with the genesis of women writings in different geographical and socio cultural settings. The paper also traces the changing approaches in dramatic work and the growth of Restoration tragedy and comedy with respect to plot, character, dialogue, theme, and dramatic technique. The paper also introduces the satirical works of Pope, rise of periodical and personal essays, and the growth of Romantic poetry and Novel.
Paper- 4	English Poetry, Drama and Fiction: Restoration to Romanticism	The paper imparts a clear chronological survey of the major writers of Restoration and Romantic Period and their writings. It will enable the students to familiarize with the larger contexts that generated literatures as well as the possible impacts of the literature on society. It offers students the opportunity to study Milton's Epic Poetry to Pope's Mock-Epic Poetry, from Congreve's comedy of manner to Austin's novel of manner that truly reflect the socio-cultural and political interests from Restoration to Romanticism. The paper also elucidates the students with the principle of simplicity and lucidity of expression, powerful imagination and lyricism of Romantic poetry.
Paper- 5	The Social and Literary Context: The Victorian World.	In this paper students will encounter with the Victorian Literary tradition along with the social condition of Victorian Age. During the reign of Queen Victoria, Britain was transformed from rural agricultural society into an urban and industrial one. Students will know about the rapid changes of society through Reform Act of 1832, the conflict between science and religion, educational and



		Literary significances through Oxford Movement through this paper.
Paper- 6	Victorian Poetry and Fiction	Through this paper, the students will encounter the characteristics of Victorian Poetry. They will be acquainted with forms like dramatic monologue, love-poem, Pre-Raphaelite experiments and the beginning of modern poetic experience in Hopkins. The students will come across the social concerns of the Age through fiction s written by Dickens and Hardy
Paper-7	The social and Literary Context- Modernism and After	This paper will familiarize the students about the circumstances that shaped the processes of literary production from the 20th century to the present.
Paper-8	English poetry and Fiction: Modernism and After	This paper will familiarize the students with English poetry and Fiction of the modern and postmodern period through which they will learn about some important trends, critical shifts and even experimentation. The paper includes example from the British, the American and the Latin American literary cultures.
Paper-9	Modern Drama I	This paper is concerned to the 20th century English and European drama. Students will be acquainted with the European historical and cultural situations of the period 20th century by the prescribed essays and dramas by the authors like George Bernard Shaw, Anton Chekhov, Bertolt Brecht and Antonin Artaud.
Paper- 10	Drama: Theory and Practice-II	This paper, the epoch of modern drama will mark the proliferation of avant-garde theory with the theatre making it self-conscious and experimental. The students will be impact of contemporary philosophy, ideas and art movements like existentialism, expressionism, impressionism, Marxism and the Absurd reverberate s in modern drama.
Paper- 11	The Essay in English: Addison to Dickens	In this paper, the students will come to learn about some representative texts from the 18th and 19th centuries. They acquaint themselves with the development of 'Essay' as a literary genre from the time of Bacon and the emergence of periodical essay in the hands of Addison and Steele. Students have to study these essays in relation to social, political and cultural context. Moreover,students will also acquaint with various styles of personal writing.
Paper - 12	The Essay in English: The Twentieth Century	This paper introduces students to the developments in the genre of the essay in the 20th century. Students will note how the genre has adapted in order to address a variety of contemporary issues and become the vehicle for representing personal experiences, moved into literary, social, and cultural criticism and engaged in polemic and persuasion. The selected essays enable the students to read the intellectual and socio-cultural background of the Age, the shift away from the elevated, literary, and classical style of earlier times to a general tendency towards factual and referential writing and a style more direct, immediate, and colloquial.
Paper- 13	Life Writing: Biographies, Memoirs and Letters	This paper will enable the students to study the elements of 'story' and the material conditions under which these great works are written. The students will know about the truths of the lives of prominent people. The paper will try to have that sense of

		narrativity, in various forms of life-writing such as Biographies, memoirs and letters.
Paper-14	Women's Writing	This paper on writing by women introduces students to a body of literature that has emerged with growing feminist awareness of women's lives and their representation. It enables the students to recognize the importance of gender specificity in literature and link the status of woman to social discrimination and social change. It also enables the students to understand the complexity of social and biological constructions of manhood and womanhood.
Paper-15	Literary Criticism	Students will be acquainted with some of the key ideas of Western literary criticism from Graeco Roman antiquity to the modern period. Through this paper the students expect to examine the ideas like mimesis, imagination, classicism, romanticism and modernism etc.
Paper-16	Twentieth Century Criticism and Theory	This paper encounters the students with the intellectual shifts in the reading of culture, language and literature in the 20th century and the emergence of theory.
Paper-17	Nature	This paper seeks to explore the process through which language and literature as manifestation of culture are produced by the interconnections between both nature and culture. It enables the students to study the relationship between literature and the physical environment and examining literary texts through "an earth-centred approach". It enables the students in understanding key ideas in eco-critical thinking.
Paper-18	Western Mythology: Introducing Classical and Judeo-Christian Myth	This paper introduces the students to the study of Classical and Judeo-Christian Myth and their importance in social, historical, cultural and literary perspective. Students will come to know about the mythical ideas and images in western art and literary cultures. In the Section I, emphasis is given on obtaining knowledge of specific myths and related characters. In Section II, students come across the presentation of myths in various literary contexts.
Paper-19	<b>Option A:</b> Indian English Literature: Intellectual Context	The paper acquaints the students to the distinctive literature produced in India in the wake of English education. The selected essays in the course connect students with a lengthy period of time from pre historic to the present. Students are made familiar with intellectuals' perception of India and Indians; Gandhi from before Independence to AmartyaSen in the twenty first century. Offering the illuminate traditions, people and society, they seek to establish a continuity of those faith, belief, customs and traditions that could form the basis of what an Indian perceives as his identity.
Paper-20	Indian Poetry, Fiction and Drama	This paper connects students to the major authors of Indian English Literature. All the selected texts are read in the light of the historical, cultural and political circumstances of their production. Students are made familiar with illuminating Indian imagery, Indian sentiment, culture, tradition and institution, and the ancient Indian story of Emperors and Heroes and Heroines.

