Sripat Singh College

Program outcomes, program specific outcomes and course outcomes for all programs offered by the institution are stated and displayed on website and communicated to teachers and students

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BENGALI

- Specific outcomes for a B.A. Bengali Honours & P.G. Bengali programme depend on the syllabus of Kalyani University and its curriculum. These outcomes are designed to ensure that students acquire a comprehensive understanding of Bengali language and Literature and critical thinking skills during their course of study.
- The Department of Bengali aims to provide a comprehensive education in the Bengali language and literature to equip students with the necessary skills for academic and professional life.
- The course contains through various texts, essays, novels, drams etc. So that students can learn to evaluate and interpret arguments and engage in meaningful literary analysis.
- The course outcome of the Department of Bengali equips students with a broad skills prepare them for a variety of career paths such as teaching, writing, journalism, publishing, and more, more.

- Here are some common specific outcomes:

Undergraduate & Post-graduate

- The course provides a brief introduction to the history of Bengali language and literature. It is followed by a discussion on the language family of the Indian sub-continent and Indo-Aryan family of languages to which Bengali belongs to. The subsequent three parts deal with Old Bengali, Middle Bengali & Modern Bengali phases of the language. Rather than discussing the features only, we plan to introduce some texts of the said periods (i, e: Chorjapod, Srikrisnokirton, Mongolkabya etc.)

- Bengali has a rich oral tradition from the olden days. Objective of this paper is to focus upon various oral traditions like Folktales, Folklore/Songs and Myths and proverbs of Bengali and to make the students familiar with that abundance of beliefs and practices which had been a source of energy for our everyday life and had been passed down from earlier generations to us.
- To enhance students' knowledge Modern Novel (i.e:Ilius Akhtarujjaman) and short stories (i.e. Munsi Premchandra), drama (i.e. Dolls House by Ibsen) essay are discussed.
- The course introduces some of Tagore's literary works, such as short stories, novels, drama, essays.

- To highlight the cultural background and history of Bengali Culture, history of Sanskrit, and English Literature are also interacted.

SANSKRIT

After successful completion of B.A. Honours in Sanskrit

Program specific outcome

1. Students will learn Sanskrit Language and communication skills in Sanskrit very efficiently. By learning a new language they will be able to compare its characteristics, grammatical foundation, enriched vocabulary etc. with other Indian languages especially with those who belong to OIA family of languages.

2. Through the Sanskrit language students will get connected to the ancient heritage of Indian subcontinent, its glorious culture and diversity, its history and its journey from past to present. The actual India with its splendid culture will be in front of the students devoid of any external misinterpretation because the students will be able to access the primary sources and will not depend on the secondary sources like translation or exposition in other languages.

3. Students will learn to read the ancient manuscripts and will get initial knowledge about Inscriptions, different ancient scripts and some other languages derived from Sanskrit like Pāli and Prākṛta etc. which will lead them to learn Ancient Indian History in a very authentic way. Students will be ready to serve in different projects related to Manuscripts and archives.

4. Students will know the base and basic ideas of Indian society and social Institutions and Indian Polity as well. Being aware about the evolution of Indian society with all its details they will be critical to the social rules and regulations and therefore they will be awakened citizens

and will help to make a better Indian society. They will be able to bring forth the liberal ideas from Ancient Indian texts and to propound harmony in different aspects of society.

5. Students will enjoy Ancient and Modern Sanskrit literature and will be wellversed in Indian Poetics. Students will acquire good writing skill and will learnt the art of articulating different aspects and emotions of life following the literary creation of great poets (*kavi*) of all time like Kālidāsa, Bāṇa, Māgha and others.

6. The syllabus gives the students a great chance to literate themselves in computer and computational Sanskrit simultaneously. Students will learn digitizing of texts, data typing and printing, different software and machines (searching, translating, analyzing etc.) related to Sanskrit. They will get a chance to get employed in few of trending fields of ICT as well.

7. Students will be well aware about the trending ideas of Indology in both East and West, which will provide them the chance to choose future streams of research in both India and abroad. Because of the revolution in Information and technology field students will get the chance to stay in touch with the learned researchers and their research works and with the renowned institutions as well.

8. Students will get introduced to Indian Philosophical schools and will read a few texts on it. They will also know the differences and characteristics of Schools of Indian Poetics as well. After the completion of the course they will know their field of interest which will help them to choose future specializations in academic venture. Students will learn the Pāṇinian system of Sanskrit Grammar and will know the structure of any language very well and will be efficient enough to learn other languages than students of other streams.

9. Students will read the texts like Ramayana and Mahabharata which simultaneously will grow their interest in Indian Culture and literature and will develop their personality. Bhagavad Gīta, Nītiśataka and other nīti texts will help them to lead a healthy and balanced life which is the need of the hour.

10. Students will find themselves employable in academic fields, language teaching posts, administration through competitive examinations, different manuscript, translation and in other projects and also make them ready for further studies and research works in specific fields.

Course Outcome

1. Core Courses of the Under Graduate Syllabus cover a wide range of subjects of Indology through Sanskrit Language and therefore provide a good opportunity to students to acquire diversified knowledge about Indian‘s rich ancient knowledge tradition encompassing literature, poetics, dramaturgy, ancient science, philosophy, grammar, smṛti (Social Institutions and Polity), Epigraphy and Paleography, mythology, Ancient and Modern Literature etc. Students will get introduced in all these fields and will read a few texts related to each field in a very scientific way.

2. Through the Skill Enhancement courses (SEC) students acquire practical Knowledge about the Indian Scripts. Here are some of the advantages: Access to a Rich Literary Tradition, Understanding Indian Culture, Language Learning, Personal Growth, Cultural Sensitivity, Enhanced Learning, Transliteration clarity, Enhanced Multilingual Skills etc. Through the Skill Enhancement courses (SEC) students acquire practical knowledge about Sanskrit language and its applicability in day to day life and in Information and Communication Technology as well. Students become well equipped both in theoretical and practical aspects of Sanskrit Language and the texts related to the language. These courses enhance the writing and conversation skills of the students to make them free from being dependent from secondary sources.

3. Discipline Specific Courses (DSE) allow the students to dive deep into the theoretical parts of different fields of Indology like Philosophy, Poetics, Ancient Literature etc. These courses gradually improve the critical thought of the students and they will be expert in explanation and analysis of the ancient texts and will find applicability of them in current context.

4. Students will read Vedic, classical and modern Sanskrit literature and therefore will get the chance to critically perceive the evolution pattern being guided by the research works done by great scholars of East and West for a long time. Students will read the literary creations of the renowned poets of all time like Kālidāsa, Bāṇa etc. and will be able to appreciate them and compare their works with others of past and present.

5. Students will learn the Indian Social Institutions and Indian Polity from the Mahābhārata, Rāmayaṇa, Arthaśāstra, Manusaṃhitā, *Manusmṛti, Nitivākyāmṛta, śatapathabrāhmaṇa, Atharvaveda, Ṛgveda , Āpastambadharmasūtra, Baudhāyanadharmasūtra* etc. They will learn the ideas of people like MK Gandhi, Vivekananda and other modern thinkers regarding them as well.

6. Students will learn the discussions on Indian Dramaturgy which is very enriched and ahead of time. The lessons on the schools of Indian Poetics will grow a critical approach in the students while discussing and analyzing any literature form.

7. Students will get introduced to the Indian Philosophical Schools both the Orthodox and non Orthodox and will read a few canonical texts related to the schools.

8. The courses on Paleography and Epigraphy will educate the students in Ancient Manuscripts, Inscriptions and Scripts which will create an expertise in discussion of Ancient Indian History.

9. Students will learn Pāṇinian Grammar following the authentic primary texts which will allow them to analyze the structure of Vedic and Classical Sanskrit Language. This structure will help a lot while creating translating software or while decoding the structure of any language.

10. Students will learn a lot about Indian approach on ethics, yoga, science and other practical aspects following the ancient texts. Self management in Gīta is a very important addition to the syllabus which will teach the students to manage the balance in their personal life and lead to a very creative and fruitful social life simultaneously.

Course Outcomes (1+1+1 System)

Paper I:
1. Textual analysis literature and different composing styles (Daśakumāracarita)
2. Textual and literary criticism of Kālidāsa‘s Abhijñānaśakuntala.
3. Essay in Sanskrit; on topics of Indic culture, idols, ideals, social values, current of Sanskrit prose.
4. Sanskrit General Grammar

Paper II:
1. Study of Sanskrit Metres (i.e. Chandomañjarī)
2. Textual and literary analysis of Mahākāvya from post-kālidāsa era (i.e. Kirātārjunīya)
3. Textual and literary analysis of drama from pre-kālidāsa era (i.e. Svapnavāsavadatta)
4. Basic introduction to Sanskrit Poetics with the help of Kāvyālaṅkārasūtravṛtti.

Paper III:
1. General Acquaintance with the Indian philosophical systems.
2. Elementary knowledge about the subject of Annaṃbhaṭṭa‘s Tarkasaṃgraha.

Paper IV:
1. Basic introduction to ancient Indian legal system
2. Different perspectives on ancient Indian polity (i.e. rājadharmaprakaraṇā of Manu and arthaśāstra of kauṭilya)
3. Texts on Dharmaśāstra and Arthaśāstra
4. Comparison with Modern Indian legal system (specially with Indian Penal Code) (Yājñavalkya-saṃhitā - Chapter 2 Vyavahārādhyāya)

Paper V:
1. General Introduction of Indian Poetology(Poetological Text in Sanskrit: Sāhityadarpaṇa of Viśvanātha-Kavirāja; chapter 6-10)
2. Post-Kālidāsa Sanskrit Mahākāvya: Bhaṭṭikāvya (or Rāvaṇavadha) of Bhaṭṭi (Canto 2)

Paper VI:
1. History of classical Sanskrit Literature including Inscriptional and Historical Works.
2. Introduction and basics of Vedic, scientific and Technical Sanskrit Literature.
3. History of Vedic Sanskrit Literature.

Paper VII:
1. Vedic texts and Vedic grammar (Vedic texts: Hymns of Ṛgveda — 1.1. Agnisūkta, 10.121. Hiraṇyagarbhasūkta, 10.125. Devīsūkta, 10.34. Akṣasūkta, 10.191. Saṃjñānasūkta)
2. Vedic Grammar: Padapāṭha and general outline of Vedic grammar.
3. Vedic texts; Yajurveda; Atharvaveda and Brāhmaṇa, Upaniṣad (Rudrādhyāya (Śukla-Yajurveda, 16.1-14), Atharvaveda (12.1.1-10), Maumatsyakathā (śatapathabrahmaṇam), śunaḥśepopakhyānam (Aitareyabrāhmaṇam, 3.3.3), Bṛhadāraṇyakopaniṣad (4.4. and 4.5.)

Paper VIII:
1. Sanskrit Grammatical text : Siddhāntakaumudī of Bhaṭṭojidīkṣīta.
2. General Acquaintance with Phonetic Tendencies (The following topics — Assimilation, dissimilation, epenthesis, prosthesis, metathesis, anaptyxis, haplology, syncope, apocope, aphaeresis, cerebralisation, analogy).
3. Siddhāntakaumudī of Bhaṭṭojidīkṣita — Samāsaprakaraṇa; excluding Samāsāntavidhāna
4. Elementary knowledge about ‗Science of Language', the IE family of language and the phonetic laws, history of the concept of IE language, divisions of IE. (Among phonetic laws the following are important — Grimm's law, Verner's law, Grassmann's law, Bartholomae's law, Collitz's law, Fortunatov's law)

HISTORY

After successful completion of B.A. Honours in History

Program specific outcome

HISTORY Programme specific Outcome after completing History Honours Undergraduate Course
1. Students of this course shall be able to express thinking skills by analyzing, synthesizing, and evaluating historical information from multiple primary and secondary sources.
2. They will develop the ability to distinguish between fact and fiction and they will understand that there is no one historical truth. They will be able to analyze the historical facts as well.
3. Students will produce well researched written works with the help of both primary sources and the secondary sources.
4. Students will grow an informed familiarity with multiple cultures.
5. Students will develop an ability to convey verbally their historical knowledge.
6. Students will demonstrate their understanding of cause and effect along with their knowledge of the general chronology of human experience.
Course Outcomes: 1. Students will be able to understand the relationship between History and other streams of study such as relationship between History and Mathematics relation between History and Geography etc. 2. Study of Historiography helps in constructing original historical arguments based on primary source material research along with the development of the ability to convey verbally thesis research and relevant historiography and theory. 3. The Study of Early World History and Cultures proposes the idea that humankind as a whole has a history to be investigated and that a world history course may be more than study of various ―cultures. 4. Students will learn the methods and techniques of research and analysis in the discipline of history, including the ―social sciences and humanities and traditions as well. 6. Students will develop communication skills to express historical perspectives, including writing and oral presentations of expression

POLITICAL SCIENCE

Programme Specific Outcomes
The University Grants Commission (UGC) has taken various measures by means of formulating regulations and guidelines and updating them, in order to improve the higher education system

and maintain minimum standards and quality across the Higher Educational Institutions in India. The **CBCS System** was introduced in 2018 under the University of Kalyani. The introduction of Choice Based Credit System is one such attempt towards improvement and bringing in uniformity of system with diversity of courses across all higher education institutes in the country.

There are three types of Course under the CBCS System introduce to study Political Science at undergraduate level. They are ..

1. **Core Course (CC):** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.

2. **Elective Course:** Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the student's proficiency/skill is termed as an Elective Course.

2.1 **Discipline Specific Elective Course (DSEC):** Elective courses that are offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).

2.2 **Generic Elective Course (GEC):** An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.

3. **Ability Enhancement Courses/ Skill Enhancement Courses:**

3.1 **Ability Enhancement Compulsory Course (AECC):** Ability enhancement courses are the courses based upon the content that leads to Knowledge enhancement. They (i) Environmental Science, (ii) English Communication) are mandatory for all disciplines.

3.2 **Skill Enhancement Course (SEC):** These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.

Programme Specific Outcomes

1. This course in B.A. in Political Science enables the students to develop an overall understanding on political institutions, society, culture, politics and international relations. More specifically, it shall enable the students to evolve a critical understanding on Indian Politics and its nature and contemporary trends.

2. The exposure to Political Science also encourages them to develop a scientific outlook on above-stated subjects, as it emphasizes the role of empirical methods and theories in building up the knowledge over discipline.

3. It not only introduces the students to the structural and functional dimensions of political institutions but also a range of theories which equips them with a critical understanding on society and politics. For example, after studying the degree programme, the students shall be capable of providing political analysis on political parties, party system, and models of democracy.

4. The contemporary topics as included in the syllabus shall generate interest for research among the students in future.

Course Outcomes

CC-T-1: Understanding Political Theory: Concepts (Semester-1)

Objectives

- Understand certain key aspects of conceptual analysis in political theory
- Develop the skills required to understand and assess the critical concepts in Political Theory.

CC-T-II: Understanding Political Theory: Approaches and Debates (Semester-1)
Objectives

- To Understand the contemporary approaches to the study of politics.
- To Develop a critical and reflective analysis and interpretation of social practices through the use of relevant conceptual too kit.
- To Assess the critical and contemporary debates in Political Theory.

GE-T-1(A): Reading Gandhi (Semester-1)

Objectives

- To understand the art of reading texts, to enable them to grasp its conceptual and argumentative structure and to help them acquire the skills to locate the texts in a broader intellectual and socio-historical context.
- Acquaint with the social and political thought of Gandhi.

GE-T-1(B): Nationalism in India (Semester-1)
Objectives

- To understand historically the advent of colonialism in India and the emergence of the discourse on nationalism as a response to it.
- To Engage with theoretical explanations of colonialism and nationalism in India at the same time study the social, political and institutional practices that unfolded in that period, gradually paving way towards independence and democracy in India

CC-T-3: Politics in India (Semester-II)
Objectives

- To Develop a basic understanding about the Indian party system and electoral politics.
- To Identify the major challenges to the process of Nation-building in India.
- It also familiarizes students with the working of the Indian state, paying attention to the contradictory dynamics of modern state power.

CC-T-4: Indian Constitution (Semester-II)

Objectives

- To Develop a basic understanding about the structure of the Indian Constitution.
- To Understand the nature of federalism in India.
- To Get an idea about the Fundamental rights of the Indian citizens' and the role that the Indian judiciary play in protecting and upholding these rights.

