GOVERNMENT GENERAL DEGREE COLLEGE SALBONI
GOVERNMENT OF WEST BENGAL
Office of the Principal
P. O. BHIMPUR DIST. PASCHIM MEDINIPUR PIN 721516
Website: www.salbonigovtcollege.org :: E-mail: salboni_college@mail.vidyasagar.ac.in

Department of Bengali Programme Specific Outcome (PSO) and Course Outcome (CO)

Programme Outcome

➢**PO 1:** The curriculum of Bengali Honours is mainly literature based. Here an idea is given about different branches of Bengali literature of ancient, middle and modern period. In other words, one has to read poems, stories, novels, dramas etc. by various poets and writers. Ancient Indian alchemy and some translations of modern foreign literature are also taught. The students of Bengali department read about the rhetoric and rhythm of Bengali poetry, read the history of Bengali language, read grammar, read literary forms and customs. They have to study ancient manuscripts or parts of modern linguistics, learn literary criticism and research methods. Such diverse subjects open up new worlds of knowledge to the students. Due to this, students are interested to know more about this subject. They develop their own logic. In the light of their reasoning, they are able to find new ideas by analysing various literary texts.

➢**PO 2:** Bengali Honours lessons have special importance in the professional field as well. There is an opportunity for education by doing B.A. with Honors in Bengali. Apart from this, there is also an opportunity to become a professor by passing NET/SET after graduation and post-graduation as well as.

➢**PO 3:** There is room for book criticism in daily newspaper offices Exclusive rights of Bengali Honours students there too.

➢**PO 4:** There is an opportunity to become a translator. By reading Bengali Honors, there is an opportunity to work as a translator in government or various private organizations.

➢**PO 5:** Bengali Honours students have job opportunities in various advertising agencies if they have skills in Bengali language.

➢**PO 6:** Currently students are getting jobs in various branches of print media Those who study with Bengali Honours in the editing department of the publication have proven their competence. Students get job opportunities in various media. Besides, one can make a living by writing scripts for films or dramas. There are many people who studied Bengali Honors who are living comfortably just by writing.

➢**PO 7:** Apart from this, there are job opportunities in many other departments including editing and proof reading in publishing houses after studying Bengali Honours. At present, candidates who study with Bengali Honours have the opportunity to work in various government and private organizations.

3-YEAR BA HONOURS IN ENGLISH

PROGRAMME SPECIFIC OUTCOME

The **THREE-YEAR DEGREE COURSE WITH HONOURS IN ENGLISH** will help the learners acquire the following skills and aptitudes—

- ★ Proficiency in literary analysis with advanced theories and methodologies.
- ★ Effective written and oral communication skills.
- ★ Advanced research abilities for independent projects.
- ★ Deep understanding of cultural and historical contexts of literature.
- ★ Development of creative and critical thinking skills.
- ★ High-level writing proficiency across various formats.
- ★ Recognition of interdisciplinary connections with other fields.
- ★ Engagement with global perspectives and ethical considerations.
- ★ Competence in utilizing digital tools for literary analysis and research.
- ★ Preparation for diverse career paths in fields such as teaching, publishing, and journalism.

3-YEAR BA GENERAL DEGREE IN ENGLISH

PROGRAMME SPECIFIC OUTCOME

The THREE-YEAR GENERAL DEGREE COURSE IN ENGLISH will help the learners acquire the following skills and aptitudes—

- Proficiency in written and oral communication skills, enabling them to articulate ideas effectively in English through essays, presentations, and discussions.
- Analysis and interpretation of various forms of literature, including fiction, poetry, drama, and non-fiction, from different cultural and historical contexts.
- Application of critical thinking skills to evaluate literary texts, identifying themes, motifs, and literary devices, and analyzing their significance within broader societal and cultural frameworks.
- Development of research skills to locate, assess, and integrate relevant secondary sources into academic writing, demonstrating the ability to engage with scholarly discourse in English studies.
- Understanding of linguistic concepts and principles, encompassing grammar, syntax, phonetics, and semantics, and their effective application in writing and analysis.
- Exploration of interdisciplinary connections between literature and other fields such as history, philosophy, psychology, and sociology, fostering a holistic understanding of human experiences and perspectives.
- Cultivation of awareness and appreciation of diverse voices and perspectives in English literature, emphasizing the importance of inclusivity, representation, and cultural sensitivity in academic discourse.

BACHELOR OF ARTS (HONOURS)
MAJOR IN ENGLISH
4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)
Based on
Curriculum & Credit Framework for Undergraduate Programmes
(CCFUP), 2023 & NEP, 2020

Programme Outcome

Upon successful completion of the **BACHELOR OF ARTS (HONOURS) 4-YEAR UNDERGRADUATE PROGRAMME with MAJOR IN ENGLISH**, students will attain the following outcomes.