		Issues discussed in these readings are expected to give students a foundation in ideas that will help in the readings of literary texts in these papers.
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### COURSE OUTCOME :: BOTANY (NON CBCS)

<b>Bachelor Programme in Botany (Non CBCS)</b>	
Programme Outcome	Bachelor programme in botany bring students more closure to nature along with the understanding of the scientific issues for day to day application. The programme aware the students about the issues regarding the environment and ecology. The contributory role of plants for the breath of earth is can be understood with topics such as anatomy, physiology, morphology, cytology etc.
Programme Specific Outcome	Mainly deals with the importance of plants and plant products for a sustainable development. It encourages knowledge the ethno botany as well as pure and applied botany. Knowledge of botany plays the vital role in the field of Agriculture, Horticulture, Sericulture, Forestry, Pharmacology, Tissue culture and Medicine.
Course Outcome	<p>The students become familiar with the general characteristics, diversity, reproduction, economic importance of various plants ranges from lower plants i.e. thallophyta to higher plants i.e. spermatophyta.</p> <p>The students learn about Plant Metabolism, Biochemistry, Taxonomy, Physiology, Embryology, Cell Biology, Plant Breeding, Genetics, Molecular biology, Biostatics, Bioinformacts.</p> <p>Students earn skills about Biofertilizer, Mushroom, Culture, Nurseray and Gardening, Floriculture, Horticulture and Ethnobotany.</p>

## COURSE OUTCOME :: CHEMISTRY

### Program Outcomes

- To understand the basic facts and concepts in Chemistry
- To understand the importance of Chemistry in daily life
- To develop a better understanding and reasoning of facts
- To skill-up for basic analytical tools
- To skill-up for various laboratory techniques used in pharmaceutical laboratories and chemical industries.
- To make efficient for various spectrometric analyses

### Course Outcomes

#### SEM-I

##### Paper RC/HG-1016:CHEMISTRY1

After completion of this course the students will learn the atomic structure through the basic concepts of quantum mechanics. They will understand the chemical bonding through VB and MO approaches. In organic part, they will learn basic ideas used in organic chemistry, stereochemistry, functional groups, alkanes, alkenes, alkynes etc.

##### Lab: Practical Chemistry

After completion of this course students will be able to analyze volumetric estimation, detection of extra elements in organic compound and separation of mixtures by chromatography.

#### SEM –II

##### Paper RC/HG-2016:CHEMISTRY2

After completion of this course the students will learn periodic properties in main group elements, transition metals (3d series). They will also learn the crystal field theory in coordination chemistry unit. In physical chemistry part the students are expected to learn kinetic theory of gases, ideal gases, surface tension, viscosity, basic solid state chemistry and chemical kinetics.

##### Lab: Practical Chemistry2

After completion of this course students will be able to semi-micro qualitative analysis using H<sub>2</sub>S mixture, Estimation, determination of surface tension, Viscosity, Chemical kinetics etc.

#### SEM –III

##### Paper RC/HG-3016:CHEMISTRY3

After completion of this course the students will be able to understand the chemical system from thermodynamic points of view. They will also learn two very important topics in chemistry- chemical equilibrium and ionic equilibrium. In organic chemistry part, the students are expected to learn various classes of organic molecules- alkyl halides, aryl halides, alcohols, phenols, ethers, aldehydes and ketones.

##### Lab: Practical Chemistry3

After completion of this course students will be able to analyze the various experiments of thermochemistry, measurements of pH, Purification of organic compounds, preparation of organic compounds etc.

**Paper: SE-3042:IT SKILLS FOR CHEMISTS**

After completion of this course students are able to use the computer for basic purpose of preparing his/her personal/business letters, viewing information on Internet (the web), sending mails, using internet banking services etc. After opting this course the students are expected to accumulate the skills in writing activities and handling numerical data.

**Paper: SE-3034: BASIC ANALYTICAL CHEMISTRY**

Upon completion of this course, students shall be able to explain the basic principles of chemical analysis, design/implement microscale and semimicro experiments, record, interpret and analyze data following scientific methodology.

**SEM –IV****Paper RC/HG-4016:CHEMISTRY4**

After completion of this course the students learn solutions, phase rule and its application in specific cases, basics of conductance and electrochemistry. Students will also learn some important topics of organic and biochemistry, carboxylic acids, amines, amino acids, peptides, proteins and carbohydrates.

**Lab: Practical Chemistry4**

After completion of this course students will be able to analyze cell constant, equivalent conductance, construction of phase diagram, determination of critical solution temperature, qualitative analysis of organic compounds, paperchromatography etc.

**Paper: SE-4014: ANALYTICAL CLINICAL BIOCHEMISTRY**

After completion of this course students will be able to identify various molecules relevant to a particular pathological condition and their estimation protocols.

**Paper: SE-4024: GREEN METHODS IN CHEMISTRY**

Students shall be able to describe and evaluate chemical products and processes from environmental perspective, define and propose sustainable solutions and critically assess the methods for waste reduction and recycling.

**Paper: SE-4034: PHARMACEUTICAL CHEMISTRY**

After completion of this, course students will be able to appreciate the drugs development process, identify various small molecules used for treatments different ailments and other physiological processes.

**SEM –V****Paper- RE-5016: APPLICATION OF COMPUTERS IN CHEMISTRY**

After the completion of this course it will help the students to interpret laboratory data, curve fitting of experimental work, and also perform quantum mechanical calculations for various molecular models.

At the same time through the experiments, after completion of this course students will be able to interpret computer programs based on numerical methods for roots of equation, numerical differentiation, numerical integration, matrix operations, simple exercise using molecular visualization software etc.

**Paper- RE-5026: ANALYTICAL METHODS IN CHEMISTRY**

After completion of this course students will have theoretical understanding about choice of various analytical techniques used for qualitative and quantitative characterization of samples.

At the same time through the experiments students will gain hands on experience of

the discussed techniques. This will enable students to take judicious decision while analyzing different samples.

**Paper-RE-5036: MOLECULAR MODELLING & DRUG DESIGN**

After completion of this course students will be able to identify basic components of computer and programming as applied to computer assisted design and modelling of molecules.

At the same time through the experiments after completion of this course students are able to analyse the conformation of butane, comparison of shapes of different molecules, hydration of ethylene, comparison of different optimised bond angles etc.

**Paper: RE-5046: NOVAL INORGANIC SOLIDS**

After the completion of this course it will be possible for the students to opt for studying an interdisciplinary master's programme with an emphasis on the synthesis and application of various materials or take up a job in the materials production and or processing industry.

At the same time though the experiments students are able to learn how to determine the cation are exchange, synthesis of ceramic oxides, synthesis of Ag and Au metal nanoparticles etc.

**Paper: RE-5056: POLYMER CHEMISTRY**

After completion of this course the students will learn the definition and classification of polymers, kinetics of polymerization, molecular weight of polymers, glass transition temperature, and polymer solution etc.

They also learn the brief introduction of preparation, structure, and properties of some industrially important technologically promising polymers through experiments.

**Paper: RE-5066: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS**

After completion of this course students shall be able to explain the theoretical basis of different analytical techniques, identify the experimental requirements and compare or analyze data or results thereof.

**Paper: SE-5014: CHEMICAL TECHNOLOGY & SOCIETY**

Students shall be familiarized with processes and terminologies in chemical industry, like mass balance, energy balance etc. Learners will be able to use chemical and scientific literacy as a means to better understand the topics related to the society.

**Paper: SE-5024: CHEMOINFORMATICS**

After completion of this course, the students shall be able to explain, interpret and critically examine the utility of computers and software tools to solving chemistry related problems. Recognize, apply, compare and predict chemical structures, properties and reactivity and solve chemistry related problems.

Employ critical thinking and scientific reasoning to design and safely implement laboratory experiments and keep the records of the same.

Compile, interpret and analyze the qualitative/ quantitative data and communicate the same in a scientific literature.