GE-T-2(A):- Human Rights, Gender and Environment (Semester-II)

Objectives

- Enabling the students to understand the issues concerning the rights of citizens in general and the marginalized groups in particular.
- Help us to assess the institutional and policy measures which have been taken in response to the demands of various movements.
- Help us to understand the conceptual dimensions, international trends and the Indian experience

GE-T-2(B):- Governance: Issues and Challenges (Semester-II)

Objectives

- To Identify the different dimensions of governance.
- To Identify the Structure and process of Governance in India
- To Identify the various good governance initiatives introduced in India.

CC-T-5: Indian Political Thought (Ancient and Medieval) (Semester-III)

Objectives

- To Understand the key concepts of ancient Indian political thought.
- To Identify the key concerns of medieval Indian political thinkers

CC-T-6: Indian Political Thought (Modern) (Semester-III)

Objectives

- Understand the key concerns of major political thinkers of modern India.
- To understand the views on rule of law, Rights, freedom of thought and social justice of Raja Rammohan Roy.
- To understand the Views on Cultural nationalism, Society and Education of Vivekananda.
- To understand the concept of Nationalism and Internationalism of Rabindranath Tagore.
- To understand the Views on social justice and Constitutionalism.
- To understand the views on Gender & Social Justice of Pandita Ramabai.

CC-T-7: Understanding International Relations: Theories and Concepts (Semester-III)

Objectives

- To Understand the major approaches to the study of International Relations
- To Comprehend the main theories in International Relations
- To Develop an idea about some major concepts of International Relations.

GE-T-3(A): Politics of Globalization (Semester-III)

Objectives

-
- To Understand the process of Globalization from a political perspective.
- To Identify the major dimensions of Globalization and their impact on the International Order
- To understand the role of International Institutions.
- To understand the impact of Globalization on State, Society, Sovereignty and Nation State.

GE-T-3(B): United Nations and Global Conflicts (Semester-III)

Objectives

-
- To Understand the organizational structure and the political process of the UN.
- To Understand the evolution of the UN since 1945.
- To Understand the role of the UN in dealing with major global issues and problems.

SEC-T-1(A): Legislative Practices and Procedures (Semester-III)

Objectives

- To Identify the legislative process in India at various levels,
- To understand the basic requirements of peoples' representatives in policy making process.
- To understand the basic skills required for understanding the political process.

SEC-T-1(B): Democratic Awareness with Legal Literacy

Objectives

- To Understand the structure and manner of functioning of the legal system in India.

- To Develop an understanding of the formal and Alternate Dispute Redressal (ADR) mechanisms that exist in India, public interest litigation.
- To get idea of FIR, Arrest, Cr.PC, ADR System, Right to legal aid.

CC-T-8: Public Administration (Theories & Concepts) (Semester-IV)

Objectives

- To Understand the nature of public administration and distinguish it from private administration.
- To Trace the evolution of public administration as an academic discipline.
- To Develop an understanding of the major concept & theories of public administration.

CC-T-9: Public Policy and Indian Administration (Semester-IV)

Objectives

-
- To Trace the evolution of Indian administrative system.
- To Understand the maladies in Indian civil service and identify the major reforms made.
- To Identify the major issues affecting Indian administrative system in contemporary period

CC-T-10: Global Politics & Issues since 1945 (Semester-IV)

Objectives

- To Understand the major issues influencing international politics
- To Identify the major regional organizations and their policies
- To understand the role of major regional organization in international politics.

GE-T-4(A): Feminism: Theory and Practice (Semester-IV)

Objectives

-
- To Understand the contemporary debates on feminism and the history of feminist struggles.
- To Understand the complexity of patriarchy and the history of feminism.
- To understand the different rights and laws for the women.

GE-T-4(B): Understanding Ambedkar

Objectives

-

- To Understand Ambedkar's ideas and their relevance in contemporary India, by looking beyond caste.
- To understand Ambedkar's philosophical contributions towards Indian economy and class question, sociological interpretations on religion, gender, caste and cultural issues
- To understand the relevance of Ambedkar's thought in contemporary India.

SEC-T-2(A): Public Opinion and Survey Research
Objectives

-
- To Identify the debates, principles and practices of public opinion polling in the context of democracies with special reference to India.
- To Understand how to conceptualize and measure public opinion using quantitative methods, with particular attention being paid to developing basic skills pertaining to the collection, analysis and utilisation of quantitative data.

SEC-T-2(B): Peace and Conflict Resolution

Objectives

- To Help build an understanding of a variety of conflict situations.
- To Understand the various dimensions of Conflict.
- To Identify the Gandhian Techniques of Peace-Building.
- To Develop ideas on Conflict Responses.

CC-T-11: Western Political Thought (Ancient & Medieval) Semester-V

Objectives

- To Have an insightful knowledge about the ancient and medieval western political thought.
- To Understand the key ideas of western political thinkers of ancient and medieval period.
- To get idea of Justice, Democracy, Ideal State of Plato and Aristotle, Aquinas, Marsiglio, Machiavelli.

CC-T-12: Western Political Thought (Modern) Semester-V

Objectives

-
- To Have an insightful knowledge about the western political thought of modern times.
- To Understand the key ideas of western political thinkers of modern period.
- To understand the concept of Liberty, Freedom of different thinkers like Hobbs, Lock, Hegel. J.S. Mill.

DSE-T-1(A): Citizenship in a Globalizing World Semester-V

Objectives

- To Understand the theories of citizenship and the historical development of the concept.
- To Develop an idea about citizenship as a practice in an increasingly globalizing world

DSE-T-1(B): Public Policy in India (Semester-V)

Objectives

-
- Be familiar with different public policies in India.
- To Understand various theories and methods of understanding public policy and governance
- To Identify the different challenges to governance which has hampered effective implementation of public policies

DSE-T-2(A): Development Process and Social Movements in Contemporary India (Semester-V)
Objectives

- To understand the development process in India since Independence.
- To Understand a variety of protest movements in the context of development in India.
- To analyse the conditions, contexts and forms of political contestation over development paradigms.

CC-T-13: Introducing Political Sociology (Semester-VI)

Objectives

- To Understand the nature and scope of Political Sociology
- Understand the concept of Social Stratification and the role of caste, class and elite in politics.
- To Comprehend the concepts of Power, authority and Influence and their inter-relationships.
- To Understand the meaning, nature and type of Political Culture
- To Identify the process of political socialization

CC-T-14: Comparative Government & Politics (Semester-VI)

Objectives

- To Identify the difference between Comparative Politics and Comparative Government.
- To Identify the different types of Constitutional Systems.
- To Gain knowledge about the basic features of the constitution in UK.USA and PRC

DSE-T-3(A): Understanding South Asia. (Semester-VI)

Objectives

- To Understand the Geo-politics of South Asia as a region.
- To Understand the nature of state system in various countries of South Asia.
- To Understand the process of regional integration in South Asia.
- To Identify the major environmental issues in South Asia.

DSE-T-3(B): India's Foreign Policy in a Globalizing World (Semester-VI)

Objectives

- To Have an insightful understanding about India's foreign policy preferences in the globalizing World.
- To Identify the pattern of India's engagements with global powers.

DSE-T- 4 (A): Dilemmas in Politics (Semester-VI)

Objectives

- Explore, analyse and evaluate some of the central issues, values and debates in the/ contemporary world.

DSE-T-4(B): Dissertation (Semester-VI)

Objectives

- To Apply the knowledge gained through different courses in practical field.
- To Solve problems related to his course of study.
- To Document, calculate, analyse and interpret data.
- To Deduce findings from different studies
- To Write and report in standard academic formats.

PHILOSOPHY

Programme Outcome, Programme Specific Outcome and Course Outcome

Programme Outcome (PO):

Combining a wide range of perspectives on contemporary philosophy with a focus on bridging the gap between traditional and contemporary thought, we encourage our students to become dedicated, responsible and successful in their careers in the field of academics, government sector and mass communications.

We're proud to have great students and faculty, and our graduate program provides students with a deep understanding of different aspects of philosophy.

PO1: Analytic outlook: This ability develops through proper study of analytic philosophy. It helps to form the capacity to analyze various situations in life.

PO2: Logical and critical attitude: Study of logic helps to think logically and critically. The student can argue and evaluate in a constructive way.

PO3: Ethical thinking: The course introduces the moral concepts of good and bad, right and wrong. It helps to form a strong foundation of character and personality.

PO4: Communication skill: A student develops the capacity to communicate with others, understand an issue from different perspectives and find out a rational solution.

PO5: Philosophy and society: Study of philosophy helps to develop an integrated and holistic view of life and world.

Program specific Outcomes (PSO):

The three-year Undergraduate course (CBCS) in Philosophy Honours initiates students to Epistemology and Metaphysics, Logic, Indian Philosophy, History of Modern and Western Philosophy and Ethics, Philosophy of Religion and Existentialism. The course develops interest in learning philosophy with clarity and analyzing the philosophical concepts with philosophical reflection and analysis. The course also helps to develop critical thinking. After successfully completing the 3year degree course the following Programmes Specific Outcomes outcome are expected of the students: After successfully completing B. A. in Philosophy:

PSO1: After completion of a three-year Bachelor of Arts in Philosophy honours CBCS course, students are encouraged to read the books written by different philosophers on different philosophical topics in order to gain a comprehensive understanding of philosophy, as well as to expand their philosophical knowledge, generate enthusiasm and interest in research work, and write short articles on different philosophical topics. This is done in order to cultivate logical thinking skills and to motivate other students to pursue a similar interest in philosophy.

PSO2: First, to cultivate a love of the subject, their capacity for constructive critical thinking, and to offer a rational, logical, and systematic solution to the issues posed by philosophy, whether metaphysical, empirical, social, political, or religious.

PSO3: Learn and apply the various ways of doing philosophy. Understand the meaning of philosophy. Apply philosophy to different domains.

PSO4: Acknowledging and comprehending the distinctions between individual, collective and global values, acknowledging the importance of the universal existence and its interdependent relationships and learning how to live together in a world where there's so much diversity and how important it is.

PSO5: To understand the distinctive features of each philosophical systems either traditional, contemporary or modern and value them.

PSO6: Understand the meaning and importance of the history of each philosophical tradition and attain knowledge from them.

PSO7: To get a good grasp on the different types of traditions, how they shape society, the importance of philosophy in all aspects of sociology and politics, and how to evaluate them.

PSO8: to understand the ethical and moral implications and to learn applying them in all the spheres of life either academic or non-academic.

PSO9: With a good understanding of philosophy, students can become either a good philosopher, counsellor, academician, politician and social scientist.

Course outcomes: (CBCS System)

The Choice Based Credit System (CBCS) is an attempt to improve the system and bring uniformity of courses with diversity across all the higher education institutions in the country. The CBCS allows the students to select from the prescribed courses which include core courses, elective courses, skill enhancement courses, ability enhancement courses, etc. The courses will be evaluated according to the grading system which is considered better than the conventional marks system. Students will be able to move across institutions in India to start with and across countries to study courses of their choice, the uniform grading system will also help in assessing the candidates' performance in terms of employment.

Indian Philosophy: HCC1, HCC3, DSE1, DSE4, GE1, GE3, PDSE1,

1. Students will read and critically assess the work of central thinkers in the history of classical Indian and contemporary Indian philosophy.
2. Students will explore and understand the historical development of major Indian philosophical thoughts.
3. Students will develop a critical understanding of various key concepts in philosophy such as rta, rna, padartha, prama, pramana, prameya, manas, atman, jiva, jagat, ishwara, karma, dharma, moksa and so on.
4. the course outcome is to critically explain and examine Carvaka materialism, Pratitya-Samutpadakshanika-vada, Nirvana, anekantavada, ekantavada, the meaning of ‘syat’ and sapta-bhangi-naya of Jaina.
5. Students will learn about Pramana (Nyaya), the different kinds of Pratyaksa, Anumana, upamana, shabda.
6. Students will explain and understand the characteristics of prakrti, purusha of samkhya and yoga system.

7. Students will learn about the nature of Brahman in Samkara's advaita Vedanta and Ramanuja's Visistadvaita Vedanta. the characteristics of maya, cit-acit, nature of Jagat, atman and moksa.

Western Philosophy: HCC2, HCC4, DSE2, HCC13, HCC14, PCC3

1. Students will read and critically assess the work of central thinkers in the history of western philosophy.
2. Students will explore and understand the historical development of major western philosophical ideas.
3. Students will develop a critical understanding of various key concepts in philosophy such as substance, God, scepticism, mind-body problems, man and the god relation and Universal.
4. Students will also gain critical insights into some of the most important ideas in philosophy. such as reality, mind, causal theory, evolution theory and different views on metaphysical and epistemological thoughts of the philosophers.

Ethics: HCC5, HCC6, DSE3, PGE1, PDSE1

1. Students will learn to identify and evaluate ethical principles, values and moral reasoning of Western and Indian ethical traditions.
2. Students will learn to identify and evaluate critically the ethical foundations of key social institutions and professions with a view toward social justice.
3. Students will be able to explain and discriminate between major approaches to moral philosophy such as consequentialism, deontology and virtue ethics, and to summarize and evaluate the views of at least one philosopher associated with each.

Logic: HCC7, HCC8, HCC12, SEC2, GE2, GE4, PCC2, PSEC1, PSEC2,

1. A solid understanding of the basic concepts of logic, and in particular what it means for an argument to be valid, and the related notion of what it means for a set of statements to be consistent.

2. The ability to apply formal techniques and systematically codify deductively valid arguments.
3. The ability to translate natural language sentences into precise symbolic form and rigorously evaluate standard inferences.
4. Acquire a firm foundation for the study of other disciplines where logic plays an important role (mathematics, computer science, formal semantics in linguistics).
5. Generic analytical and critical thinking skills, including: the ability to identify the argument and analyse its logical structure.

Psychology: HCC9

1. Application of knowledge with critical thinking skills: Students should be able to use critical thinking to evaluate and interpret evidence and to apply psychological concepts of individual, social, and cultural theories.
2. Studying Psychology can assist students in gaining a deeper understanding of themselves and others, as well as in resolving various psychological issues. Through mutual understanding and respect, a society can be created that is conducive to peace and harmony.

Social and Political Philosophy: HCC11, PCC4

1. Students will be able to apply their socio-political learning to important public issues and to articulate why philosophical understanding is valuable in such debates.
2. Students will develop their own philosophical areas of interest and investigate them from various socio-political perspectives.
3. Students will acquire reading skills necessary to understand and critically engage with historical and contemporary social and political philosophy.
4. Students will be aware of the existence of multiple social traditions and will be able to reflect on the cultural specificity of some of their own concepts and values.
6. Students will learn how to distinguish between the major philosophical schools of political philosophy, including Libertarians, Marxists, Liberals and Communitarians, and how to summarise and analyze the views of one or more of the associated philosophers.

Philosophy of Religion: HCC10, PDSE1

1. Students will be able to read various philosophical and theological texts and understand the key perspective of philosophy of religion.
2. Students will understand and be able to apply the methodological tools used in the study of religion including textual analysis, sociology of religion, anthropology of religion and comparative religions.
3. Students will understand the basic features of Western, Eastern and indigenous religious traditions, be able to recognize the foundations of traditions and be able to compare them.

Why to choose PHYSICAL EDUCATION!!

A physically educated person is one who has mastered the necessary movement skills to participate confidently in many different forms of physical activity and also have values for physical fitness.
Students who choose to actively participate in quality physical education programs receive a variety of benefits, including the development of:

1. **A variety of motor skills and abilities related to lifetime leisure activities**
2. **Improved understanding of the importance of maintaining a healthy lifestyle**
3. **Improved understanding of movement and the human body**
4. **Improved knowledge of rules and strategies of particular games and sports**
5. **Self-confidence and self-worth as they relate to physical education recreation programs.**

STUDENT OUTCOMES

1. **Students will develop competency in many movement activities.**
2. **Students will understand the relationship between physical education and general education.**
3. **Students will achieve and maintain a health-enhancing level of physical fitness.**
4. **Students will exhibit the need, scope and importance of physical education.**
5. **Students will demonstrate responsible personal behavior while participating in movement activities.**
6. **Students will demonstrate the role of physical education in modern society.**
7. **Students will understand the relationship between history, culture and games of ancient and modern times.**

COURSE OUTCOME

These courses offer a comprehensive, standards-based program as the curriculum is designed to meet the following state standards for Physical Education:

1. Demonstrate knowledge and competency of movement patterns and strategies needed to perform a variety of physical activities.

2. Achieve a level of physical fitness for health and performance while demonstrating knowledge of fitness concepts, principles, and strategies.

3. Demonstrate knowledge of psychological and sociological concepts, principles, and strategies as they apply to learning and performance of physical activity.

4. Give opportunity to persue various types of higher studies like B.P.ED/ M.P.ED /M.PHILL /P.HD and much more.

5. Achieve larger scopes to become Sports Officer, Yoga Instructor, Coach, Physical Instructor , School or College teacher, Fitness Instructor and much more.

ECONOMICS

Program outcomes, program-specific outcomes, and course outcomes for Economics offered by the institution are stated and displayed on the website and communicated to teachers and students.

Programme specific outcome:

1. Sound financial understanding and application in day to day life.
2. Understand hoe government helps in mediating between consumers and producers.
3. Understanding international relation in terms of economic co-operation.
4. Addressing various economic problems like unemployment, inflation etc.
5. How economic growth of a country affects in general income of a person.
6. Prescribe methods of improving health, education and other activities of life.
7. Good employment opportunity in teaching, research and industry. 8. Helps in starting new ventures as successful entrepreneurs.

Course outcome:

1. Introductory microeconomics:

This course is designed to expose the students to the basic principles of microeconomic theory. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations.

2. Mathematical method for economics:

This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook. This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for

illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

3. Introductory macroeconomics:

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 savings, investment, GDP, money, inflation, and the balance of payment.

4. Intermediate microeconomics:

The course is designed to provide a sound training in microeconomic theory to formally analyze the behaviour of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts. This course looks at the behaviour of the consumer and the producer and also covers the behavior of a competitive firm

5. Intermediate macroeconomics:

This course introduces the students to formal modeling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of policy in this context. It also introduces the students to various theoretical issues related to an open economy.

6. Statistical method for economics:

This is a course on statistical methods 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. This is followed by a discussion on sampling techniques used to collect survey data. The course introduces the notion of sampling distributions that act as a bridge between probability theory and statistical inference. The semester concludes with some topics in statistical inference that include point of interval estimation.

7. Intermediate microeconomics 2:

This course is a sequel to Intermediate Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers general equilibrium and welfare, imperfect markets and topics under information economics.

8. Intermediate macroeconomics 2:

This course is a sequel to Intermediate Macroeconomics I. In this course, the students are introduced to the long run dynamic issues like growth and technical progress. It also provides the micro-foundations to the various aggregative concepts used in the previous course.

9. Indian economy 1:

This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models.

10. Development economics 1:

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-Independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list will have to be updated annually.

11. Indian economics 2:

This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

12. Development economy 2:

This course examines sector-specific polices and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list will have to be updated annually. This is the second module of the economic development sequence. It begins with basic demographic concepts and their evolution during the process of development. The structure of markets and contracts is linked to the particular problems of enforcement experienced in poor countries. The governance of communities and organizations is studied and this is then linked to questions of sustainable growth. The course ends with reflections on the role of globalization and increased international dependence on the process of development.

BOTANY

Programme specific outcome:

- Students develop a holistic approach in understanding the fundamental concepts of different life forms, considering chiefly the plants. The undergraduate course starts with biomolecules, encompassing different plant groups and their economic importance and finally encroaches into the advanced plant studies like plant metabolism, biotechnology, ecology and genetics, which synergistically induce the young minds to realize the significance of plants in sustaining life on Earth.
- In practical classes students do the work out of the specimens which enable them to inculcate the concept and motivate them to explore the unknown to the best of their abilities.
- The local and long field excursions also help the students to develop an idea about the local flora and flora of specific phytogeographic region in their natural habitat.
- Students build up awareness in environmental related issues such as sustainable development, pollution control waste management, biodiversity, conservation etc.
- Students get an exposure in skill enhancement courses such as Mushroom culture, environmental biology, medicinal and ethno-botany etc. This will open up new avenues and job opportunities for the students.
- The students get experience in research during carrying out dissertation work. This helps the students to have research exposure which will be beneficial for those who will join the Ph.D. programme in future.
- The contents of core course are beneficial for the students to get prepared for NET/SET/GATE and also GRE and other competitive examinations.

Course specific outcome

The semester system in the undergraduate course in Botany was introduced under CBCS in 2018.

Sem I

There are two core courses viz., Biomolecules and Cell Biology (CC-1) and Plant Morphology and Anatomy (CC-2) in this semester. A brief account on different biomolecules and organelle structures of cell in core course -1 helps to generate a clear concept about cells inherent mechanism of self-regulation. The subject Plant Anatomy in core course-2 helps the students to know about internal structural organisation of different plant organs. The students also do practical to study the anatomical details of plant tissues and organs.

Sem II

There are two core courses viz., Biodiversity of Microbes and Algae (CC-3) and Diversity of Fungi and Plant Pathology (CC-4) in this semester. In microbes' part, the students develop a clear knowledge on different aspects of bacteria and virus. Students learn various culture techniques and bacterial staining method in the practical classes. Different algal and fungal genera are taught in these two papers which help the students to develop a clear idea on these two cryptogamic groups of plant kingdom. Besides, the practical classes the local field excursions enable the students to identify the fungal and algal genera. In Phytopathology, students study about important plant diseases, host pathogen interaction and plant disease management. The study of phytopathology is very much essential in the field of crop protection and disease management.

Sem III

There are three core courses viz., Diversity of Bryophytes and Pteridophytes (CC-5), Diversity of Gymnosperms and Palaeobotany (CC-06), Reproductive Biology of Plants (CC-7) and one skill enhancement course titled Biofertilizers (SEC-1) in this semester. The students study about Bryophyte, Pteridophyte and Gymnosperm like archegoniate groups of the plant kingdom. The students are taught about plant fossils, pollen structure and applied palynology viz. forensic palynoloy, aeropalynology etc. In Reproductive Biology of Plants (CC-7) the students learn about reproduction and embryology of angiosperms.

In SEC-1, The students develop idea about the potential uses of different types of biofertilizers and their roles in sustainable agriculture. The production and practical implications of biofertilizers in agricultural fields, citing several commonly practiced methods are also taught. This special course opens up new avenues for the students and they acquire knowledge in the applied fields of plant sciences.

Sem IV

There are three core courses viz., Taxonomy of Angiosperms and Plant Systematics (CC-8), Plant Ecology and Phytogeography (CC-09), Economic Botany and Pharmacognosy (CC-10) and one skill enhancement course titled Mushroom Culture (SEC-2) in this semester.

In this semester students go for a long excursion in a place of higher altitude to observe and identify angiosperms in their natural habitat. Plant systematics paper (CC-8) deals with plant nomenclature, system of classification and taxonomic families. The students work out on angiosperm specimens in practical classes and they also learn to identify plants. A number of local field excursions are in the curriculum during this semester. Students learn to prepare field note book and herbarium specimens. In ecology paper (CC-9), students learn different types of

biotic interaction, trophic structure of the ecosystem, population and community dynamics, elucidating their roles in maintaining ecological balance. In Economic Botany paper (CC-10) students study about economically important crops viz. cereals, legumes, sugar, spices, beverage, oil, timber, fibre yielding plants along with special reference to medicinal plants.
In SEC-2, the students are given hands-on training on mushroom cultivation. This triggers interests among the students and they find a career option in this applied science.

Sem V
In this semester two core courses are offered viz., Plant Physiology (CC-11) and Plant Metabolism (CC-12) along with two discipline specific electives viz., Analytical Techniques in Plant Sciences (DSE-1) and Plant Breeding and Biometry (DSE-2). In Plant Physiology (CC-11) paper students acquire knowledge about various physiological processes viz. Photomorphogenesis, plant growth regulators, seed dormancy etc. In plant metabolism paper (CC-12) students study about metabolic pathways such as photosynthesis, respiration, nitrogen lipid metabolism, signal transduction etc.
The DSE-1 paper offers enough opportunities to the students to grasp the operational aspects of different laboratory-based instruments, primarily used in higher studies and research. DSE-2 gives scopes to learn the different breeding techniques in plants and also helps the students to understand the underlying genetic mechanism by way of using various biostatistical methods.

Sem VI
In this semester two core courses are offered viz., Genetics (CC-13) and Plant Molecular Biology and Biotechnology (CC-14) along with two discipline specific electives viz., Biodiversity and Conservation (DSE-3) and Dissertation/Project (DSE-4). In the core courses, students come to know about basic principles of genetics, DNA replication, transcription, translation, gene regulation and recombinant DNA technology. In Practical classes students carry out a number of experiments on plant biotechnology.
In DSE-3, students become familiar with the conservation aspects of the environment and significantly, this paper offers enough leeway to the students to think and implement the strategies of their own to mitigate environmental degradation. The DSE-4 paper especially fosters the scientific minds of the students by bringing them into the world of active research through their project work or dissertation.

CHEMISTRY
LEARNING OUTCOMES
Programme Specific Outcome and Course Outcome

PSO1. Understand bonding, physical properties, stereochemistry and reaction mechanism in organic molecules.
Students will gain an understanding of

1. Interaction process between atoms leads to bonding.
2. Stabilization of resulting molecule by means of bonding and antibonding shortly by M. O.

3. Physical properties & their explanation in the case of organic molecules from their structure.
4. Understanding stereochemistry or spatial isomer of organic molecules elaborately.
5. Able to describe mechanism of different aliphatic nucleophillic substitution reactions.
6. Able to draw potential energy diagrams.
7. Able to assign R and S to given molecules.
8. Able to do itnerconversion of Fischer to Newmann,Newmann to Sawhorse and vice versa.

PSO2. Understand reactions in unsaturated, carbonyl and associated compounds and organometallics.

Students will gain a knowledge of

1. Structure & reactions involving in unsaturated molecules.

2. Structure & reactions involving in carbonyl compound cum molecules in details.
3. Structure & reactions involving in carbonyl associated compound cum molecules elaborately.
4. Chemistry involving in organometallic compound cum molecules elaborately.

PSO3. Study nitrogenous compounds, rearrangement reactions and logical synthesis of organic molecules.

Students will gain a knowledge of

1. Introduction about the chemistry of nitrogenous compounds.
2. Study on rearrangement of organic compounds/ molecules. Study on few rearrangement reaction. Knowledge on their applications.
3. Synthesis of organic molecules using different basic logic of synthetic chemistry.

PSO4. Study and analyze organic spectroscopy:

Students will gain knowledge & understanding of

1. Basic idea about electromagnetic radiation/ wave/ spectra.

2. Basic idea about different types of spectroscopic methods viz. Rotational, Raman, Vibrational, IR, NMR etc. other types of spectroscopic methods.

3. To be able to assign structures to simple molecules on the basis of nuclear magnetic resonance spectra.

PSO5. Study carbocyles, heterocycles, pericyclic reactions, carbohydrate and biomolecules:

Students will gain a knowledge of

1. The students will be able to fully comprehend the chemistry of many heterocyclic products, carbohydrate, amino acids, peptides, proteins and lipids in use such as drugs and food.

2. Heterocyclic compounds to study to develop novel, efficient, convenient, selective and environmentally benign synthetic methods in organic chemistry.

3. The objective of the present study of heterocyclic compounds is to develop green methodologies for the synthesis of nitrogen containing heterocyclic.

4. The students will be aware about most of drugs in the present market are the compounds containing various heterocyclic moieties.

PSO6. Analyze solid binary mixtures; determine boiling points of organic liquid samples; prepare small scale organic compounds; identify pure solid and liquid samples, Separate organic mixture in chromatographic method and analyzes organic compounds by spectroscopy:

Students will gain an understanding of

1. Separation and analysis of organic compound mixture.
2. In order to study the NMR spectroscopy to understand the important role of nuclear magnetic resonance spectroscopy in the study of the structures of organic compounds.
3. Deduce unknown structures and fully assign an IR spectrum to the structure.
4. Apply mass spectroscopy (exact mass, and fragmentation patterns) to organic structural analysis.

PSO7. Atomic Structure, Radioactivity, Periodic properties and Acid base reactions:

Students will gain an understanding of

1. The fundamental properties of atoms, molecules, and the various states of matter with an emphasis on the particulate nature of matter.
2. Able to write electronic configuration of given atomic number.
3. Able to tell the name of orbitals by recognizing shapes of orbitals.
4. Able to calculate effective nuclear charge using Slaters Rule.
5. Fundamental atomic structure and the periodicity of elements in the periodic table.
6. The fundamentals of nuclear decay.
7. The properties of an atomic nucleus that make it unstable and undergo nuclear decay
8. How to use the chart of the Nuclides.
9. The proper methods to detect various types of ionizing radiation.
10. How various radiation detection instruments are constructed and become familiar with the electronic circuitry that is necessary for their operation.
11. How gamma spectrometry can be used to detect and to identify gamma photons.
12. How the neutron capture cross-section varies among atomic isotopes and how nuclear activation analysis can be used to identify small quantities of various isotopes.
13. How to avoid the specific radiation and radioisotope hazards associated with a fissile nuclear explosion and an explosive radiological dispersive device.
14. Understand the basics of nuclear chemistry applications: nuclear power, medical treatment, isotopic labelling, and carbon dating.

15. Understand the pH scale. Differentiate between acids and bases. Identify properties of acids and bases. Identify household as acidic or basic based on their properties.
16. Knowledge in organic and inorganic acid-base and skills are particularly essential analyzing more complex organic and inorganic reactions to identify the acid-base-related skills and knowledge that students would need to analyze those reactions more complex organic and biochemical reactions.
17. The students should be able to explain the use of terms Hard and Soft in relation to metal ions and ligands and discuss the stability of complexes in terms of hard and soft interactions.

PSO8. Chemical bonding, structure and properties of covalent compound, structure, defects and properties and chemical forces of ionic and non ionic crystalline solids:

Students will gain an understanding of

1. The common themes running through ionic, covalent and metallic descriptions of chemical bonding
2. Understand how the concept of electronegativity and its variation over the periodic table can be used to rationalise the nature of the bonding in substances
3. Appreciate how chemical substances can be described (and classified) in terms of structure and bond type.
4. Recognize the bonding in transition compounds by VBT and CFST theories.
5. Able to predict the geometry of coordination compounds and type of hybridization.
6. Able to calculate bond order of different molecules.
7. Able to draw MO digrams of different molecules.
8. Able to draw structures of different ionic solids.
9. Chemical bonding is a fundamental idea in chemistry that helps to explain other concepts like molecules and reactions. Scientists would be unable to explain why atoms are attracted to one another or how products are generated following a chemical reaction if it were not for chemical bonding.

PSO9. Study preparation, bonding, structure and properties and reactions of compounds of s, p, d and f block elements:

Students will gain an understanding of

1. The s-block elements play important roles in biological systems. Covalent hydrides, for example, are the building blocks of organic compounds, and other compounds and ions containing s-block elements are found in tissues and cellular fluids.

2. The p-block elements have covalency in general, but higher members can have electrovalency. Highly electronegative elements, such as halogens F, Cl, and others, exhibit electrovalency by accepting electrons and forming anions. Some of the elements also have coordinate valency.

3. In order to study transition metals to understand the trends in properties and reactivity of the d-block elements.

4. To explain the typical physical and chemical properties of the transition metals.

5. To identify simple compound classes for transition metals and describe their chemical properties.

6. The d block elements and alloys are fundamental for the existence of life, and also for its progression through time. The d-block metals, and some of it's key alloys, shaped the Bronze Age, Iron Age, and most importantly the steel age.

7. The f block elements are also frequently employed in the petroleum industry, where they are used to refine crude oil into gasoline products. Lanthanide carbides, borides, and nitrides are used as refractories. Lanthanide oxides are used as abrasives in glass cleaning.

PSO10. Study organometallic and coordination compounds and bioinorganic chemistry:
Students will gain an understanding of

1. Concepts of metal ligand bonding in transition complex compounds.

2. Organometallic and coordination compounds are used as stoichiometric reagents in both industrial and research-oriented chemical reactions. These compounds are also used in the manufacture of some semiconductors, which require the use of compounds such as trimethylgallium, trimethylaluminum, trimethyl antimony etc.

3. The three major types of applications of organometallic compounds in industry are in the areas of electronics, polymers, and organic synthesis. In organic synthesis, the organometallic compounds are used as either catalysts or stoichiometric reagents.

4. To understand the role of metal ions in biological system.

5. To understand the role of metal ions in oxygen transport.

6. The bioinorganic chemistry of hemoglobin, myoglobin etc.

7. The principles of bioinorganic chemistry are used in several fields like medicine, environment, chemical reactions, and much more.