**Paper: SE-5034: BUSINESS SKILLS FOR CHEMISTS**

After completion of this course, students shall be able to explain and or analyze the important steps of business operations, finance and intellectual property as applied to chemical industry.

**Paper: SE-5044: INTELLECTUAL PROPERTY RIGHT**

After completing this course, students will have in depth understanding about the importance and types of IPR. This course will also provide the clarity on the legal and economic aspects of the IP system.

**SEM –VI****Paper RE-6016: GREEN CHEMISTRY**

After completion of this course students are able to know about green chemistry, which will make them conversant with applications of green chemistry to organic synthesis. Students will be prepared for taking up entry level jobs in the chemical industry. They will also have the option of studying further in the area.

At the same time through experiments students are able to learn to extract biodiesel from vegetable oil, Principles of atom economy (avoiding waste), use of enzyme as catalyst, Diels-Alder reaction in water, alternative sources of energy etc.

**Paper: RE-6026: INDUSTRIAL CHEMICALS AND ENVIRONMENT**

After successful completion of this course, students would have learnt about the manufacture, application and safe ways of storage and handling gaseous and inorganic industrial chemicals. Students will get to know about industrial metallurgy and the energy generation industry. Students will also learn about environmental pollution by various gaseous, liquid waste and nuclear waste management, their safe disposal and the importance of environment friendly “green chemistry” in chemical industry.

At the same time through experiments students are able to learn to analyse dissolved oxygen in water, COD, BOD, % of Chlorine in bleaching powder, estimation of SPM in air sample, preparation of borax/ boric acid etc.

**Paper: RE-6036: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

This course will establish the basic foundation of industrial inorganic chemistry among the students. This will be helpful for pursuing further studies of industrial chemistry in future.

Experiments will help the students to gather the experience of qualitative and quantitative chemical analysis. Students will be capable of doing analysis of the inorganic materials which are used in our daily life. They will have insight of the industrial processes.

**Paper: RE-6046: RESEARCH METHODOLOGY FOR CHEMISTRY**

After completion of this course students should be able to construct a rational research proposal to generate fruitful output in terms of publications and patents in the field of chemical science.

**Paper: SE-6014: CHEMISTRY OF COSMETICS & PERFUMES**

After completion of this course, students will learn about the preparation and chemistry involved with the production of different cosmetics. This may encourage students to take up entry level jobs at cosmetics industry or venture into commercial production of cosmetics as an entrepreneur.

**Paper: SE-6024: PESTICIDES CHEMISTRY**

After completion of this course, students will be able to explain or describe and critically examine different types of pesticides, their activity/toxicity and their applications

and the need for the search of an alternative based on natural products.

**Paper: SE-6034: FUEL CHEMISTRY**

At the end of this course students will learn about the classes of renewable and non-renewable energy sources. Students will learn about the composition of coal and crude petroleum, their classification, isolation of coal and petroleum products and their usage in various industries. They will also learn to determine industrially significant physical parameters for fuels and lubricants.

**COURSE OUTCOME :: MATHEMATICS**

<b>Bachelor programme in Mathematics</b>	
Program Outcome	After completion of graduation Students will acquaint the basic concepts fundamental principles and theories of science related to various phenomenon and their relevance in the day-to-day life. To enable the students to analyze the scientific data critically and systematically and to think creatively to propose new ideas
Program Specific outcomes	Students will be able to demonstrate basic manipulative skills in algebra, geometry, trigonometry, calculus, astronomy, etc. Also they are able to demonstrate proficiency in establishing validity of mathematical theories. Students are able to learn about the use of computer programming in solving mathematical problems.
<b>Course Outcomes</b>	
M104- Algebra and Trigonometry	Familiarize the student with the basic concepts of algebraic structure such as relation, functions, symmetry, equivalent relation, group and Trigonometry i.e. triangle properties.
M105- Calculus	To acquaint knowledge on the ability to find the effects of changing conditions on a system. To inculcate knowledge on the ability to sketch curves in a plane using its mathematical properties in different coordinate systems.
M – 204 Coordinate Geometry	To acquaint knowledge on the transformation of Coordinate axes. Gives the learners idea of two dimensional and three dimensional coordinate geometry. Gives the knowledge about different conics and their properties.
M205- Differential Equations	To inculcate knowledge on the Origin of ordinary differential equations, degree and order of ordinary differential Equations. Gives the learners idea of transformation of the equation by changing the dependent variable, independent Variable, method of variation of parameters.



M304-Abstract Algebra	To inculcate knowledge on the homomorphism of groups,rings. Also gives the idea of Sylow's theorems and its applications.
M305-Linear Algebra and Vector	Gives the learners idea of matrices, vectors operations on matrices and vectors. To inculcate knowledge on the matrix representation of linear transformation, compute the characteristic polynomial, eigenvalues, eigenvectors,andeigenspace.
M404-Real Analysis	To inculcate knowledge on the real number systems $\mathbb{R}$ as a complete Archimedean ordered field. Gives the learners idea about derivability of the functions such as Taylor's theorem, Maclaurin's infinite series.
M405-Mechanics	To inculcate knowledge on the parallel forces, couples, reduction and center of gravity on solid and plane, etc. Gives the learners idea about stable and unstable equilibrium.
M501-Real and Complex Analysis	To inculcate knowledge on the study of real number system. To inculcate knowledge on complex numbers and their properties, to introduce the basic ideas of analysis for complex functions with visualization through relevant practical.
M502- Topology	To inculcate knowledge on understanding the notation of distance functions, topological structure and their properties with mathematical proofs.
M503-Spherical Trigonometry and Astronomy	To inculcate knowledge on moments and products of inertia, theorem of six constants , motion of a body in two dimension and Lagrange's equation.
M505-Probability	To inculcate knowledge on the basic statistical concepts and tools which are needed to study situations involving uncertainty or randomness , to render the students to several examples and exercises that blend their everyday experiences with their scientific interests.
M506-Optimization Theory	The course will enable the students to learn about the graphical solution of linear programming problems with two variables and learn about the relation between basic feasible solution and extreme points.
M601-Hydrostatics	To inculcate knowledge on the physical properties of a fluid. Gives the learners idea of calculating the pressure distribution for in compressible fluids. Also gives the idea of calculating the hydrostatic pressure and force on plane and curved surface.

M602-Numerical Analysis	To inculcate knowledge on algebraic Equations solved by numerical methods, this will enable the students to learn some numerical methods to find the zeros of nonlinear functions on a single variable and solution of a system of linear Equations to know about methods to solve systems linear equation, interpolation techniques to compute the values for tabulated functions at points not in the table, applications of numerical differentiation and integration to convert differential Equations into difference equation for numerical solutions.
M603 Computer Programming in C	Able to handle nonlinear Equations as those can't be handled analytically. This course has equipped the students to carry out long and tedious computational works particularly when they go for research in some application oriented field and after knowing programming in c, the students can easily shift over to any other programming which are used in different fields.
M604-Discrete Mathematics	Gives the learners idea of fundamental ideas of number theory, congruence and basic properties of congruence's, linear congruence and their solutions, diophantine Equation, linear diophantine equation. To inculcate knowledge on prepositional Calculus and boolean Algebra.
M605-Graph and Combinatorics	Enables the learners in understanding the concepts of graph theory and combinatorics. To inculcate knowledge on counting principles, permutations, pigeonhole principle, understand the basics of graph theory and learn about social networks.
M606-Project	Make research proposal . Construct tool of data collection . Understand the process of data analysis .writing research report.