PSO11. Understand principles of separation techniques, quantitative estimation of metal ion single or present in a mixture, ore and mineral analysis, spectroscopic techniques:

Students will gain an understanding of

1. Refining the separation techniques and the tools associated to test the quality of the finished product with more and more accuracy and precision. This allows to understand better the manufacturing process by identifying the impurities and thus allows us to fix the process and improves upon it.
2. Mineral analysis is important in determining nutritional values of foods. Studies to determine the presence of minerals that directly affect human health, mienral analyzes in short, are carried out to ensure food and product safety. Iron, for example, is naturally present in foodstuffs to a certain extent.
3. Spectroscopy is a technique used to study the interaction between matter and light across a wide range of wavelengths or frequencies.
4. Spectroscopy is used as a tool for studying the structures of atoms and molecules. The large number of wavelengths emitted by these systems makes it possible to investigate their structures in detail, including the electron configurations of ground and various excited states.

PSO12. Identify cation and anion present in a mixture of inorganic salts, oxides, hydroxides or carbonates:
Students will gain an understanding of

1. Main objective of the qualitative analysis is the detection or identification of individual elements or ions entering in to the chemical composition of a substances.

PSO13. Estimate quantitatively metal ions present in mixture by volumetric analysis:
Students will gain an understanding of

Volumetric analysis plays a significant role in determining the amount of metals or unknown substance present and is used in numerous industries like the food industry, cosmetic industry, and pharmaceutical industry. As for example, the drugs used for the treatment of diabetes contain metals in a specific amount and the metal content in a drug can be determined by complexometric or volumetric titrations.

PSO14. Understand basic principle of thermodynamics, thermochemistry, equilibrium, colligative properties, phase rule and statistical thermodynamics:
Some of the learning outcomes that students can achieve from the topics are

1. Learn how to use thermodynamics laws to describe and apply macroscopic properties of matter and energy.
2. Learn how to measure and calculate heat changes and spontaneity of chemical and physical changes using thermochemistry concepts.
3. Learn how to determine and predict the equilibrium constant and composition of reversible reactions using equilibrium principles.
4. Learn how to explain and calculate the changes in physical properties of solutions due to non-volatile solutes using colligative properties concepts.

5. Learn how to use the phase rule to determine the degrees of freedom and construct and interpret phase diagrams of heterogeneous systems.
6. Learn how to derive and calculate classical thermodynamics quantities from statistical behaviour and interactions of microscopic constituents.

PSO15. Study and understand properties of ideal gases; speed, kinetic energy heat capacity, real gases, intermolecular forces, liquefaction:

Some of the learning outcomes that students can achieve from the topics are

1. Learn how to use the ideal gas law and the kinetic molecular theory to relate and calculate the properties of ideal gases.
2. Learn how to understand and describe the deviation of real gases from ideal behaviour using intermolecular forces, molecular size, compressibility, and different models.
3. Learn how to explain and apply the concept of liquefaction to various solid or gas systems.

PSO16. Understand properties of liquid; viscosity and surface tension:

Some of the learning outcomes that students can achieve from the topics are:

1. Properties of liquid: Students can learn how to describe the macroscopic and microscopic characteristics of liquids, such as density, compressibility, fluidity, diffusion, and vaporization. They can also learn how to explain the intermolecular forces that govern the behaviour of liquids, such as cohesion, adhesion, and capillary action
2. Viscosity: Students can learn how to measure and calculate the resistance of a fluid to flow or deformation under an external force. They can also learn how to understand the factors that affect the viscosity of a fluid, such as intermolecular forces, molecular size and shape, and temperature
3. Surface tension: Students can learn how to quantify and compare the elastic tendency of a liquid surface to minimize its area. They can also learn how to relate the surface tension of a liquid to its intermolecular forces and external influences, such as surfactants and electric fields

PSO17. Understand principle of quantum mechanics and analyse related phenomenon, study quantum mechanical model:

Some of the learning outcomes that students can achieve from the topics are:

1. Principle of quantum mechanics: Students can learn how to use the concepts and equations of quantum mechanics to describe the physical properties and behaviour of matter and energy at the atomic and subatomic scales. They can also learn how to analyse

related phenomena, such as wave-particle duality, quantization, superposition, uncertainty, and entanglement.

2. Quantum mechanical model: Students can learn how to use the Schrödinger equation and its solutions to determine the wave functions and energies of electrons in atoms and molecules. They can also learn how to interpret the wave functions as probability distributions of finding electrons in different regions of space, called orbitals. They can also learn how to use quantum numbers and spin to label and distinguish different orbitals.

PSO18. Understand and analyse molecular spectroscopy:

Some of the learning outcomes that students can achieve from the topics are:

1. Understand and analyse molecular spectroscopy: Students can learn how to use the concepts and equations of molecular spectroscopy to describe the interactions between molecules and electromagnetic radiation.

2. They can also learn how to measure and interpret the spectra produced by different types of molecular transitions, such as rotational, vibrational, and electronic.

PSO19. Determine physical properties like surface tension, viscosity, partition coefficient, rate constant of a reaction, pKa, pKIn etc.:

Some of the learning outcomes that students can achieve from the topics are:

1. **Surface tension**: Students can learn how to measure and calculate the elastic tendency of a liquid surface to minimize its area, using concepts such as force per unit length, work per unit area, and contact angle. They can also learn how to relate the surface tension of a liquid to its intermolecular forces and external influences, such as surfactants and electric fields.
2. **Viscosity**: Students can learn how to measure and calculate the resistance of a fluid to flow or deformation under an external force, using concepts such as shear stress, velocity gradient, and Poiseuille's law. They can also learn how to understand the factors that affect the viscosity of a fluid, such as intermolecular forces, molecular size and shape, and temperature
3. **Partition coefficient**: Students can learn how to determine and compare the solubility of a solute in two immiscible solvents at equilibrium, using concepts such as acid dissociation constant, distribution ratio, and log P value. They can also learn how to apply this concept to various phenomena, such as extraction, chromatography, and drug distribution

4. **Rate constant of a reaction**: Students can learn how to use the rate law and the integrated rate law to calculate the rate constant of a reaction from experimental data, using concepts such as reaction order, half-life, and Arrhenius equation. They can also learn how to understand the factors that affect the rate constant of a reaction, such as temperature, catalysts, and reaction mechanism
5. **pKa**: Students can learn how to use the acid dissociation constant and the Henderson-Hasselbalch equation to calculate the pKa value of an acid from experimental data, using concepts such as pH, buffer solution, and titration curve. They can also learn how to understand the factors that affect the pKa value of an acid, such as molecular structure, resonance, inductive effect, and solvent effect
6. **pKIn**: Students can learn how to use the indicator dissociation constant and the color change range to calculate the pKIn value of an indicator from experimental data, using concepts such as equilibrium constant, Le Chatelier's principle, and colorimetry. They can also learn how to choose an appropriate indicator for a given titration based on its pKIn value and its color transition interval.

CO1. Understand physical and chemical properties of chemical compounds and correlate these properties with their structure, bonding, intermolecular forces and other features as explained by different theories and principles of chemistry:

1. Students should be able to explain the structure and bonding in molecules and predict the structure of molecules
2. The students should be able to describe various types of isomerism which can occur in coordination complexes.
3. The students should be able to give the systematic names of simple coordination compounds.
4. The students should be able to explain what is meant by the Spectrochemical Series and list the approximate order of common ligands in the spectrochemical series.
5. The students should be able to explain the terms stepwise stability constant and overall stability constant.
6. The students should be able to give appropriate definitions of the terms inert and labile and state which d-electron configurations are associated with inertness.
7. Intermolecular forces are important because they influence the properties (physical, chemical and biological) of molecules such as melting point, boiling point, solubility and reactivity.

CO2. Understand periodic correlation of properties of metals, nonmetals and metalloids:

Some of the learning outcomes that students can achieve from the topics are:

1. Able to write electronic configuration of given atomic number.
2. Able to tell the name of orbitals by recognizing shapes of orbitals.
3. Able to calculate bond order of different molecules.
4. Specific idea about physical and chemical properties of metals, nonmetals and metalloids.
5. Idea about the semiconducting properties of metalloids.

CO3. Understand and practice basic principle of analytical techniques used for identification, separation and estimation of chemical species:

1. The Students should be familiar with the basic knowledge of the non-aqueous solutions and applications of non-aqueous solvents in analytical chemistry.
2. The students will develop the ability of effective solving practical problem of analytical chemistry of non-aqueous solutions.
3. Student will able to Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
4. Understand the concept of p-values.
5. Student will Learn non-parametric test such as the Chi-Square test for Independence as well as Goodness of Fit.
6. Students aware about the concept of sampling method which are practical used.

CO4. Understand laws of nature and apply them to explain the behaviour of solid, liquid and gases and their mixture:

Student's course outcome of the topics:

1. Learn and apply laws of nature to explain solid, liquid and gas properties and behaviour, such as density, pressure, temperature, phase transitions, and mixtures.
2. Understand the molecular structure and intermolecular forces of different states of matter and how they affect their macroscopic characteristics and interactions.
3. Use mathematical models and equations, such as the ideal gas law, the kinetic molecular theory, the van der Waals equation, and the phase rule, to describe and calculate the physical quantities of matter and energy in different states and conditions.
4. Perform experiments and measurements to observe and analyse the phenomena related to solids, liquids, and gases, such as thermal expansion, viscosity, surface tension, vapor pressure, boiling point, and solubility.

CO5. Understand different laws which guide the physical processes and chemical reactions and measure the parameters involved:

Student's course outcome of the topics:

1. Learn and apply different laws that guide the physical processes and chemical reactions, such as the law of conservation of mass, the law of definite proportions, the law of multiple proportions, and the first law of thermodynamics
2. Understand how the physical state, concentration, temperature, catalysts, and intermolecular forces affect the rate and equilibrium of chemical reactions
3. Measure and calculate the parameters involved in physical processes and chemical reactions, such as heat, work, internal energy, enthalpy, entropy, free energy,

equilibrium constant, rate constant, pKa, pKIn, partition coefficient, viscosity, and surface tension

CO6. Understand principle of spectroscopy and analyse molecules by spectroscopic techniques:

Student's course outcome of the topics:

1. Learn and apply the principle of spectroscopy, which is the study of the interaction of electromagnetic radiation with matter, to identify and elucidate the structure and properties of molecules
2. Understand how different types of spectroscopies, such as infrared, ultraviolet-visible, nuclear magnetic resonance, mass, and Raman spectroscopy, probe different molecular features, such as vibrations, electronic transitions, magnetic moments, masses, and scattering.
3. Analyse molecules by spectroscopic techniques, using concepts and equations such as absorption and emission spectra, Beer-Lambert law, molecular orbital theory, chemical shift, coupling constant, fragmentation pattern.

CO7. Understand and practice instrumental methods used in chemical analysis:

1. In order to study the NMR spectroscopy to understand the important role of nuclear magnetic resonance spectroscopy in the study of the structures of organic compounds.

2. To develop an understanding of the significance of the number, positions, intensities and splitting of signals in nuclear magnetic resonance spectra.
3. To be able to assign structures to simple molecules on the basis of nuclear magnetic resonance spectra.
4. Students should have the ability to explain common terms in NMR spectroscopy such as chemical shift, coupling constant and anisotropy and describe how they are affected by molecular structure. 5. Students are skilled to perform the most commonly used NMR experiments and to interpret and document their results.
5. Understand the effect of structure on chemical shift and coupling constants.
6. Construct splitting diagrams ("trees") and be able to measure coupling constants an NMR spectrum, or predict coupling constants and trees from a structure.
7. Recongnize and know how to test for exchangeable hydrogens in a molecule.
8. Deduce unknown structures and fully assign an IR spectrum to the structure.
9. Apply mass spectroscopy (exact mass, and fragmentation patterns) to organic structural analysis.

COMPUTER SCIENCE

After successful completion of B.Sc. in Computer Science (Mjor or Minor), students gain the knowledge of the following:

Course description:

1. The course Computer Fundamentals and Programming using C Major Course, introduces the fundamental principles and concepts of digital logic, Number systems and codes along with C programming language. Students will learn about number system, and codes, various tasks to be carried out by C language.

   Course Outcomes (COs):

   After completing this course satisfactorily, a student will be able to:

   i) Confidently operate computers to carry out computational tasks
   ii) Understand working of Hardware and Software and the importance of operating Systems
   iii) Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
   iv) Read, understand and trace the execution of programs written in C language
   v) Write the C code for a given problem
   vi) Perform input and output operations using programs in C
   vii) Write programs that perform operations on arrays, strings , structures, unions and functions.

2. The "Computer Science for Beginners" for Multidisciplinary Course, aims to provide an introductory understanding of the field. It covers the fundamentals of computer hardware, software, and programming languages. Students will learn about number systems, Boolean algebra, and logic gates used in digital circuits. Additionally, the course introduces concepts of database management systems, the history of the internet, and relevant information technology laws, fostering a well-rounded understanding of computing basics and their real-world applications.

   Course Outcomes (COs):

   After completing this course satisfactorily, a student will be able to:

   (i) Understand the historical development and evolution of computers, including the main features and advancements of each generation.
   (ii) Describe the components of modern computers, including the CPU, primary and secondary storage, and various I/O devices.
   (iii) Gain knowledge of different number systems and fundamentals of Boolean Algebra and circuit design.
   (iv) Understand problem-solving techniques using flowcharts, decision tables, and pseudo codes.
   (v) Comprehend the history of programming languages, including Machine Language, Page 10 of 24 Assembly Language, and High-Level Language.
   (vi) Gain an overview of different types of DBMS architectures and their applications.
   (vii) Understand the history of the internet, its role in daily life, and different internet service providers.

(viii) Learn about Information Technology laws related to electronic commerce, electronic signatures, data protection, cybersecurity, penalties, offenses under the IT Act, and dispute resolution.

3. The course Office Automation for Skill Enhancement Course, is to teach students the fundamental concepts and principles of using technology and software to streamline office processes. It aims to enhance their proficiency in essential office automation tools such as word processing, spreadsheets and presentations. The course focuses on increasing productivity, improving communication, and promoting collaboration among team members using automation features.

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

(i) Compare and contrast various types of operating systems
(ii) Explain the purpose of office automation
(iii) Describe how information is stored and retried in/from computer memory
(iv) Know about various types of office automation software and their applications
(v) Create document using word processing software
(vi) Design presentation using presentation software
(vii) Create worksheets and analyse data using spreadsheet software

4. This course Digital System Design for Major Course, will teach the basic understanding of Digital Logic Design and its application for digital computer. The course focuses on understanding the Introduction to organization of digital computer, Concept of Memory, Boolean Algebra & its Simplification of Boolean Functions, and Combinational Logic and Sequential Logic.

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

(i) explain the concept of organization of digital computer its different hardware components such as Input Unit, Output Unit, Storage Unit, CPU. Control Unit, Arithmetic Logic Unit
(ii) solve problems on different number systems, binary arithmetic operation, floating point number and signed magnitude number representation, overflow, under flow, and different computer error detection and correction codes
(iii) have thorough idea on memory Hierarchy, and different types of memory, hit and miss
(iv) solve problems on Boolean algebra and simplification of boolean Functions
(v) Design different digital Combinational and Sequential Logic circuitry

5. The importance of a database, relational data model, schema design and normalization, transaction processing, indexing, and the related data structures (files and B+- trees) are covered in this course.

   Course Outcomes (COs):

   After completing this course satisfactorily, a student will be able to:

   (i) Gain knowledge of database systems and database management systems software.
   (ii) Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model.
   (iii) Formulate, using SQL, solutions to a broad range of query and data update problems.
   (iv) Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
   (v) Be acquainted with the basics of transaction processing and concurrency control. Become familiar with database storage structures and access techniques. Compare, contrast and analyse the various emerging technologies for database systems such as NoSQL.
   (vi) Analyse strengths and weaknesses of the applications of database technologies to various subject areas.

6. The course objectives are to equip students with practical skills in creating and managing databases. They will learn to design efficient database schemas, write complex SQL queries to retrieve and manipulate data, and administer databases effectively. The course also aims to provide real-world application scenarios for students to apply their SQL knowledge and problem-solving skills. By the end of the course, students should be proficient in handling relational databases and SQL queries.

   Course Outcomes (COs):

   After completing this course satisfactorily, a student will be able to:

   (i) Proficiency in SQL
   (ii) Database Design Skills
   (iii) Data Manipulation and Administration

7. The course, Practical, Office Automation for Multidisciplinary Course, objective of this course is to teach students the fundamental concepts and principles of using technology and software to streamline office processes. It aims to enhance their proficiency in essential office automation tools such as word processing, spreadsheets and presentations. The course focuses on increasing productivity, improving communication, and promoting collaboration among team members using automation features.

   Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

(i) Compare and contrast various types of operating systems
(ii) Explain the purpose of office automation
(iii) Know about various types of office automation software and their applications
(iv) Create document using word processing software
(v) Design presentation using presentation software
(vi) Create worksheets and analyse data using spreadsheet software

8. The course , Practical, Web Development and Applications Skill Enhancement Course, is intended to give the students an introduction to the Hypertext Markup Language and its various components. Use of different HTML components like links, images, tables, headers, forms, CSS, etc., to design an ergonomic and efficient webpage will be taught in this course.

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

(i) Understand basics of HTML.
(ii) Use of CSS in web design.
(iii) Understand the basics of Javascript
(iv) They will be able to build basic static web pages

Environmental Science Course Specific outcome

Students will understand key concepts in the life and physical sciences and will apply them to environmental issues. Students will understand and apply the scientific process, as well as appreciate both the potential and limitations of the process. B.Sc. in Environmental Science also prepares the students for advanced research in the field of ecosystem and wildlife conservation. Graduates in this field have bright career opportunities and a chance to improve the living conditions of various living beings.

To deal with environmental issues one must understand not only scientific concepts, but also the social interactions by which humans behave and the cultural values that underlay behaviors. Therefore, our Environmental Studies and Environmental Science programs lead to learning outcomes involving many different disciplines, or ways of knowing. We have organized our more detailed learning outcomes according to the three traditional academic categories: social sciences, natural sciences, and the humanities.

They can apply for the roles of environmental engineers, environmental biologists, environmental scientists, environmental journalists, and much more. These roles are influential in fertilizer plants, mines, dying industries, textile industries, food processing units, and many other areas.

Semester-1

Academic competence: (i) Understand fundamental concepts, principles and processes underlying the field of Environmental Science, its interdisciplinary nature and create and disseminate knowledge to the students about environmental problems at local, regional and global scale.
(ii) Demonstrate an understanding of a wide range of Environmental techniques (e.g. basic water and soil analysis, microbiological methods, spectrophotometry, GIS based analysis, Ecological data analysis.
Entrepreneurial and Social competence: (i) Employ skills in specific areas related to Environmental Science such as industrial pollution, Green technology development, Ecological, health, agriculture and ensure multilevel commitment to health and well being of the society at large
(ii) Exhibit awareness of environmental and ethical issues: emphasizing on academic and research ethics, scientific misconduct, intellectual property rights and issues of plagiarism.
(iii) Demonstrate capability for developing sustainable societies and understand national and international environmental policies and programmes and their implementation strategies.

Semesr-2

1.Illustrate different types of theories of Ecology and its applications.
2.Examine different measures to remediate ecosystems by natural recovery.
3. Design experiments to understand types of processes and different concepts.
4.Recall the importance of different biotic, abiotic components of the ecosystem and relate it to environment protection and conservation issues.
5.Compile different interactions among the interspecific and intraspecific species.
6. Study characters of population and community and recognize environmental issues associated with it.
7.Determine synthetic characters of community by connecting environmental variables.
8.Identify key challenges posed by developmental activities on natural processes and integrate modern day techniques to solve various problems at local, regional level to attain a far-reaching goal of sustainability.
9.Evaluate the importance of life sustaining processes on Earth and integrate them in planning and development for innovative solutions.

Semester-3

1.Calculate different indices used in vegetation studies and apply them for data analysis.
2.Identify and classify different associations and interactions among the species.
3. Design a field survey with objectives to study biodiversity of the region.
4.Relate the interactions among the species loss and anthropogenic issues.
5. Demonstrate methods used for sterilization and media preparation. Differentiate Bacterial cultures based on Gram staining method.
6.Organize, compare, relate data obtained through field work, online portals and secondary data and relate it with spatio-temporal aspects.
7. Evaluate different water quality parameters and compare with different water quality standards.
8. Develop skills to assess biological aspects of the environment in laboratory and on field, to take decisions accordingly to manage it.
9.Identify and distinguish types of rocks and minerals.
10.Illustrate different geological and atmospheric processes.
11.Analyze different geological and atmospheric processes.
12. Examine different geological and atmospheric processes.

13. Determine important geological and atmospheric processes used in environmental laboratories and conclude the results obtained by using different methods.
14.Measure different parameters of geological and atmospheric processes based on toposheets .
15.Recall the points used during interpretation of the toposheet.

Semester-4

1.Design water treatment plan with PID diagram.
2. Integrate the role of coagulants and flocculants in wastewater treatment and implement different population forecasting methods.
3. Compare water treatment methods for removal of impurities and differentiate between working principles of unit operations of water treatment plants.
4. Select the appropriate unit operations for water treatment and evaluate the performance of each unit operation.
5. Examine impurities from water. Design Effluent Treatment Plan (ETP) based on characteristics of wastewater.
6.Carry out biodiversity assessment of the area. Compile Community Biodiversity Register with the help of the local people.
7. Explain potability of water based on data obtained by evaluation of water quality parameters. Describe role of Effluent Treatment Plant and unit operational processes.
8. Examine, develop ecotourism plan for the protected area and Joint forest Management for a local area.
9. Compare water quality data obtained from laboratory analysis with water quality standards.

Semester-5

1.Develop Competency to geospatial techniques for biodiversity studies, monitoring skills and design field projects independently. Write a report on field visits.
2.Articulate concepts of renewable and non-renewable energy resources, its importance and limitations. Outline methods of harnessing renewable energy and their global availability.
3.Explain the basic principles and technologies to harness various energy resources. Discuss the merits and demerits of energy generation technologies.
4. Demonstrate energy generation process using lab scale models of biogas plants, wind mills, solar devices.

Semester-6

Dissertation

1.Apply the objectives of the work to solve the issues of the society. Calculate the impacts on the environment by using well known methods.
2.Develop a research-oriented approach to solve environmental issues and test it with the help of innovating solutions.
3. Determine the exact techniques used in restoration studies. Outline the outcomes of restoration projects.
4. Design an experimental setup and develop a lab scale model to generate data and interpret it for solving environmental problems
5. Develop protocol to work on the selected dissertation topic for systematic research work.

Department of Geography

Programme Specific Outcome:

Specific outcomes for a B.Sc. Geography Honours program depend on the Syllabus of Kalyani University and its curriculum. However, I can provide you with a general idea of the typical specific outcomes that you might expect from such a program. These outcomes are designed to ensure that students acquire a comprehensive understanding of geography and develop relevant skills during their course of study. Here are some common specific outcomes:

- **Geographical Knowledge**: Graduates should demonstrate a deep and broad understanding of geographical concepts, theories, and principles across various subfields of geography, including physical geography, human geography, and geographic information systems (GIS).
- **Research Skills**: Students should be capable of conducting independent research in geography, including formulating research questions, designing research methodologies, and collecting, analyzing, and interpreting geographical data.
- **Spatial Analysis**: Graduates should have the ability to use spatial data and GIS technology to analyze and solve real-world problems related to geography, such as environmental issues, urban planning, or demographic trends.
- **Critical Thinking**: The program should foster critical thinking skills, enabling students to evaluate geographical issues and theories, make informed judgments, and develop well-reasoned arguments.
- **Effective Communication**: Graduates should be able to communicate complex geographical ideas and research findings effectively through written reports, oral presentations, and visual media.
- **Environmental Awareness**: Students should develop a strong awareness of environmental issues, including sustainability, climate change, and conservation, and be able to apply geographical knowledge to address these challenges.
- **Cultural and Social Understanding**: The program may aim to promote an understanding of cultural and social diversity, and how geography influences and is influenced by various cultural and societal factors.
- **Fieldwork and Practical Experience**: Students should have the opportunity to gain practical experience through fieldwork, internships, or laboratory work, allowing them to apply theoretical knowledge to real-world situations.
- **Geospatial Technology Proficiency**: Graduates should be proficient in using geospatial technologies such as GIS, remote sensing, and GPS to collect, analyze, and visualize geographic data.

- **Interdisciplinary Thinking**: The program may encourage students to think holistically and integrate knowledge from other disciplines, such as economics, ecology, and sociology, into their geographical studies.
- **Ethical and Professional Conduct**: Students should be aware of ethical considerations in geographical research and practice, including issues related to data privacy, social justice, and environmental responsibility.
- **Global Perspective**: Graduates should have a global perspective and an understanding of how geography plays a role in global issues, including geopolitics, international development, and global environmental challenges.

Course specific outcome

Undergraduate

The undergraduate course in Botany under CBCS credit system has been semesterised in 2018. In each semester the core courses have theoretical and practical papers.

SEM – I

Geotectonics and Geomorphology-

Geotectonics and Geomorphology are important subfields within the study of geography, particularly in the context of a B.Sc. Geography Honours program. The course outcomes for Geotectonics and Geomorphology typically aim to provide students with a strong foundation in understanding the processes that shape the Earth's surface and the forces responsible for the deformation of the Earth's crust. Below are some common course outcomes for a Geotectonics and Geomorphology course in an Honours Geography program:

- **Understanding Plate Tectonics**: Students should demonstrate an understanding of the theory of plate tectonics, including the mechanisms of plate movement, plate boundaries, and their geological consequences.
- **Earth's Interior Structure**: Graduates should be able to describe the internal structure of the Earth, including the composition and properties of Earth's layers (e.g., core, mantle, crust) and their influence on tectonic processes.
- **Tectonic Landforms**: Students should be able to identify and explain the formation of various tectonic landforms, such as mountains, valleys, rifts, and faults, through the application of plate tectonics principles.
- **Volcanism and Earthquakes**: Graduates should have knowledge of volcanic processes, types of volcanoes, and volcanic hazards, as well as the causes and effects of earthquakes, including seismic waves and earthquake hazards.
- **Geomorphic Processes**: Students should understand the processes that shape the Earth's surface, including weathering, erosion, sediment transport, and deposition, and how these processes vary in different environmental settings.

- **Landform Classification**: Graduates should be able to classify and analyze landforms, including erosional and depositional landforms, using geomorphological principles and terminology.
- **Landscape Evolution**: Students should be capable of explaining how landscapes evolve over geological time scales, including the development of river valleys, coastal landforms, and glacial features.
- **Geological Mapping**: Graduates should gain practical skills in geological mapping, allowing them to interpret geological structures, rock types, and landforms in the field.
- **Hazard Assessment**: Students should be able to assess geological hazards, such as landslides, volcanic eruptions, and earthquakes, and understand their impact on human societies and infrastructure.
- **Environmental Applications**: Graduates should be able to apply their knowledge of geotectonics and geomorphology to address environmental issues, such as land-use planning, natural resource management, and geohazard mitigation.
- **Critical Thinking and Problem-Solving**: The course should promote critical thinking skills, enabling students to analyze geological data, solve geological problems, and make informed interpretations of Earth's dynamic processes.

SEM – II

Human Geography –

Human Geography is a subfield of geography that focuses on the study of human activities, societies, and their interactions with the environment. However, I can provide you with some common course outcomes that are often associated with Human Geography courses:

- **Understanding of Human-Environment Interaction**: Students should develop an understanding of how human activities and societies interact with and influence the natural environment, including topics such as environmental degradation, resource management, and sustainability.
- **Spatial Analysis**: Graduates should be proficient in spatial analysis techniques, including the use of Geographic Information Systems (GIS), to study and analyze human phenomena and spatial patterns.
- **Cultural Geography**: Students should gain insights into cultural diversity, cultural landscapes, and the ways in which culture shapes human behaviors and landscapes.
- **Urban Geography**: Graduates should understand the processes of urbanization, urban planning, and the challenges and opportunities associated with urban areas, including issues related to infrastructure, transportation, and housing.
- **Rural Geography**: The course may cover rural landscapes, agriculture, and the dynamics of rural communities, including topics such as agrarian change, food security, and rural development.
- **Population Geography**: Students should be able to analyze population patterns, migration, demographic transitions, and population-related issues like population growth and aging.

- **Social Geography**: The course may explore social inequalities, social movements, and the ways in which social factors influence spatial patterns and human behaviors.
- **Political Geography**: Students should gain insights into geopolitics, political boundaries, territorial disputes, and the impact of political decisions on the geography of regions.
- **Cultural and Social Awareness**: Graduates should develop cultural and social awareness, including an appreciation for diversity, equity, and social justice issues within geographic contexts.
- **Fieldwork and Research Skills**: The course may emphasize fieldwork, research design, data collection, and analysis to investigate geographic questions and issues.
- **Geographical Thinking**: Students should develop critical thinking skills and the ability to apply geographical concepts and theories to analyze real-world problems and make informed decisions.
- **Environmental Sustainability**: The course may highlight the importance of sustainable practices and the role of human geography in addressing environmental challenges, such as climate change and habitat loss.
- **Interdisciplinary Perspective**: Students should be encouraged to integrate knowledge from other disciplines, such as sociology, economics, anthropology, and political science, to gain a holistic understanding of human geography.

SEM – III

Climatology –

Climatology is the study of climate, including the long-term patterns of temperature, humidity, wind, and precipitation in a region. Undergraduate courses in climatology aim to provide students with a fundamental understanding of climate processes, climate variability, and the factors that influence climate patterns. Here are some common course outcomes for undergraduate studies in climatology:

- **Climate Systems**: Students should develop a comprehensive understanding of Earth's climate system, including the atmosphere, hydrosphere, cryosphere, and biosphere, and how they interact to determine climate patterns.
- **Climate Classification**: Graduates should be able to classify climates based on systems like the Köppen-Geiger climate classification, and understand the characteristics and distribution of different climate types.
- **Climate Data Analysis**: Students should gain proficiency in analyzing climate data, including temperature records, precipitation patterns, and climate anomalies, using statistical and data visualization tools.
- **Climate Change**: The course may cover the science of climate change, including the causes and consequences of global warming, as well as strategies for mitigating and adapting to climate change.

- **Climate Variability**: Students should learn about natural climate variability, such as El Niño-Southern Oscillation (ENSO), and how it affects climate patterns on various timescales.
- **Climate and Society**: Graduates should be able to examine the impacts of climate on human societies, including issues related to agriculture, water resources, and climate-related hazards.
- **Climate Data Sources**: Students should be familiar with sources of climate data, including meteorological stations, satellites, and climate archives, and be able to access and work with climate datasets.
- **Climate Resilience**: The course may address strategies for building climate resilience, including urban planning, infrastructure development, and disaster preparedness.
- **Fieldwork and Data Collection**: Depending on the program, students may have the opportunity to participate in fieldwork or research projects related to climatology, collecting climate data and conducting observations.
- **Ethical Considerations**: Graduates should be aware of ethical considerations in climate science and the importance of scientific integrity in climate research.

Statistical Geography –

An undergraduate course in Statistical Methods in Geography aims to equip students with the necessary statistical tools and skills to analyze geographic data, conduct spatial analyses, and make informed decisions in the field of geography. Here are some common course outcomes for an undergraduate course in Statistical Methods in Geography:

- **Statistical Literacy**: Students should develop a fundamental understanding of statistical concepts and terminology, including measures of central tendency, variability, probability, and hypothesis testing.
- **Data Collection and Management**: Graduates should be proficient in collecting, organizing, and managing geographical data, including data from surveys, remote sensing, and Geographic Information Systems (GIS).
- **Descriptive Statistics**: Students should be able to calculate and interpret descriptive statistics, such as mean, median, mode, standard deviation, and variance, to summarize geographical data.
- **Inferential Statistics**: Graduates should understand inferential statistics and hypothesis testing, including the use of t-tests, chi-squared tests, analysis of variance (ANOVA), and regression analysis to make inferences about geographical phenomena.
- **Spatial Statistics**: The course may cover spatial statistics techniques, including spatial autocorrelation, spatial interpolation, and spatial regression, to analyze geographic data with spatial dependencies.
- **Geospatial Data Visualization**: Students should be able to create effective visual representations of geographical data, including maps, graphs, and charts, to communicate spatial patterns and trends.

- **Sampling Techniques**: Graduates should understand different sampling techniques used in geography and be able to design and implement appropriate sampling strategies for geographical research.
- **Multivariate Analysis**: The course may introduce multivariate statistical techniques, such as factor analysis and principal component analysis, to explore relationships among multiple geographical variables.
- **Time Series Analysis**: Students should gain skills in analyzing temporal data and time series analysis, especially when studying phenomena that change over time, such as climate data or urban growth.
- **Spatial Data Analysis**: Graduates should be able to conduct spatial data analysis using Geographic Information Systems (GIS) software and spatial statistics packages, including identifying spatial patterns and clusters.