## **COURSE OUTCOME :: ZOOLOGY**

### Program Outcome

Students gain knowledge and skill in the fundamentals of the animal sciences ,understands the complex interactions among various living organisms. Apply the knowledge of internal structure of cell, its functions incontrol of various metabolic functions of organism.

Imparting basic knowledge of various disciplines of Zoology and General biology meant for a graduate and for higher studies and inculcating interest in nature and its living creatures and in future they can diversify their interest in the field of photography as a career as NE India being the HUB of Biodiversity. Understands the various concept. Understands about various concepts of genetics and its importance in human health. Gains knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation. Develops empathy and love towards the animals

### Programmed specific outcomes

Understand the nature and basic concepts of cell biology ,genetics,taxonomy,physiology, ecology and applied zoology. Helps in obtaining knowledge in wildlife and can choose Wildlife Tourism as a career. Understand the applications of biological sciences in Apiculture, Aquaculture, Agriculture and Medicine. Perform procedures.Perform procedures as per laboratory standards in the areas of Taxonomy , Physiology, Ecology, Cell biology, Genetics, Applied zoology, Clinical science, tools and techniques of zoology,Toxicology, Entomology,Nematology Sericulture, Biochemistry, Fish biology, Animal biotechnology, Immunology and research methodology.Gains knowledge about research methodologies, effective communication and skills problem solving methods.

## **Course outcomes**

### **Animal Diversity – Invertebrates**

Describe general taxonomic rules on animal classification. Classify Protista up to phylum using examples from parasitic adaptation . Classify Phylum Porifera to Echinodermata with taxonomic keys .Describe Phylum Nematoda and give examples of pathogenic Nematodes

### **Ecology, Zoogeography and Animal Behaviour:**

Distribution of fauna in different realms interaction. Understand Animal behaviour and response of animals to different instincts. Interaction of biota abiota .Various kinds of Animal adaptations .

### **Animal Diversity – Vertebrates & DevelopmentalBiology:**

Imparts conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment . Classify phylum Protochordates to Mammalia. Complex Vertebrate interactions. Basic concepts of developmental biology .

### **Cell Biology, Geneticsand Evolution:**

Structural and functional aspects of basic unit of life i.e. cell concepts .Mendelian and non mendelian inheritance .Concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism . Theories of Evolution .Knowledge of eras and evolution of species.

### **Physiology and Biochemistry:**

Seeks to understand the mechanisms that work to keep the human body alive and functioning. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of humans, their organs, and the cells of which they are composed .Interactions and interdependence of physiological and biochemical processes .

### **Animal physiology:**

Students are taught the detailed concepts of digestion respiration excretion the functioning of nerves and muscles . Students gain fundamental knowledge of animal physiology . Students will gain skill to execute the roles of a biology teacher or medical lab technicians with training as they have basic fundamentals .

**Animal physiology genetics and evolution:**

Students learn the concepts of endocrine systems and homeostasis a brief account of genetics and organic evolution. This course helps students to gain fundamental knowledge in these topics. Students gain fundamental knowledge of physiology and endocrine systems. Students gain fundamental knowledge of physiology of homeostasis. Understanding of basic concepts of genetics, laws of inheritance and central dogma of biology. Understanding of genetic basis of evolution, human karyotyping and speciation.

**Applied Zoology:**

Understands concepts of fisheries, fishing tools and site selection. Aqua culture systems, induced breeding techniques, post harvesting techniques. Understands about composition of blood, blood born diseases, autopsy and biopsy. Types of immunity, antigens-antibodies and their properties.

**Entomology:**

Imparts knowledge of beneficial and non-beneficial insects. Knowledge of how they interact with their environment, other species and humans. Classification of Insects. Role of insects in spread of diseases.

**Sericulture:**

Gives knowledge of silk worm rearing. Mulberry cultivation. Pests and diseases associated with silk worm and mulberry. Various process involved in silk production.

**Research Methodology:**

Understanding of scientific method, concepts and steps in research. Differentiate between the Quantitative and Qualitative Research and understand different types of Research Design. Understand the various techniques of Data Collection- Observation, Questionnaire, Interview Schedule; Case Study, Social Survey, Content Analysis. Describing various types of Sampling. Elaborate on Data Processing and Data Analysis.

**Immunology:**

Imparts in depth knowledge of tissues, cells and molecules involved in host defense mechanisms. Understanding of types of immunity. Interactions of antigens, antibodies, complements and other immune components. Understanding of immune mechanisms in disease control, vaccination, process of immune interactions.

**Clinical science:**

Gives knowledge related to the techniques involved in detection of various diseases. Pathology associated with various diseases. Practical skills of conducting basic clinical lab experiments. Application of knowledge of clinical science and pathology to one's own life.

**Animal biotechnology:**

Imparts the Knowledge to culture animal cells in artificial media. Knowledge of animal cells in culture, growth of cell lines. Use in recombinant DNA technology, genetic manipulations and in a variety of industrial processes.

**Aquarium fish management :**

Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue for youth.

**Clinical Science and pathology:**

Understands about composition of blood, blood born diseases, autopsy and biopsy .Techniques of microscopy, microtomy, biopsy, autopsy and immunological techniques .Types of immunity, antigens-antibodies and their properties . Understanding of pathology of diseases caused by various microorganisms such as bacteria, virus, parasites and fungus .

**Structural Biology :**

Allows the students to gain basic knowledge about various bio molecules and their role in metabolism. Classification of enzymes, enzyme kinetics .Metabolism of carbohydrates, nucleic acids and metabolic disorders . Gains understanding of cellular organization and functional biology nucleic acids.

**Environmental and Conservation Biology :**

Imparts knowledge to the student regarding environment and conservation biology. Gains knowledge in the areas of responses to Laws of limiting factor, Laws of minimum, Laws of Tolerance and Tragedy of commons . Types of ecosystem – freshwater, marine and terrestrial, Population characteristics and dynamics – conceptual approach .Growth curves and pyramids; sigmoid curve, J curve and hyperbola; logistic equation and concepts relating to growth.The students will be well equipped to become very competent in research or teaching fields after completion of this course.

**Immunology :**

Provides basics knowledge about immune system and allows the student to create insight as how to improve their immune system and good health. Types of immunity, antigens-antibodies and their properties . Complement system, MHC's and immune responses . Understanding of types of hypersensitivity reactions and auto immune diseases. Ability to understand concepts of tumor immunology and transplantation immunology.

**Taxonomy, Systematics and Functional Anatomy of Invertebrates :**

Imparts knowledge regarding the various Invertebrates species and the regulatory processes to safeguard them .With the study of this paper students gain knowledge in the areas of responses to Systematic position, general organization and affinities of Ctenophora and Nemertea .Rhynchoceola; Systematic position, general organization and affinities of Rotifera; Systematic position, general organization and affinities of Hemichordata .The students will be well equipped to become very competent in research or teaching fields after completion of this course

**Tools, Techniques and Biostatistics :**

Students gain knowledge about various tools & techniques used in biological systems and give them insight about their use in research. Biostatistics teaches them to use the best data analysis methods in their research projects .Students gain knowledge about statistical methods like measures of central tendencies, Probability .Learns about hypothesis testing and inferential statistics. Learns the problem-solving methods .

### **Animal Physiology :**

Imparts knowledge about various metabolic and physiological mechanisms of the human body. Understands about neurophysiology and receptors . Gain knowledge about hormones and bioluminescence .Understanding of stress physiology and endocrine mechanisms will allow them to control their stress and emotions there by diverting their energy towards the positive nation building activities.

### **Molecular Genetics and Developmental Biology:**

Knowledge about genetics, developmental biology and organogenesis .Application of DNA technology and molecular biology for research. Gains knowledge about gametogenesis, cleavage mechanisms, gastrulation and role of hormones in metamorphosis and regeneration .Provides students insight into maintaining healthy relationships with their opposite gender and allows them to make right choice about their life partner thus preventing congenital/consanguial diseases.

### **Evolution and Functional Anatomy ofVertebrates :**

Imparts knowledge regarding the various theories of evolution, evolutionary process such as variation, speciation, natural selection, origin of primates and man .Understanding of origin and salient features of Ostracoderms to Actinopterygii, adaptive radiation of Amphibians, Reptiles, birds and Mammals. Gains knowledge of functional anatomy of vertebrates from fishes to mammals .Understanding of evolutionary significance of internal fertilization, neoteny and paedogenesis .Identifies the significance of amniotic egg its structure and evolutionary significance of skeletal system.

### **Systems Biology:**

Imparts knowledge regarding the various concepts of systems biology, systems approach and its application in biological systems . The structural biology paper is physiological chemistry of all the bio molecules .The paper imparts trough knowledge in the fundamentals of biochemistry of all the biomolecules like the carbohydrates ,proteins,lipids,nucleicacids,their classification structure and metabolism. Understanding of Mammalian biological clocks, Sustainable pest and disease management and bioremediation .Develops skills of Insect outbreak models Data formats, simulation techniques, modeling tools .Application, characterization and interactions ofnanoparticles in biological systems.

### **Research Methodology :**

The course provides wide knowledge about research, experimental & sampling design, Data collection, analysis & interpretation of data and allows student to present the research data in scientific method .Gains skill to solve problems using inferential statistical tools . Learns to collect literature collection, literature citation, and components of research report – Text, tables, figures, bibliography. Writing of dissertations, project proposals, project reports, research papers. Intellectual Property Rights – Biopiracy, copyrights, patent and traditional knowledge and plagiarism. Understanding of Laboratory safety measures, laboratory good practices, animal model systems, animal ethics- animal welfare guidelines for care and use of animals.

### **Comparative Animal Physiology :**

Comparative animal physiology is a comprehensive subject that gives in depth knowledge of various physiological processes in the animal kingdom .students gain knowledge about the comparative

physiological concepts of nutrition digestion respiration excretion metabolism and osmoregulation. Course provides students comprehensive understanding about neurobiology, neurophysiology, molecular neurobiology . Understanding of cognitive/behavior neurobiology, thus allowing then to correlate the human behaviour under given situation.It gives comprehensive understanding regarding inborn disorders and deranged metabolisms. Students feel confident in teaching physiology as well as executing research projects .

### **Comparative animal physiology:**

With the study of this paper students gain knowledge in the areas of responses to environment with study of receptors CNS integration of behavior . Understanding of the functions of effectors in all aspects as well as the circulatory physiology and reproduction and adaptations by animals to environment .The students will be well equipped to become very competent in research. The course provides employability in teaching fields.

### **Applied Toxicology :**

It is a discipline overlapping with biology, chemistry, medicine that involves the study of toxic agents, their mechanism of action. It involves the study of the adverse effects of chemical substances on living organisms. Skill development in environmental and occupational Toxicology.It provides opportunities for students research projects, internships in assessing the effects of toxic pollutants on the environment and in the food chain.

### **Medical Entomology I & II**

Medical Entomology is an integral part of applied ecology involving the study of diverse ecto and endoparasites .Understanding of fundamental complement of numerous diseases which have significant impact on human health . Understanding of Insect vector host interactions of many important diseases like Malaria, Filariasis, Dengue etc. Understanding of denudation of forests its results in increased human vector contact which have become almost irreversible. Course gives insight into physiology, biochemistry and reproduction of insect vectors and their control measures. Students gain knowledge about the concepts of overview of Entomology. Source reduction and environmental methods for vector control, biological control and other Insect bites. Knowledge of hormones and Insects .Students get good insight into how Medical Entomology is acting as a promising factor for entomologist vacancies in both public and private sectors. Student gains knowledge regarding vector born diseases their pathology, control measures, thus aiming at 'Swach and Swasth Bharat'. Students feel confident in teaching Medical Entomology as well as executing research projects.

### **Sericulture:**

Gives knowledge of silk worm rearing, mulberry cultivation, pests and diseases associated with silk worm, mulberry and various process involved in silk production. It is an agro based cottage industry in India that enables them to get self-employment . Sericulture is a comprehensive subject that gives in depth knowledge of the study of silkworms both physiological as well as commercial purposes including the various processes involved in the formation of silk . Students gain knowledge about various systems study of silkworms and cocoons, other defective cocoons . Reeling and significant diseases seen in the silkworms . Students feel confident in teaching Sericulture as well as executing research projects

### **Animal Biotechnology**

It gives insight into various cell/tissues culture techniques . Understanding of in vitro culturing of

organisms and production of transgenic animals. Understanding of cloning of mammals, large scale culture and production from recombinant microorganisms. Gains skills in medical, environmental biotechnology, biopesticides, Biotechnology of aquaculture and use of animals as bioreactors. This insight allows students to take into consideration about ethical issues involved in production transgenic animals and BT products.

### **Fish Biology**

Course provides them comprehensive understanding about aquatic ecosystem and various economical important fishes. Students gain knowledge in the areas of responses characterization and classification of Ostracoderms, placoderms, acanthodians, holocephali, elasmobranchs. Students gain knowledge of integumentary system - basic structure of skin, dermal and epidermal pigments, fins, and scales. Understanding of embryogenesis - Early development and post embryonic development. Understanding of fishes habits and habitats and their functional anatomy. The students will be well equipped to become very competent in research or teaching fields. It is one of the small scale industry which can provide the student employment opportunity.

### **Instrumentation and computer applications in biology**

Understanding of basic concepts of instrumentation such as cell fractionation, homogenation and centrifugation. Students gain skills in techniques of chromatography, electrophoresis, spectroscopy and radioisotopes. Students gain skills in histological, immunological and electrophysiological techniques. Students gain skills in basics of computers, operating systems, overview of programming languages. Application of internet and statistical bioinformatics in research.