Geography of INDIA-

An undergraduate course on the Geography of India typically focuses on providing students with a comprehensive understanding of the physical, cultural, economic, and environmental aspects of the Indian subcontinent. Here are some common course outcomes for an undergraduate Geography of India course:

- **Geographical Knowledge**: Students should develop a thorough knowledge of the physical geography of India, including its landforms, rivers, mountains, and climate zones.
- **Political Geography**: Graduates should understand the political divisions of India, including states, union territories, and international borders, and how they influence regional development and governance.
- **Cultural Diversity**: The course may explore the cultural diversity of India, including languages, religions, traditions, and the historical development of Indian culture.
- **Urban and Rural Geography**: Students should gain insights into the urbanization process in India, including the growth of major cities, urban planning challenges, and the characteristics of rural areas.
- **Economic Geography**: Graduates should be able to analyze the regional disparities in economic development within India, including the distribution of industries, agriculture, and services.
- **Environmental Issues**: The course may cover environmental challenges in India, such as air and water pollution, deforestation, land degradation, and the conservation of natural resources.
- **Demography**: Students should understand the demographic trends in India, including population growth, distribution, and migration patterns, as well as the implications for social and economic development.
- **Agriculture**: Graduates should be familiar with the diverse agricultural practices in India, including the Green Revolution, traditional farming systems, and the challenges faced by Indian agriculture.

- **Transportation and Infrastructure**: The course may examine transportation networks, infrastructure development, and connectivity in India, including roads, railways, ports, and airports.

SEM – IV

Regional Planning –

An undergraduate course in Regional Planning and Development in geography typically aims to provide students with a comprehensive understanding of the principles and practices involved in planning and developing regions. Here are some common course outcomes for an undergraduate study in Regional Planning and Development:

- **Understanding Regional Planning**: Students should develop a strong understanding of the concept of regional planning, including its objectives, processes, and significance in addressing regional disparities.
- **Regional Analysis**: Graduates should be capable of conducting comprehensive analyses of regions, including assessments of their social, economic, environmental, and infrastructure characteristics.
- **Infrastructure Planning**: Students should learn about the planning and development of essential infrastructure, including transportation, utilities, and public services, within regions.
- **Land Use Planning**: Graduates should understand land use planning and zoning regulations, as well as how land use decisions impact regional development and sustainability.
- **Urban and Rural Dynamics**: Students should gain insights into the dynamics between urban and rural areas within regions, including the challenges and opportunities for balanced development.

Economic Geography –

An undergraduate course in Economic Geography typically focuses on understanding the spatial distribution of economic activities, industries, and resources, as well as their impact on regions and societies. Here are some common course outcomes for an undergraduate study in Economic Geography:

- **Understanding Economic Geography**: Students should develop a comprehensive understanding of the field of economic geography, including its scope, key concepts, and relevance to contemporary global issues.
- **Spatial Analysis**: Graduates should be proficient in using spatial analysis techniques, including Geographic Information Systems (GIS), to analyze and visualize the spatial distribution of economic activities and patterns.
- **Economic Systems**: Students should gain insights into different economic systems, such as capitalism, socialism, and mixed economies, and their impact on the geography of economic activities.
- **Globalization**: The course may cover the concept of globalization and its effects on the geography of trade, investment, and production, including the role of multinational corporations.

- **Regional Development**: Students should understand the factors influencing regional economic development, including infrastructure, human capital, natural resources, and government policies.
- **Urban and Rural Economies**: Graduates should be familiar with the economic dynamics of urban and rural areas, including the growth of cities, urban-rural linkages, and the challenges of rural development.
- **Economic Inequality**: Graduates should be aware of economic inequalities within and between regions and their social and political implications.

Environmental Geography –

An undergraduate course in Environmental Geography typically focuses on the study of the Earth's environment, including the physical environment, ecosystems, human impacts, and sustainability. Here are some common course outcomes for an undergraduate study in Environmental Geography:

- **Understanding Environmental Geography**: Students should develop a comprehensive understanding of the field of environmental geography, including its key concepts, methods, and relevance to global environmental issues.
- **Physical Geography and Environmental Systems**: Graduates should be proficient in understanding physical processes and systems, such as climate, landforms, hydrology, and soils, and their interactions with the environment.
- **Ecosystems and Biodiversity**: Students should gain insights into ecosystems, ecological processes, and the importance of biodiversity conservation for ecosystem health and resilience.
- **Environmental Impact Assessment**: Graduates should understand the principles and methods of environmental impact assessment (EIA) and be able to assess the potential environmental impacts of development projects.
- **Natural Resource Management**: The course may cover the sustainable management of natural resources, including water, forests, minerals, and energy sources, and the implications for environmental sustainability.
- **Environmental Policy and Governance**: The course may explore environmental policies, regulations, and international agreements aimed at addressing environmental challenges, as well as the role of government and non-governmental organizations in environmental governance.
- **Environmental Ethics and Values**: Students should consider ethical aspects of environmental geography, including issues related to environmental justice, sustainability, and responsible stewardship of the Earth.
- **Conservation and Restoration**: Graduates should be familiar with conservation strategies and habitat restoration efforts to protect endangered species and ecosystems.
- **Waste Management and Pollution Control**: The course may cover waste management practices, pollution control measures, and efforts to reduce environmental pollution.

SEM – V

Research Methodology and Fieldwork in geography-

An undergraduate course in Research Methodology and Fieldwork in geography typically aims to provide students with the foundational knowledge and practical skills necessary for conducting geographic research, fieldwork, and data collection. Here are some common course outcomes for an undergraduate study in Research Methodology and Fieldwork in geography:

- **Research Design**: Students should develop the ability to design research projects, formulate research questions or hypotheses, and select appropriate research methods and techniques.
- **Data Collection Methods**: Graduates should be proficient in a variety of data collection methods used in geography, such as surveys, interviews, observations, and the use of geographic information systems (GIS).
- **Fieldwork Skills**: Students should gain practical experience in planning and conducting fieldwork, including site selection, data collection, and field observations.
- **Sampling Techniques**: Graduates should understand different sampling techniques used in geography and be able to design and implement appropriate sampling strategies for their research.
- **Literature Review**: Graduates should be able to conduct a comprehensive literature review to identify existing research on their chosen topic and understand the broader context of their research.
- **Fieldwork Planning and Logistics**: Graduates should be capable of planning and organizing fieldwork logistics, including equipment, transportation, and safety considerations.

Remote Sensing and GIS –

An undergraduate course in Remote Sensing and Geographic Information Systems (GIS) in geography typically aims to provide students with the knowledge and practical skills required to use remote sensing technology and GIS tools for spatial analysis, data visualization, and geographic research. Here are some common course outcomes for an undergraduate study in Remote Sensing and GIS.

- **Understanding Remote Sensing**: Students should develop a comprehensive understanding of remote sensing principles, including the electromagnetic spectrum, sensors, and image interpretation techniques.
- **Remote Sensing Data Acquisition**: Graduates should be proficient in acquiring and working with remote sensing data from various sources, such as satellites, drones, and aerial photography.
- **Image Interpretation**: Students should gain the ability to interpret and analyze remote sensing images, including the identification of land cover types, terrain features, and environmental changes.
- **GIS Fundamentals**: The course may cover the fundamentals of GIS, including data structures, spatial databases, and cartographic principles.

- **Data Integration**: Graduates should be capable of integrating remote sensing data with other geographic datasets within a GIS environment to conduct spatial analysis.
- **Geospatial Data Processing**: Students should learn geospatial data processing techniques, including data manipulation, transformation, and georeferencing.
- **Spatial Analysis**: Graduates should understand spatial analysis methods in GIS, including spatial statistics, buffering, overlay, and network analysis.
- **Map Production**: The course may include map production and cartographic design skills, enabling students to create effective maps and visualizations.
- **Remote Sensing Applications**: Students should be able to apply remote sensing and GIS technology to address real-world geographic questions and problems, such as land use classification, environmental monitoring, and disaster management.
- **Remote Sensing and GIS Software**: Students should become proficient in using remote sensing and GIS software packages commonly used in the field, such as ArcGIS, QGIS, ENVI, and ERDAS Imagine.
- **Integration of Remote Sensing and GIS**: Graduates should understand how remote sensing and GIS technologies can complement each other in geographic research and applications.

Urban Geography-

An undergraduate course in Urban Geography typically focuses on the study of cities, urbanization processes, and the spatial patterns of urban areas. Here are some common course outcomes for an undergraduate study in Urban Geography:

- **Understanding Urbanization**: Students should develop a comprehensive understanding of urbanization processes, including the growth and development of cities, and their historical and contemporary contexts.
- **City Systems**: Graduates should be proficient in analyzing city systems, including the functions and structures of urban areas, such as central business districts, residential neighborhoods, and industrial zones.
- **Urban Morphology**: Students should gain insights into urban morphology, including the physical layout, land use patterns, and architectural characteristics of cities.
- **Urbanization Models**: The course may cover urbanization models and theories, such as the concentric zone model, sector model, and multiple nuclei model, to explain spatial patterns within cities.
- **Urban Planning**: Students should be familiar with urban planning concepts and practices, including land use planning, transportation planning, and urban design.
- **Urban Environmental Issues**: The course may cover urban environmental challenges, such as pollution, waste management, green spaces, and sustainability in urban areas.
- **Urban Resilience**: The course may explore the concept of urban resilience, including disaster preparedness, climate adaptation, and the ability of cities to withstand and recover from shocks.

- **Urban Fieldwork and Research**: Students may have opportunities to conduct fieldwork in urban areas, collect data, and analyze urban phenomena as part of their coursework.

SEM – VI

Evolution of Geographical Thoughts –

An undergraduate course in the Evolution of Geographical Thoughts typically explores the historical development of geographical theories, concepts, and methodologies. Here are some common course outcomes for an undergraduate study in the Evolution of Geographical Thoughts:

- **Historical Context**: Students should gain an understanding of the historical context in which geographical thought evolved, including major historical events and the influence of different time periods on geographical thinking.
- **Ancient Geographical Ideas**: Graduates should be able to identify and discuss the contributions of ancient civilizations to geographical thought, such as the knowledge of early Greek geographers and the geographical ideas in Chinese and Islamic cultures.
- **Geographical Exploration**: The course may cover the impact of geographical exploration and discoveries on the development of geographical thought, including the Age of Exploration and the exploration of the New World.
- **Enlightenment and Enlightenment Thinkers**: Students should become familiar with Enlightenment-era thinkers and their contributions to geography, including the work of philosophers like Immanuel Kant and their influence on the scientific approach to geography.
- **Regional Geography and Regionalism**: Graduates should understand the emergence of regional geography and regionalism as significant approaches to geographical analysis, including regional geography schools and their methodologies.
- **Environmental Determinism and Possibilism**: The course may explore the debates between environmental determinism and possibilism, examining how geographical thought evolved in response to these contrasting perspectives.
- **Quantitative Revolution**: Students should learn about the quantitative revolution in geography, including the adoption of statistical and mathematical methods to analyze spatial phenomena.
- **Humanistic Geography**: Graduates should be aware of the development of humanistic geography and the emphasis on human experience, perception, and place in geographical research.
- **Geographical Thought in Different Regions**: The course may examine geographical thought in different regions of the world, highlighting the unique contributions and perspectives of various geographical traditions.
- **Contemporary Geographical Thought**: Students should be aware of contemporary trends in geographical thought, including the integration of interdisciplinary approaches, globalization, and the study of contemporary issues like climate change and urbanization.

Disaster Management-

An undergraduate course in Disaster Management typically focuses on preparing students to understand, mitigate, respond to, and recover from disasters and emergencies. Here are some common course outcomes for an undergraduate study in Disaster Management:

- **Understanding Disasters**: Students should develop a comprehensive understanding of the various types of disasters, including natural disasters (e.g., earthquakes, hurricanes, floods) and human-made disasters (e.g., industrial accidents, terrorism).
- **Disaster Risk Assessment**: Graduates should be proficient in conducting risk assessments to identify potential hazards, vulnerabilities, and the likelihood of disasters occurring in specific regions.
- **Mitigation Strategies**: Students should learn strategies for disaster risk reduction and mitigation, including land-use planning, building codes, and infrastructure improvements.
- **Emergency Preparedness**: Graduates should understand the importance of emergency preparedness, including the development of emergency plans, communication protocols, and evacuation procedures.
- **Response and Relief Operations**: The course may cover the principles of disaster response, including coordination among various agencies, search and rescue operations, medical triage, and the distribution of humanitarian aid.
- **Disaster Recovery and Rehabilitation**: Students should gain insights into the long-term recovery and rehabilitation efforts following disasters, including rebuilding infrastructure and providing psychosocial support.
- **Disaster Risk Reduction Policies**: The course may explore national and international policies and frameworks related to disaster risk reduction and disaster management.
- **Geospatial Technology**: Students should be familiar with the use of geospatial technology, such as Geographic Information Systems (GIS) and remote sensing, for disaster mapping, damage assessment, and decision-making.

Resource Geography-

An undergraduate course in Resource Geography typically focuses on the study of Earth's natural resources, their distribution, utilization, and sustainable management. Here are some common course outcomes for an undergraduate study in Resource Geography:

- **Understanding Natural Resources**: Students should develop a comprehensive understanding of natural resources, including renewable resources (e.g., forests, water, fisheries) and non-renewable resources (e.g., minerals, fossil fuels).
- **Resource Classification**: Graduates should be able to classify resources based on their origin, economic significance, and environmental impact, distinguishing between biotic and abiotic resources.

- **Resource Distribution**: Students should gain insights into the spatial distribution of natural resources at local, regional, and global scales, considering factors like geological formations, climate, and human activities.
- **Resource Extraction and Utilization**: Graduates should understand the processes and technologies involved in resource extraction, as well as the various ways in which resources are utilized, including industrial, agricultural, and domestic uses.
- **Resource Conservation and Management**: The course may cover strategies for the sustainable management and conservation of natural resources, including ecosystem-based management and resource replenishment.
- **Resource Economics**: Students should learn about the economic aspects of resource management, including resource valuation, pricing mechanisms, and the impacts of resource scarcity on economies.
- **Energy Resources**: Graduates should be familiar with different energy resources, including fossil fuels, renewable energy sources (e.g., solar, wind, hydro), and their role in global energy production.
- **Water Resources**: The course may focus on water resources, including the distribution, quality, and management of freshwater sources, as well as issues related to water scarcity and access.
- **Forest Resources**: Students should understand the ecological and economic significance of forests, forest management practices, and the conservation of forest ecosystems.
- **Mineral and Mining Resources**: Graduates should gain insights into mineral resources, mining techniques, and the environmental and social impacts of mining activities.
- **Resource Sustainability**: Graduates should be able to assess the sustainability of resource utilization practices and propose solutions for sustainable resource management.

Soil and Bio-Geography-

An undergraduate course in Soil and Biogeography typically focuses on the study of soils, their properties, formation processes, and their relationships with ecosystems and biogeographical patterns. Here are some common course outcomes for an undergraduate study in Soil and Biogeography:

- **Soil Composition and Characteristics**: Students should develop a comprehensive understanding of soil composition, including mineral particles, organic matter, water, and gases, as well as soil properties such as texture, structure, color, and pH.
- **Soil Formation Processes**: Graduates should be proficient in explaining the processes of soil formation, including weathering, mineralization, and pedogenesis, and how these processes vary across different environments.
- **Soil Classification and Taxonomy**: Students should learn soil classification systems and understand how soils are categorized based on their properties, horizons, and geographic distribution.

- **Soil Profile Analysis**: Graduates should be capable of analyzing soil profiles to identify horizons (O, A, E, B, C, R) and interpret the environmental history and conditions associated with each horizon.
- **Soil Erosion and Conservation**: The course may cover soil erosion processes, the impacts of erosion on ecosystems, and strategies for soil conservation and erosion control.
- **Soil and Climate Interactions**: Students should gain insights into the relationship between soil characteristics and climate patterns, including the influence of temperature and precipitation on soil development.
- **Soil and Vegetation Interactions**: Graduates should understand how soil properties influence vegetation types and distribution, including the role of soil nutrients, pH, and moisture levels.
- **Biogeographical Patterns**: The course may explore biogeographical patterns related to soil types, including the distribution of biomes, ecosystems, and plant species based on soil conditions.
- **Soil Pollution and Remediation**: The course may cover soil pollution sources, the effects of contaminants on soil health, and remediation techniques for polluted soils.