### **Agricultural Nematology**

Students gain knowledge of nematodes, their taxonomic importance, collection and fixation. Understanding of morphology of nematodes, life cycles, pathogenic and predatory nematodes. Understanding of feeding mechanisms of nematodes and nematode associations. Students gain skills of various kinds of nematode control measures.

### **Biodiversity and Conservation**

Biodiversity and conservation explore natural landscapes, species and ecosystems and acquires theories and practical methods in preserving environments and organisms. Biodiversity refers not only to endangered species but also to every organism, including microbes and fungi. Biodiversity and Conservation increase awareness and understanding of how human life depends on preserving animal species and natural ecosystems. Biodiversity and conservation is connected to similar disciplines like environmental science, natural resources management and animal sciences. Conserving biodiversity in the face of pressures such as land clearing, pest plants and animals and climate change is a challenge facing land managers and policy-makers globally. Key threats to biodiversity, including habitat modification and loss, unsustainable resource use, introduced species and climate change. Management actions that are used to mitigate threats to biodiversity, including selecting nature reserves, connectivity and wildlife corridors, ecosystem restoration and control of pest plants and animals. Policies to conserve biodiversity including financial incentives, market-based instruments (e.g. biodiversity offsetting), ecological triage and adaptive management.

### **Project**

Make research proposal. Construct tool of data collection. Learn fieldwork modalities. Understand the process of data analysis. Writing research report.



### **COURSE OUTCOME :: COMMERCE**

- =) Enables learners to get theoretical and practical exposure in the commerce sector which includes Accounts, Commerce, Marketing, Management, Economics, Environment etc.
- =) Develops communication skills and build confidence to face the challenges of the corporate world.
- =) Enhances the capability of decision making at personal and professional levels.
- =) Makes students industry ready and develop various managerial and accounting skills for better professional opportunities.
- =) Develops entrepreneurial skills amongst learners.
- =) Strengthens their capacities in varied areas of commerce and industry aiming towards holistic development of learners.
- =) Enables learners to prove themselves in different Professional examinations like CA, CS, CAT, GRE, CMA, MPSC, UPSC etc.
- =) Learners further move towards research in the field of Commerce.
- =) Enables students to demonstrate Progressive learning of various tax issues and tax forms related to individuals and businessmen and setting up their own business start-up.
- =) The vast syllabi covers various fields of commerce and accountancy which helps students grasp practical and theoretical knowledge.
- =) The course helps aspirants to acquire knowledge in the field of accounting, taxation, auditing, risk management, financial accounting, managerial economics, business law and business communications.

- => Learners can pursue careers as financial experts and also develop a better understanding of the markets as this course gives an in-depth understanding of the essential qualities and areas of expertise required for such jobs.
- => Students get opportunities to explore many career paths like investment and portfolio management, stock market, security analysis, mutual fund and capital market analysis, accounting field, financial field etc.
- => The programme aims to develop professional skills among students and build a strong foundation in accounts, Finance and Ethics which will benefit themselves as well as the society.
- => B.Com in Banking and Insurance is developed as per the requirements of the Banking and Finance Industry where students learn banking operations, regulations, monetary auditing, selling of financial products and services.
- => The specially designed syllabus creates trained professionals who can handle various financial activities associated with banking and insurance sectors.
- => Specialisation in Banking and Insurance helps students to operate efficiently in the Banking and Insurance environment in the financial service sector and handle various technologies employed in the field of Banking and Insurance.
- => It gives students theoretical and application-based knowledge in the banking and financial sector and analytical skills to work with various financial tools, such as regulatory agencies and global markets.

Thus, after completing their graduation learners develop a thorough understanding of the fundamentals in Commerce and Finance. Learners venture into Managerial positions, Accounting areas, Banking Sectors, Auditing, Company Secretary ship, Teaching, Professor, Stock Agents, Government Employment etc.

## **COURSE OUTCOME**

### **Financial Accounting:**

- To enable the students to learn principles and concepts of Accountancy.
- Students are enabled with the Knowledge in the practical applications of accounting.
- To enable the students to learn the basic concepts of Partnership Accounting, and allied aspects of accounting.

- The student will get thorough knowledge on the accounting practice prevailing in partnership firms and other allied aspects.
- To find out the technical expertise in maintaining the books of accounts.
- To encourage the students about maintaining the books of accounts for further reference.

### **Marketing Management**

- This course enables the students, the practical knowledge and the tactics in the marketing.
- To study and critically analyze the basic concepts and trends in Marketing. □ To aware of the recent changes in the field of marketing.

### **Computer Applications in Business**

- To make students familiar with computer environment & operating systems □ To introduce students with accounting packages like tally.
- To develop skill and knowledge among students in applications of internet in education of commerce.

### **Business Mathematics and Statistics**

- To use and understand useful functions in business as well as the concept of EMI.
- To understand the different concept of population and sample and to make students familiar with Calculation of various types of averages and variation.
- To learn the applications of matrices in business.
- To understand the students to solve LPP to maximize the profit and to minimize the cost.
- To use regression analysis to estimate the relationship between two variables and to use frequency distribution to make decision.
- To understand the techniques and concept of different types of index numbers.

### **Business Environment**

- To make the students aware about the Business and Business Environment.

- To develop entrepreneurial awareness among students.
- To motivate students to make their mind set for thinking entrepreneurship as career.

### **Banking and Finance**

- To familiar the students with the fundamentals of banking and thorough knowledge of banking operations.
- To build up the capability of students for knowing banking concepts and operations.
- To make the students aware of banking business and practices.
- To make understandable to the students regarding the new concepts introduced in the banking system.

### **Compulsory English**

- To offer relevant and practically helpful pieces of prose and poetry to students so that they not only get to know the beauty and communicative power of English but also its practical application.
- To expose students to a variety of topics that dominates the contemporary socio-economic and cultural life.
- To develop oral and written communication skills of the students so that their employability enhances.
- To develop overall linguistic competence and communicative skills of students

### **Functional English**

- To expose students to a good blend of old and new literary extracts having various themes that are entertaining and informative so that they realize the beauty and communicative power of English
- To make students aware of the cultural values and the major problems in the world today.
- To develop literary sensibilities and communicative abilities among students.

### **Functional Bodo**

- To develop literary sensibilities and communicative abilities among students.

- Students can learn about the origin formation writing style of the poems in various ages
- Through this paper students can learn about the History of Bodo culture and folklore, its important in the society
- Students can learn about the formation of Bodo language its basic structure and so on.

### **Business Economics (Micro)**

- To provide students' knowledge of Micro Economic concepts and inculcate an analytical approach to the subject matter.
- To arouse the students interest by showing the relevance and use of various economic theories.
- To apply economic reasoning to solve business problems. Organizational skill development
- To make familiar the students with the emerging changes in the modern office environment and to develop organizational skills.
- To build up the conceptual , analytical , technical and managerial skills of students efficient office organization and records management
- Technical skills among the students for designing and developing effective means to manage records , consistency and efficiency of work flow in the administrative section of an organization will be developed.
- To develop employability skills among the students.