Program specific outcomes and course outcomes for Students of Department of Molecular Biology and Biotechnology

Programme Specific Outcome

Successful completion of the B. Sc. course in Molecular Biology and Biotechnology will enable students to:

1. Understand the basic principles, practices and emerging concepts of Biotechnology
2. Understand the contribution of various scientists in the field of biotechnology.
3. Understand the modern technologies and their application in diagnosis, drug designing, development of commercially valuable products, prevention of food spoilage, bioremediation of environmental pollutants, etc.

4. Develop skills for designing short experiments using basic concepts, analysis and interpretation of results and troubleshooting of problems.
5. Excel in higher studies and research from laboratory training, basic research projects, multiple lab visits and educational excursionsof the course.
6. The hands-on-training will enable them to carry out their own projects, identify different specimens, isolate and characterize microbes of industrial and medicinal importance.
7. An exposure to skill enhancement courses such as Biofertilizers and Microbial Diagnosis in Health Clinics and discipline specific elective courses such as Animal Biotechnology, Plant Biotechnology, Environmental Biotechnology, etc, will open up new avenuesandjobopportunitiesforstudents.
8. Build up awareness and knowledge in environmental relatedissues.
9. Have clear concept of ethics and IPR in research and industries.
10. Compete in examinations of national and international significance.

Course Specific Outcome

Semester 1

In Semester 1 there are two core course papers: CCR1 (Biochemistry) and CCR2 (Cell Biology).

In the core course theory paper CCR1, students are given introduction of Biochemistry and the idea about amino acids, proteins, structure, properties, types and function of amino acids, proteins, carbohydrates, lipids, nucleic acids, etc. Students are also taught about

different enzymes, cofactors, coenzymes, common features of active site, enzyme specificity, role of NAD+, NADP+, FMN/FAD, biotin, etc. This theory paper also gives the idea of metabolic pathways like glycolysis, gluconeogenesis, pentose phosphate pathway, TCA cycle, Electron transport chain, Oxidative phosphorylation, etc. Students in this core course can also explore the interesting history of Biotechnology and the future prospect of it.

In the CCR1 practical students are given hands-on-training for estimation of blood glucose, enzyme activity under optimum and altered conditions of pH, temperature, effect of inhibitors, etc., Students also learn to estimate sugars, proteins and lipids, both qualitatively and quantitatively, separate amino acids by chromatography. They also learn the use of different important instruments like spectrophotometer, colorimeter, autoclave, etc.

In the core course theory paper CCR2, students are given the introduction of prokaryotic cells, eukaryotic cells, their structure, components, fractionation process, etc. They are also given the idea of membrane vacuole system, cytoskeleton and cell motility, structure, function, biogenesis and significance of different compartments of cell. This paper also illustrates the composition of extracellular matrix and significance of different molecules, membrane receptors, signaling molecules and their regulation. A brief idea on carcinogenesis, agents promoting carcinogenesis, molecular basis of development of cancer, etc., are also given to the students through this paper

In the core course Practical paper CCR2 students study the plasmolysis, de-plasmolysis, cell division in onion roots tip, effect of temperature and organic solvents on semi permeable membrane, etc.

Semester 2

In Semester 2 there are two core course papers: CCR3 (Mammalian Physiology) and CCR4 (Development Biology).

The CCR3 theory paper deals with mammalian physiology processes like digestion, respiration, circulation, muscle physiology, osmoregulationand nervous and endocrine coordination. The mechanism of digestion and absorption of carbohydrates, proteins, lipids, composition of bile, saliva, gastric, pancreatic and intestinal juices and blood are taught to the students. Students also get the detail knowledge of significance of plasma proteins, mechanism of coagulation of blood, haemopoesis, mechanism of heart, generation and propagation of nerve impulse, action of hormones, urine formation, muscle contraction, etc. The structure of synapse, synaptic conduction, endocrine glands, different types of muscle, modes of excretion, etc. are also taught to the students in this paper.

The practical of this paper include determination of blood groups, haemoglobin, and coagulation time of blood, TLC, DLC and counting of mammalian RBCs.

The CCR4 theory paper deals with different stages of development of a human embryo. It includes the concept of gametogenesis, fertilization, spermatogenesis, oogenesis, cleavage, gastrulation, morphogenetic movements, formation, fate and differentiation of germ layers, embryonic induction, neurulation, notogenesis, eye and brain development, etc. In this paper students also learn the significance of different layers of placenta, cell commitment and determination, etc.

The practical of this paper include study of different types of placenta and different development stages of *Anopheles, Drosophila*, chick embryo, etc. Students also learn to prepare temporary stained mounts of chick embryo.

Semester 3

In the 3rd semester students have three core course papers CCR5 (Genetics), CCR6 (General Microbiology) and CCR7 (Biophysics) and one Skill enhancement paper (SEC-Biofertilizer).

In the CCR5 theory paper students are given idea on historical developments in the field of genetics, organism suitable for genetic experiments, their significance. They are also taught about mitosis, meosis, cell cycle and its checkpoints, Mendelian genetics, chromosomal theory of

inheritance, allelic interactions, non-allelic interactions, chromosome and genomic organizations, structure and characteristics of bacterial and eukaryotic chromosome, packaging of DNA, chromosome and gene mutations, sex determination and sex linkage, linkage, crossing over, chromosomal aberrations, etc. In addition to these, students are taught about different stating techniques, dyes and technologies for detection of chromosomal aberration and mutation.

The practical of this paper include preparation of temporary mount of mitosis, meosis, demonstration of Barr body, karyotyping and translocation study in Rheo.

The CCR6 theory paper deals with fundamentals, history and evolution of microbiology, classification of microorganisms, microbial diversity, cultivation and maintenance of microorganisms, microbial growth, metabolism, reproduction, etc. In addition to these concepts, students are given ideas on physical, chemical and chemotherapeutic agents to control microbes, bacterial pollutants, their significance in water contamination, food spoilage, infection, intoxication, etc.

The practical paper includes methods for isolation, characterization, staining and enumeration of microorganism, different sterilization techniques, etc. Students are also given hands-on-training on handling of different instruments and equipments like autoclave, microscope, BOD shaker, Laminar Air flow, etc.

The CCR7 theory paper deals with atomic structure, different bonding, thermodynamics, reaction kinetics, energy transduction, significance of pH, buffers, Henderson Hasselbalch equation, isotopes, radioactivity, hydrodynamic properties of molecules, etc. The students are also taught about different technologies like centrifugation, X-ray crystallography, atomic and emission spectroscopy, Raman spectroscopy, NMR spectroscopy, etc. Different factors affecting the different properties of molecules, chemical shift, hyperfine splitting, etc., are also taught to the students.

The practical paper includes preparation of buffers, titration of amino acids, different chromatography methods, measurement of X-ray diffraction pattern, etc.Students also get exposure on handling of spectrophotometer.

In addition to the three course papers, students are also given exposure on Biofertilizers through their skill enhancement course paper. Through this paper students are given idea on different microbes used as biofertilizer, their isolation, selection, preservation and application for sustainable agricultural development. Students are also taught about various mycorrhizal association, their occurrence, distribution, isolation, inoculums production etc. Concepts of organic farming, recycling of biodegradable wastes, vermicomposting, etc., are also provided to the students.

Semester 4

In semester 4 students read three core course papers CCR8 (Molecular Biology), CCR9 (Immunology) and CCR10 (Bioinformatics) and one Skill enhancement course paper (SEC-Microbial Diagnosis in Health Clinics).
In the CCR8 theory paper, students are given detail concepts of structure and types of DNA and RNA, replication, transcription, translation, DNA damage, and regulation of these processes. Students also learn the unique and different aspects of prokaryotic and eukaryotic replication, transcription, translation, repair, etc. Different post transcriptional and post translational modifications, inhibitors of replication, transcription and translation, transposons, their significance and their mechanism are also taught to the students.

The practical paper includes isolation of genomic DNA, plasmid DNA, detection of different types and forms of DNA on agarose gel, restriction digestion of DNA samples, demonstration of AMES test, etc.

In the CCR9 theory paper students are given idea on immune response, overview and components of mammalian immune system, structure of immunoglobulins, T cell receptors, B cell receptors, affinity maturation, class switching, assembly and rearrangements of receptors encoding genes, regulation of immunoglobulin gene expression, etc. Students are taught about major and minor histocompatibility complexes, antibody diversity, pathogen defense strategies, avoidance of recognition, autoimmune diseases, immunodeficiency, AIDS, vaccines, vaccination, immunodiagnostics, etc.

The practical paper includes TLC, DLC and RBC count, haemagglutination assay, haemaglutination inhibition assay, double immunodiffusion test, etc.

In CCR10, students are taught about history of bioinformatics, homologous sequence, sequence information sources, protein information sources, data generating techniques, mass spectrometry, PCR, sequence and phylogeny analysis, detection of open reading frames, alignments of sequences, searching databases and genome annotation. Students are also given idea for submission of data, using web, interpretation of results, etc.

The practical paper includes understanding and using PDB, swissprot, TREMBL, BLAST, ClustalW, EMBL, Genebank, Unigene, PIR, etc.

In the SEC paper students are given idea on importance of diagnosis of diseases, various pathogenic bacteria, virus, fungi, protozoa, disease associated clinical samples for diagnosis, methods for collection of clinical samples, preparation and composition of different medias- simple, modified, selective, etc. Students are also given knowledge about different techniques and methodology for diagnosis of diseases like ELISA, PCR, immunofluorescence, rapid detection kits, antibiotic sensitivity and resistance, etc.

Semester 5

In semester 5 students learn two core course papers CCR11 (Bioprocess Technology) and CCR12 (Recombinant DNA Technology) and twodiscipline specific elective course papers DSE1 (Animal Biotechnology) and DSE2 (Plant Biotechnology).

In CCR11 theory paper students learn about bioprocess technology, its range, chronological development, principle components of fermentation technology, types of microbial cultures and its growth kinetics, design and types of bioprocess vessels, upstream processing, bioprocesses measurement and control system, downstream processing, product recovery and purification.

The practical paper includes calculation of thermal death point of microbial sample, production of ethanol, amylase, lactic acid, isolation of industrially important microorganism from natural resource.

In CCR12 theory students are taught about different molecular tools and their applications, restriction enzymes, PCR, primer designing, different types of vectors, restriction mapping, southern and northern blot hybridization, genomic and cDNA library, genome mapping, application of genetic engineering, transgenic mice, therapeutic products, etc. Students also get ideas on genetic engineering in plants, random and site directed mutagenesis, protein engineering, etc.

The practical paper includes isolation and qualitative and quantitative estimation of genomic and plasmid DNA from plant and bacteria, restriction digestion of DNA, making of competent cells, etc.

In DSE1 theory paper students learn about different gene transfer methods in animals, animal propagation techniques, etc. They also get information on transgenics, transgenic animals, role of biotechnology in diagnosis and treatment of animal diseases, stem cell technology and its applications, etc. Students are also taught about gene therapy, types, vectors used in gene therapy, human genetic engineering, problem and ethics.

In the practical students prepare different growth mediums-Minimal essential growth medium, Hanks Balanced salt solution. They also learn to isolate and quantify DNA from animal tissues, isolate lymphocytes for culturing, etc. The students are also given idea on different sterilization techniques and handling of different instruments.

The DSE2 theory paper deals with plant tissue culture techniques, types of culture, differentiation, dedifferentiation and re-differentiation, micropropagation, organogenesis, embryogenesis, in vitro haploid production, andogenesis, gynogenic techniques, ploidy level, etc. In addition to these concepts students are given ideas on protoplast isolation and fusion methods,

somatic hybridization, protoplast development, somaclonal variation, plant growth promoting bacteria, etc.
The practical paper include selection, sterilization and preparation of explants on different media, study of various stages of micropropagation and preparation of different nutrient medium.

Semester 6

In semester 6 students have 4 papers which include two core course papers CCR13 (Bioanalytical tools) and CCR14 (Genomics and Proteomics), and two discipline specific elective course papers DSE3 (Biostatistics) and DSE4 (Environmental Biotechnology).
In CCR13 theory paper students learn about different microscopy techniques-simple, phase contrast, fluorescence and electron microscopy, absorption and emission spectroscopy, principles and law of absorption fluorimetry, colorimetry, UV, visible and infra red spectroscopy, different chromatography techniques-HPLC, gas, gel filtration, affinity, size exclusion, ion exchange, etc. Students are also given information on different types of electrophoresis-starch gel, polyacrylamide gel, agarose, pulse field, immune electrophoresis, etc. Students also get brief idea on biosensors, nanotechnology and their applications.
The practical paper includes separation and identification of amino acids by paper chromatography, TLC, verification of Beer's law, determination of molar extinction coefficient of NADH, SDS-polyacrylamide gel electrophoresis, etc.

In CCR14 theory paper students learn about different DNA sequencing methods, genome sequence assembly software, managing and distributing genome data using different web servers and software. They are also taught about different chemical and physical interactions of proteins, analysis of proteomes, protein sample preparation, mass spectrometry, different methods of protein identification, etc.
The practical of this paper includes use of OMIM, NCBI, SNP databases by students. They also learn to detect ORFs in a DNA sequence, hydrophobic regions of a protein, etc. They are also given hands-on-training on SDS PAGE.

In DSE3 theory paper students learn about different types, classification, collection and representation of data, measurement of central tendency, dispersion, probability, theorems on total and compound probability, binomial, poisson and normal distributions, methods of sampling, confidence level, testing of hypothesis, standard error, correlation and regression, etc. Students also practice problems on t-test, chi-square test, ANOVA, etc.

The practical includes rigorous practice on measurement of central tendency, dispersions, distribution, t, f, z and chi-square test.

In DSE4 theory paper students are given information on conventional fuels, modern fuels and their environmental impacts, bioremediation of soil and water contaminated with oil spills, heavy metals, biodegradation of lignin, cellulose, pesticides, aromatic and chlorinated hydrocarbons and petroleum products. Students also learn about different treatment methods of municipal wastes and industrial effluents. Students also get to know about biofertilizers, bioleaching techniques for gold, copper, uranium, genetically modified microbes, etc.

The practical includes calculation of TDS, BOD, COD and MPN of the water sample by the students.

MATHEMATICS

Program Specific Outcomes (PSO)

1. Develop the skill to deal with the abstract ideas of Mathematics.
2. Become proficient in writing proofs.
3. Expertise in problem solving.
4. Acquire the skill to pursue career not only in school education but also in business, civil services, banking, finance etc.
5. Can continue study of Mathematics at the post graduate level and more.
6. Can apply Mathematical methods in problems of Mathematics and related fields of science and engineering.
7. Learn how to teach Mathematics in undergraduate level.
8. Develop the ability of analytical and logical thinking which will help them in all aspects of life.

Course Outcomes (CO)
1+1+1 System

PAPER I

CLASSICAL ALGEBRA I, LINEAR ALGEBRA I, ABSTRACT ALGEBRA I, ANALYTICAL GEOMETRY OF TWO AND THREE DIMENSIONS AND VECTOR ALGEBRA:

Learn concepts of Classical Algebra such as Complex numbers, Theory of Equations, introductory ideas of Linear Algebra including Matrices and determinants, Basic concepts of Abstract Algebra such as Set, Mapping, Relations and introduction of Group Theory and Analytical Geometry which includes Transformation of axes, Pair of Straight Lines, Circle, Ellipse, Parabola, Hyperbola, Rectangular Cartesian coordinates in Space, Equations of Plane, Straight lines in Space, Position Vectors, Vector Products, Application of Vector Algebra.

PAPER II

DIFFERENTIAL CALCULUS, INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS:

Concept and examples: Function of a single variable, limit, Continuity, Derivative and Partial Derivatives. Applications of Differential Calculus including Tangent, Normal, Envelops, Curvature and Curve Tracing. Concept and examples of Indefinite and Definite integrals and its applications for examples arc length, area, Volume and Moment of Inertia. Finally methods to solve ordinary Differential equations, Higher order linear equations and eigen value problems.

PAPER III

CLASSICAL ALGEBRA II, LINEAR ALGEBRA II, ABSTRACT ALGEBRA II AND ANALYSIS I:

In extension to the Classical Algebra Course in Paper I student learns Inequality and Integers. In extension to the Linear Algebra Course in Paper I student learns Vector Space, Inner Product space, Linear Transformation and Real Quadratic form. In extension to the Abstract Algebra Course in Paper I student learns Normal Subgroup, Homomorphism, Isomorphism, Rings and Fields.

PAPER IV

LINEAR PROGRAMMING, GAME THEORY, DYNAMICS OF A PARTICLE AND ANALYSIS II:

Learn theories and problem solving mechanisms of Linear Programming Problems and Game Theory. Under the section of Dynamics of a particle students will learn Work, Power, Energy, Newton‘s Laws, Impact of Elastic Bodies, Accelerations, Damped Harmonic Oscillators, Motion in a Plane under Laws of Resistance,
Also as an extension of Paper II Analysis course, learns the Indeterminate form and Maxima, Minima.