### **Business Communication**

- To make the students aware about the business communication.
- To understand the process and importance of communication.
- To develop awareness regarding new trends in business communication, various media of communication and communication devices.
- To extend business communication skills through the application and exercises

### **Corporate Accounting**

- This course aims to enlighten the students on the accounting procedures followed by the Companies.
- Student's skills about accounting standards will be developed.
- To make aware the students about the valuation of shares.
- To impart knowledge about holding company accounts, amalgamation, absorption and reconstruction of company.

### **Business Economics (Macro)**

- To familiarize the students with the basic concept of Macro Economics and its application.
- To aware students about Gross National Product (GNP), Net National Product (NNP), Income at Factor cost or National Income at Factor Prices, Per Capita Income, Personal Income (PI), Disposable Income etc.
- To Study the relationship among broad aggregates.
- To apply economic reasoning to solve the problems of the economy.

### **Financial management**

- To understand the concept & functions and importance of management and its application.
- To make the student understand principles, functions and different management theories.

### **Company law**

- To impart students with the knowledge of fundamentals of Company Law and provisions of the Companies Act of 2013.
- To apprise the students of new concepts involving in company law regime.
- To acquaint the students with the duties and responsibilities of Key Managerial Personnel.

### **Indian Banking System**

- To make the students aware of Indian banking system.

- To enable students to understand the reforms and other developments in the Indian Banking.
- To impart knowledge about functions and role of Reserve Bank of India.

### **Cost Accounting**

- To understand Basic Cost concepts, Elements of cost and cost sheet.
- Providing knowledge about difference between financial accounting and cost accounting.
- Ascertainment of Material and Labor Cost.
- Student's Capability to apply theoretical knowledge in practical situation will be increased.

### **Environmental studies**

- To furnish awareness about environmental problems among people.
- Impart basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.

### **Business Law**

- Role of law in economic, political and social context
- Understand the legal and fiscal structure of different forms of business organizations and their responsibilities as employer
- Relevance of law to individuals, business and organization
- Understand the laws related to consumer protection.
- Awareness of laws related to employee's compensation management.

### **Auditing**

- Student will understand the audit process from the engagement planning stage through completion of the audit, as well as the rendering of an audit opinion via the various report options.
- Student will understand auditors' legal liabilities, and be able to apply case law in making a judgment whether auditors might be liable to certain parties;
- Student will understand to describe the various levels of persuasiveness of different types of audit evidence and explain the broad principles of audit sampling techniques;
- Student will understand to discuss the need for an independent or external audit and describe briefly the development of the role of the assurance provider in modern business society;
- Student will be able describe the quality control procedures necessary to ensure that a competent assurance engagement is performed, and apply professional ethics including Code of Conduct to specific scenarios
- Student will explain the internal audit process including the professional standards applicable to the internal audit profession.

## **Direct Taxes**

- Students will be able to identify the technical terms related to direct taxation.
- Students should be able to determine the residential status of an assessee and thus should be able to compute the taxable income of assessee with different residential status.
- Students will be able to understand the various benefits/ deductions under Chap VI-A of the Income tax act, 1961 that are to be reduced from the gross total income of the assessee.
- Students will be able to compute the net total income and the total tax liability of an individual assessee considering the income from all heads of income and the deduction under Chap VI- A of the Income tax act, 1961.
- Students will be able to compute the taxable income and tax for a partnership firm.

## **Business Research & Project Report**

Learners are expected to demonstrate an understanding of research methodologies.



Identify the overall process of designing a research study from its inception to the report stage.

Imbibe data collection, analysis, and interpretation and presentation skills at par with globally accepted standards.

It provides a solid foundation for development of rational problem solving skills and analytical thinking that can last throughout their education and subsequent professional careers.

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## **Program Outcomes and Course Outcomes**

**Under Graduate program In B.Sc. Chemistry**

### **Program Outcomes**

- To understand the basic facts and concepts in Chemistry
- To understand the importance of Chemistry in daily life
- To develop a better understanding and reasoning of facts
- To skill-up for basic analytical tools
- To skill-up for various laboratory techniques used in pharmaceutical laboratories and chemical industries.
- To make efficient for various spectrometric analyses

### **Course Outcome**

#### **SEM-I**

#### **Paper CHE-HC-1016: INORGANIC CHEMISTRY-I**

On successful completion, students would have clear understanding of the concepts related to atomic and molecular structure, chemical bonding, periodic properties and redox behaviour of chemical species. Students will also have hands on experience of standard solution preparation in different concentration units and learn volumetric estimation through acid-base and redox reactions.

#### **LAB: PRACTICAL**

After completion of this course, students will be able to learn titrimetric analysis, Acid base titration, oxidation- reduction titration etc.

#### **.Paper CHE-HC-1026: PHYSICAL CHEMISTRY I**

In gaseous state unit the students will learn the kinetic theory of gases, ideal gas and real gases. In liquid state unit, the students are expected to learn the qualitative treatment of the structure of liquid along with the physical properties of liquid, viz, vapour pressure, surface tension and viscosity. In the molecular and crystal symmetry unit they will be introduced to the elementary idea of symmetry which will be useful to understand solid state chemistry and group theory in some higher courses. In solid state unit the students will learn the basic solid state chemistry application of x-ray crystallography for the determination of some very simple crystal structures. The students will also learn another important topic "ionic equilibria" in this course.

#### **LAB: PRACTICAL**

This course provides advance physical laboratory experiments like determination of viscosity, surface tension of a liquid, pH etc. Student will be able to correlate the importance

the theory with the practical experiments.

## **SEM –II**

### **Paper CHE-HC-2016: ORGANIC CHEMISTRY I**

Students will be able to identify different classes of organic compounds, describe their reactivity and explain/analyze their chemical and stereo chemical aspects.

### **Paper CHE-HC-2026: PHYSICAL CHEMISTRY II**

In this course the students are expected to learn laws of thermodynamics, thermochemistry, thermodynamic functions, relations between thermodynamic properties, Gibbs Helmholtz equation, Maxwell relations etc. Moreover the students are expected to learn partial molar quantities, chemical equilibrium, solutions and colligative properties. After completion of this course, the students will be able to understand the chemical systems from thermodynamic point of view.

#### **LAB: PRACTICAL**

After completion of this course students will be able to analyze the organic sample qualitatively. This will help students to work in some laboratory and find the chemical composition of an unknown organic compound. Students will be able to describe and classify organic compounds in terms of their functional groups and reactivity.

Also they are able to analyze heat capacity, calculation of enthalpy, solubility etc.

## **SEM –III**

### **Paper CHE-HC-3016: INORGANIC CHEMISTRY-II**

On successful completion of this course students would be able to apply theoretical principles of redox chemistry in the understanding of metallurgical processes. Students will be able to identify the variety of s and p block compounds and comprehend their preparation, structure, bonding, properties and uses. Experiments in this course will boost their quantitative estimation skills and introduce the students to preparative methods in inorganic chemistry.