PAPER V

ANALYTICAL STATICS, DYNAMICS OF RIGID BODY AND HYDROSTATICS

Learns Statics including Transformation of Axes, Friction, Astatic Equilibrium, Rigid Dynamics and Hydrostatics.

PAPER VI

ANALYSIS III, CALCULUS OF SEVERAL VARIABLES, DIFFERENTIAL EQUATIONS II AND METRIC SPACE:

Get ideas of Compactness in R, Functions of Bounded Variations, Riemann Integration, Sequence and Series of Real Functions. Learn concepts of function of several variables, for example Point Sets, Limit, Continuity, Differentiability, Jacobian etc. In extension to the Differential Equations-I Course in of paper-II students learn Partial Differential Equations, Laplace Transformation and Power series solution of Ordinary Differential Equations. Learn concepts of metric spaces, Mappings and Compact set.

PAPER VII

VECTOR ANALYSIS, TENSOR ALGEBRA, COMPLEX ANALYSIS, PROBABILITY THEORY AND MATHEMATICAL STATISTICS:

Learns Vector Analysis, Tensor Algebra, Complex Functions and probability and statistical methods in detail.

PAPER VIII

NUMERICAL ANALYSIS, FUNDAMENTALS OF COMPUTER SCIENCE & PROGRAMMING AND PRACTICAL COMPUTER PROGRAMMING & NUMERICAL ANALYSIS:

Familiarize oneself with the application of method of estimation in absence of exact solution or when finding exact solution is tough and also learn to write the computer programming of the numerical methods in C fundamentals of Computer Science.

Course Outcomes (CO)

CBCS System

CC1

CALCULUS, GEOMETRY AND DIFFERENTIAL EQUATIONS: Learn the foundational knowledge of Calculus, Geometry and learn to plot graphs of functions , sketch parametric curves, trace conics etc using free software.

CC2

ALGEBRA: Develop the basic ideas of Classical Algebra(Complex Number, Theory of Equation, Inequality), Abstract Algebra(Relation, Mapping, Integers) and Linear Algebra(Rank of a Matrix, System of Linear Equations etc).

CC3

REAL ANALYSIS: Get the ideas of Real Numbers, Countable and Uncountable Sets, Bounded and Unbounded Sets, Limit Points, Interior Points, Real Sequence, Subsequence in detail and learn to plot sequences and verify theorems through plotting of sequences.

CC4

DIFFERENTIAL EQUATIONS AND VECTOR ANALYSIS: Learn methods to solve Ordinary Differential Equations and Vector Analysis.

CC5

THEORY OF REAL FUNCTIONS & INTRODUCTION TO METRIC SPACES: Acquire the knowledge of Limit, Continuity and Differentiability of Real Functions and Learn Metric Space.

CC6

GROUP THEORY I: Learn the definition of Learn Group, its properties and examples, Subgroup, ita properties and examples, Cyclic Group, Permutation, Quotient Group, Homomorphisms, Isomorphisms.

CC7

NUMERICAL METHODS & NUMERICAL METHODS LAB: Familiarize oneself with the application of method of estimation in absence of exact solution or when finding exact solution is tough and also learn to write the computer programming of the numerical methods.

CC8

RIEMANN INTEGRATION & SERIES OF FUNCTIONS: Get the knowledge of Riemann Integration, Improper Integral, Sequence and Series of Functions, Power Series, Fourier Series.

CC9

MULTIVARIATE CALCULUS: introductory ideas of Multivariate Calculus(Concept of Neighbourhood, Limit Point, Interior Point, Chain Rule, Directional Derivatives).

CC10

RING THEORY AND LINEAR ALGEBRA I : Ring, Subring, Integral Domain, Field, Ideals, Ring Homomorphism and their properties and theorems in the Ring Theory and in Linear Algebra, the fundamentals of vector Space, Linear Transformation, Algebra of Linear Transformation, Eigen Values, Eigen Vectors.

CC11

PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS: Learn methods to solve Partial Differential Equations (PDE) and some problems involving PDE and in Multivariate Calculus, learn Multiple Integrals, Vector Field, Divergence, Curl, Green‘s Theorem, Stoke‘s Theorem and Divergence Theorem.

CC12

GROUP THEORY-II & LINEAR ALGEBRA-II: Get the idea of Automorphism, External Direct Product, Inner Product Spaces and Norms, Dual Spaces, Eigen Spaces.

CC13

METRIC SPACES & COMPLEX ANALYSIS: Get the concept of Metric Spaces, Compactness, Connectedness and in Complex Analysis Stereographic Projections, Differentiability, Power Series, Complex Integration etc.

CC14

RING THEORY AND LINEAR ALGEBRA II : Learn Advance level of Ring Theory and Linear Algebra

SKILL ENHANCEMENT COURSES one can learn C, Pithon, Scientific Computing with SageMath and R and Mathematical Logic.

DISCIPLINE SPECIFIC ELECTIVE COURSES one can get an overview of specialized sections of Mathematics which will help to choose the right track for future.

PHYSICS

Programme Specific Outcome (PSO)

1. Physics is the very basic science which aims to understand they way nature works. Theories of physics get established when they are confirmed through experiments. Therefore, the subject needs proper blending of both theory and experiment. Physics uses mathematics to formulate and organize theories of natural phenomena. Computational physics, therefore, plays a vital role in understanding the predictions of theoretical physics in particular circumstances. The students need proper understanding of the different aspects of physical theories, experimental techniques and computational methods, so that they can apply those techniques in the upcoming advanced courses when they have finished their UG 3 year syllabus.

2. Students would acquire knowledge in core disciplines of physics, like classical mechanics, quantum mechanics, electromagnetic theory, electronics, optics, special theory of relativity, nuclear and particle physics, solid state physics, statistical mechanics etc. They must have a proper understanding mathematical methods and that of computer of programming so that they can apply appropriate scientific skills wherever necessary.

3. In the formulation of physical problems, students would have the skill of identifying the key factors and applying appropriate principles and assumptions.

4. Students would be able to design and conduct experiments demonstrating their understanding of the scientific method and processes, analyze results and draw conclusions as supported by their data.

5. Students would realize and develop an understanding of the impact of physics and science on society.

6. Students would develop written and oral communication skills in communicating physics-related topics.

7. Students will apply conceptual understanding of the physics to real-world situations.

8. Students will discover physics concepts in other major disciplines such as mathematics, computer science, engineering, and chemistry.

9. Student would develop attitude of doing research through undertaking small projects.

10. After completing the program student will have developed interdisciplinary approach and can pursue higher studies in subjects other than physics.

ZOOLOGY

Programme Specific Outcome

After successfully completing B.Sc. in Zoology:

1. The Zoological study will enable students to gain knowledge on the overall animal world their habit and habitat and the role in environment. This will inculcate them the importance of every surviving animal in the earth and necessity of their presence for the survival of the ecosystem.

2. The concept of Ecology will enable the students to have an idea about the various pollutions in the ecosystem that are disturbing the balance of the nature. The concept of sustainable development teaches the students to learn the optimum uses of the non-renewable resources of the earth and to apply methodologies for the use of renewable resources in the survival of the mankind.

3. The study of Molecular Biology, Biochemistry, Immunology, Parasitology, and Developmental Biology will help the students to gain knowledge in the life processes and will provide them scope in researches.

4. Biotechnology will provide impetus to the students to the use of various technologies in the field of biology. The use of animals in the welfare of human society like Apiculture, Sericulture, Poultry, Lac-culture, etc., Researches in this field will provide different job-oriented courses which will be beneficial to the students.

5. Field Excursion conducted is very much beneficial to the students. The visit to National Park or Sanctuary or Biosphere Reserve help the students to learn the various conservation strategies, both in-situ as well as ex-situ, for animals and plants. This forest study will help students to understand the importance of forests and their resources. This study provides them the idea about the status of different animals on the ecosystem and also the need of conservation of the threatened or endangered species.

6. The study of animal dissections will benefit the students to have an idea of the internal anatomy of the animal which will provide them a sound knowledge about the internal environment of the living animals.

7. The study harmful microbes help the students to know about the mode of infection of those pathogens. Moreover the control measures and the prophylactic measures will give a clear idea about how to manage the diseases and to design new medicines in combating the infections caused by harmful microbes.

8. Taxonomical studies enable the students to learn about the different variety and variability of the animal world. Taxonomy helps them to identify unknown specimens and also to group animals in a systematic way by way of phenotypic or genotypic or behavioural characteristics. This study is particularly important to the students in understanding the overall diversity.

9. The study of various ecosystems including marine, forest, aquatic, wetland etc., provide good idea to the students about the variety of ecosystems and their difference and interrelationships. The study also provide an idea about the floral and faunal communities of those ecosystems and give an idea about the native species of respective ecosystems.

10.Gains insight about the economic importance of Pisces and Pisciculture.

11.The students will gain fundamental knowledge in the concepts of animal behaviour which enable the students to conceptualize learning, migration and biological rhythms.

Zoology Course outcomes (CBCS System)

Non-Chordates and Chordates: SEM 1-CC1 and GE 1, SEM 2-CC3 and GE 2, SEM 3-CC 5, SEM 4-CC 8

Students gain the knowledge of classification of Non-chordates and chordates along with various physiological functions and interactions of organisms . Students will be able to appreciate the diversity of life and develop a critical understanding how animals changed from a primitive cell to a collection of cells to a complex body plan. The project assignments will also offer them an essence of research to find the process involved in studying biodiversity and taxonomy.

Molecular Biology and Biotechnology: SEM 1-CC 2, SEM V-DSE A 1 and A2

Upon successful completion of this course students should develop a thorough grasp over the concepts, and relevance of molecular biology in the present day world. They should get well versed in recombinant DNA technology which holds immense application in the field of biomedical science, genomics, agriculture, environment management, etc. Therefore, a fundamental understanding of Molecular Biology will help in career opportunities in all these fields. They should also get research ideas in areas such as therapeutic strategies or related opportunities in industry.

Cell Biology: SEM 2- CC4

Upon successful completion of this course, students should acquire the detailed knowledge of different pathways related to cellular functioning in healthy and diseased states, cell signalling and apoptosis which will enable them to understand the pathology of tumour genesis and cancer. They should also be able to give a _health forecast‘ by analysing the genetic database and cell information. They should also get new avenues of joining research in areas such as genetic engineering, cloning, development of vaccine, transplant of organs etc.

Animal Physiology: SEM 3- CC 6, GE 3, SEM 4- CC9

Upon successful completion of these courses, the students should be able to develop an understanding of the development and function of vertebrate tissue, organ and organ system. They should also know to understand abnormal physiological changes in animal and human diseases and new methods for treating those diseases. They may also undertake research in any aspect of animal physiology in future.

Biochemistry: SEM 3- CC7

Upon successful completion of this course, the students will be able to understand the structure and biological significance of carbohydrates, proteins, lipids, enzymes, and nucleic acids. It will prepare them for making clinical diagnoses, understanding the pathology of diseases, treatment of diseases, designing drugs and understanding their metabolism and manufacture of various biological products like amino acids, proteins, antibiotics, hormones, enzymes, nutrients, etc. The composition of food materials including the quality of milk and possible adulterations can be checked by biochemical tests. This discipline will provide career opportunities in farming, fishery, poultry, sericulture, beekeeping and environmental remediation.

SEC A: APICULTURE, SEM -3

Upon successful completion of this course, the student will understand the prerequisite to beekeeping, be able to identify where to purchase equipment and demonstrate how to assemble it and may set up a cottage industry. They also acquire detailed knowledge about the nutritional and medicinal importance of honey and the economic importance of other bee products.

Immunology, CC10- SEM 4

Upon successful completion of this course Upon successful completion students will be able to understand the difference between the innate versus adaptive immune systems; and humoral versus cell-mediated immune responses; be able to distinguish various cell types involved in immune responses and associated functions; be able to distinguish and characterize antibody isotypes, development, and functions; understand the role of cytokines in immunity and immune cell activation; and be able to identify and characterize cytokines of particular immune importance; understand the significance the Major Histocompatibility Complex in terms of immune response and transplantation. They will be able to take up research careers in biomedical research, healthcare, agriculture and environmental monitoring.

SEC B: Aquarium Fisheries

Upon successful completion of this course, the students will develop awareness about the vast potential involved in ornamental fish farming and trading. They will learn the scientific method of setting up an aquarium, culture breeding and marketing techniques of common

indigenous ornamental fishes besides learning the diseases in fishes and other constraints in their culture.

Ecology CC 11-SEM 5

Upon successful completion of this course, students should understand the need to study animal ecology. They will be able to engage in field-based research activities to understand the theoretical aspects taught besides learning techniques for gathering data in the field. They will also be able to analyse a biological problem, derive testable hypotheses and then design experiments and put the tests into practice. They will also develop the ability to solve environmental problems involving the interaction of humans and natural systems at the local or global level.

Genetics CC12- SEM 5, GE4-SEM 4

Upon successful completion of this course students will be able to understand the basic organization of prokaryotic and eukaryotic genomes and perform genetic analysis at the gene, genome and population levels, understand gene expression and gene regulation mechanisms and be able to solve genetic problems. It also helps students to learn the molecular aspects of genetic disorders and mutations.

Parasitology DSE A1, SEM 5

Upon successful completion of this course, the students will be able to describe the mechanisms for transmission, virulence and pathogenicity of parasites, diagnose the causative agents, and describe pathogenesis and treatment for important diseases like malaria, leishmaniasis, trypanosomiasis, toxoplasmosis, schistosomiasis, cysticercosis, filariasis etc , assess the importance of incidence, prevalence and epidemiology in parasitic infection.

Endocrinology DSE B1, SEM 5

Upon successful completion of this course the right kind detailed knowledge of the human body, especially the endocrine system. They should also be well qualified about the knowledge of all the prevailing hormonal disorders and their symptoms. It will imbibe career opportunities as pathologists, clinicians and allied medical fields.

Developmental Biology CC 13 SEM 6

Upon successful completion of this course, students will be able to understand how a complete organism develops from a single cell, very similar mechanisms are used in very diverse organisms; and development is controlled through molecular changes resulting in variation in the expression and function of gene networks. They will also be able to examine the evolutionary history of the taxa based on developmental affinities and understand the relevance of developmental biology in medicine and its role in development of diseases.

Evolutionary biology CC14 SEM 6

Upon successful completion of this course, a student should be able to understand and explain the forces behind evolution (mutation, migration, natural selection, sexual selection, genetic drift) and the interaction among them, both over ecological and evolutionary time. They should also be able to generate evolutionary hypotheses for a wide variety of biological phenomena, read and understand research literature dealing with evolutionary biology and apply the evolutionary principles in their research

Animal Behaviour and Chronobiology DSE B 2, SEM 6

Upon successful completion of these courses, the students will be able to develop a wide range of theoretical and practical techniques used to study animal behaviour. They will also be able to understand and evaluate the role of behaviour of all animals, including humans, in the complex ecological world and use it in the protection and conservation of animals in the wild.

Department of English:

- The Department of English at Sripat Singh College focuses on developing students' language proficiency, critical thinking skills, and cultural awareness.
- The Department of English aims to provide a comprehensive education in the English language and literature to equip students with the necessary skills for academic and professional success.
- The course outcome includes enhancing students' oral and written communication skills. Through various language modules, students learn to express their ideas clearly, effectively, and persuasively. The curriculum emphasizes grammar, vocabulary, and correct usage, enabling students to communicate fluently and accurately.
- In addition to language skills, the Department of English fosters critical thinking and analytical abilities in students. Students are encouraged to read, analyze, and interpret a wide range of literary works, including novels, poetry, drama, and non-fiction. Through discussion and writing assignments, they develop the skills to evaluate and interpret complex texts, make informed arguments, and engage in meaningful literary analysis.
- Moreover, the Department of English promotes cultural awareness and sensitivity. Students explore diverse literary traditions, including Indian, British, American, postcolonial, and global literature. This exposure helps them appreciate different perspectives, cultures, and historical contexts. It also encourages them to reflect on broader social issues and themes represented in literature.
- The course outcome of the Department of English equips students with a broad skill set, including language proficiency, critical thinking, and cultural awareness. These skills prepare them for a variety of career paths such as teaching, writing, journalism, publishing, media, advertising, and more. Additionally, the course outcome also encourages a lifelong passion for literature and a deeper understanding of the world through the lens of language and culture.