### **Paper CHE-HC-3026: ORGANIC CHEMISTRY-II**

Students will be able to describe and classify organic compounds in terms of their functional groups and reactivity.

### **Paper CHE-HC-3036: PHYSICAL CHEMISTRY-III**

The students are expected to learn phase rule and its application in some specific systems. They will also learn rate laws of chemical transformation, experimental methods of rate law determination, steady state approximation etc. in chemical kinetics unit. After attending this course the students will be able to understand different types of surface adsorption processes and basics of catalysis including enzyme catalysis, acid base catalysis and particle size effect on catalysis.

#### **LAB: PRACTICAL**

After completion of this course, students will be able to learn iodometric titration, Inorganic compound preparation, Organic compound preparation, determination of CST, construction of phase diagram, Kinetics of reactions etc.

## **SEM –IV**

### **Paper CHE-HC-4016: INORGANIC CHEMISTRY-III**

On successful completion, students will be able name coordination compounds according to IUPAC, explain bonding in this class of compounds, understand their various properties in terms of CFSE and predict reactivity. Students will be able to appreciate the general trends in the properties of transition elements in the periodic table and identify differences among the rows. Through the experiments students not only will be able to prepare, estimate or separate metal complexes/compounds but also will be able to design experiments independently which they should be able to apply if and when required.

**Paper CHE-HC-4026: ORGANIC CHEMISTRY-III**

Students shall demonstrate the ability to identify and classify different types of N-based derivatives, alkaloids and heterocyclic compounds/explain their structure mechanism and reactivity/critically examine their synthesis and reactions mechanism.

**Paper CHE-HC-4036: PHYSICAL CHEMISTRY-IV**

In this course the students will learn theories of conductance and electrochemistry. Students will also understand some very important topics such as solubility and solubility products, ionic products of water, conductometric titrations etc. The students are also expected to understand the various parts of electrochemical cells along with Faraday's Laws of electrolysis. The students will also gain basic theoretical idea of electrical & magnetic properties of atoms and molecules.

**LAB: PRACTICAL**

After completion of this course students will be able to learn gravimetric analysis, Inorganic preparation, Chromatography, detection of N,S, X & other functional groups, determination of cell constant, equivalent conductance, Potentiometry etc.

**SEM –V****Paper CHE-HC-5016: ORGANIC CHEMISTRY-IV**

Students will be able to explain/describe the important features of nucleic acids, amino acids and enzymes and develop their ability to examine their properties and applications.

**Paper: CHE-HC-5026: PHYSICAL CHEMISTRY V**

After completion of this course the students are expected to understand the application of quantum mechanics in some simple chemical systems such as hydrogen atom or hydrogen like ions. The students will also learn chemical bonding in some simple molecular systems. They will be able to understand the basics of various kinds of spectroscopic techniques and photochemistry.

**Paper: CHE-HE-5016: APPLICATIONS OF COMPUTERS IN CHEMISTRY**

After the completion of this course it will help the student to interpret laboratory data, curve fitting of experimental work, also performs quantum mechanical calculations for various molecular models.

**Paper: CHE-HE-5026: ANALYTICAL METHODS IN CHEMISTRY**

On successful completion students will have theoretical understanding about choice of various analytical techniques used for qualitative and quantitative characterization of samples. At the same time through the experiments students will gain hands on experience of the discussed techniques. This will enable students to take judicious decisions while analyzing different samples.

**Paper CHE-HE-5036: MOLECULAR MODELLING & DRUG DESIGN**

Students will be able to identify basic components of computer and programming as applied to computer assisted design and modelling of molecules.

**Paper: CHE-HE-5046: NOVEL INORGANIC SOLIDS**

After the completion of this course it will also be possible for the students to opt for studying an interdisciplinary master's programme with an emphasis on the synthesis and applications of various materials or take up a job in the materials production and/or processing industry.

**Paper: CHE-HE-5056: POLYMER CHEMISTRY**

After completion of this course the students will learn the definition and classifications of polymers, kinetics of polymerization, molecular weight of polymers, glass

transition temperature, and polymer solutions etc. They also learn the brief introduction of preparation, structure and properties of some industrially important and technologically promising polymers.

**Paper: CHE-HE-5066: INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS**

Students shall be able to explain the theoretical basis of different analytical techniques, identify the experimental requirements and compare/analyze the data/results thereof.

**SEM –VI**

**Paper CHE-HC-6016: INORGANIC CHEMISTRY-IV**

By studying this course the students will be expected to learn about how ligand substitution and redox reactions take place in coordination complexes. Students will also learn about organometallic compounds, comprehend their bonding, stability, reactivity and uses. They will be familiar with the variety of catalysts based on transition metals and their application in industry. On successful completion, students in general will be able to appreciate the use of concepts like solubility product, common ion effect, pH etc. in analysis of ions and how a clever design of reactions, it is possible to identify the components in a mixture. With the experiments related to coordination compound synthesis, calculation of  $10Dq$ , controlling factors etc. will make the students appreciate the concepts of theory in experiments.

**Paper CHE-HC-6026: ORGANIC CHEMISTRY-V**

Students will be able to explain/describe basic principles of different spectroscopic techniques and their importance in chemical/organic analysis. Students shall be able to classify/identify/critically examine carbohydrates, polymers and dye materials.

**Paper CHE-HE-6016 : GREEN CHEMISTRY**

Apart from introducing learners to the principles of green chemistry, this course will make them conversant with applications of green chemistry to organic synthesis. Students will be prepared for taking up entry level jobs in the chemical industry. They also will have the option of studying further in the area.

**Paper CHE-HE-6026: INDUSTRIAL CHEMICALS AND ENVIRONMENT**

After successful completion of the course, students would have learnt about the manufacture, applications and safe ways of storage and handling gaseous and inorganic industrial chemicals. Students will get to know about industrial metallurgy and the energy generation industry. Students will also learn about environmental pollution by various gaseous, liquid wastes and nuclear wastes and their effects on living beings. Finally, the students will learn about industrial waste management, their safe disposal and the importance of environment friendly “green chemistry” in chemical industry.

**Paper CHE-HE-6036: INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

This course will establish the basic foundation of industrial inorganic chemistry among the students. This will be helpful for pursuing further studies of industrial chemistry in future. Experiments will help the Students to gather the experience of qualitative and quantitative chemical analysis. Students will be capable of doing analysis of the inorganic materials which are used in our daily life. They will have insight of the industrial processes.

**Paper: CHE-HE-6046: RESEARCH METHODOLOGY FOR CHEMISTRY**

After completing this course, students should be able to construct a rational research proposal to generate fruitful output in terms of publications and patents in the field of chemical sciences.

**Paper CHE-HE-6056: DISSERTATION**

This course is introduced to make familiar with the research methodology. Student will be able to do project work on known problems after completion of this course. They will learn how to write a project report. They will be skilled in writing the proposal, literature review, objective, methodology, results, discussion, conclusion and references. This is very

important to carry forward their career in research and development.