- **Advanced Literary Knowledge**: Acquire a deep understanding of English literature across different periods and genres, including poetry, prose, drama, and critical essays, from the beginnings to contemporary times.
- **Critical Thinking and Analysis**: Develop strong critical thinking skills to analyze and interpret literary texts, fostering the ability to evaluate and synthesize information from various sources and perspectives.
- **Effective Communication Skills**: Enhance verbal and written communication abilities, enabling clear and persuasive expression of ideas, both in academic and professional contexts.
- **Research Proficiency**: Gain expertise in conducting independent research, utilizing various methodologies and resources, and presenting findings in a coherent and scholarly manner.
- **Cultural and Historical Awareness**: Understand the cultural and historical contexts of literary works, recognizing the interplay between literature and societal changes, and appreciating the diversity of literary traditions.
- **Ethical and Reflective Thinking**: Develop an ethical perspective and reflective thinking, fostering a sense of social responsibility, empathy, and awareness of human rights issues as they relate to literature and society.
- **Career Readiness and Lifelong Learning**: Prepare for a wide range of career opportunities in education, media, publishing, and other fields, while also instilling a commitment to lifelong learning and personal growth in the ever-evolving global landscape.

BACHELOR OF ARTS WITH ENGLISH
(MULTIDISCIPLINARY STUDIES)
3-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023 & NEP, 2020

Programme Outcome

Upon successful completion of the 3-year Undergraduate Programme in English with a focus on Multidisciplinary Studies, students will:

- **Interdisciplinary Knowledge Integration**: Develop a broad understanding of English literature while integrating insights from other disciplines, fostering a holistic and versatile academic foundation.
- **Enhanced Communication Skills**: Improve proficiency in both written and oral communication, facilitating effective expression and articulation of complex ideas across various contexts and audiences.
- **Critical and Analytical Thinking**: Cultivate the ability to critically analyze and evaluate literary texts, while also applying these skills to interdisciplinary subjects, enhancing overall problem-solving capabilities.
- **Cultural and Contextual Awareness**: Gain an appreciation for the cultural, social, and historical contexts of literary works, enabling a nuanced understanding of literature's role in reflecting and shaping society.
- **Research and Inquiry**: Develop skills in research methodologies and inquiry, allowing for the exploration and investigation of interdisciplinary topics, and contributing to informed and evidence-based conclusions.
- **Ethical and Social Responsibility**: Foster an ethical mindset and social awareness, encouraging students to engage with literature and other disciplines in ways that promote social justice, equity, and human rights.
- **Career Versatility and Lifelong Learning**: Prepare for diverse career paths in fields such as education, media, public relations, and cultural organizations, while instilling a commitment to continuous personal and professional development in a dynamic and interconnected world.

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SANSKRIT UG (Hons & Gen)

Program Outcomes (POs):

PO A - Comprehensive Understanding of Classical Sanskrit Literature:
After completing the courses, students will develop a deep appreciation and nuanced understanding of classical Sanskrit literature. They study different literary forms, such as poetry, prose, drama and epic, and gain an understanding of the cultural, historical and philosophical contexts in which these works were produced. Through in-depth analysis and interpretation, students explore the complex themes, narrative structures and stylistic techniques of major Sanskrit writers, contributing to a comprehensive understanding of a rich literary tradition.

PO B - Proficiency in Sanskrit Language and Grammar:
Through rigorous study and practice, students acquire a high level of Sanskrit. He masters the complex rules of grammar, syntax and vocabulary necessary to accurately read, interpret and translate Sanskrit texts. Students will hone their language skills and develop the confidence to navigate complex Sanskrit compositions with fluency and precision, dealing with a variety of texts spanning different genres and time periods.

PO C - Critical Thinking and Analytical Skills:
The courses develop students' critical thinking and analytical skills, which gives them the opportunity to become familiar with Sanskrit literature and philosophical texts. He learns to evaluate and criticize literary works, distinguishing their underlying themes, symbolism and narrative techniques. Through extensive reading and scholarly inquiry, students develop the ability to articulate persuasive arguments supported by textual evidence and effectively articulate their own interpretations, promoting a nuanced understanding of the cultural, social, and philosophical implications of texts.

PO D - Cultural and Historical Awareness:
By immersing themselves in the study of Sanskrit literature and related subjects, students will gain profound insights into Indian culture, history, and values. They will explore the societal norms, religious beliefs, and philosophical ideals reflected in Sanskrit texts, deepening their appreciation of the rich cultural heritage of India. Moreover, students will recognize the global significance of Sanskrit literature, tracing its enduring influence on world literature, philosophy, and cultural discourse, thereby fostering cross-cultural understanding and appreciation.

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PO E - Practical and Applied Knowledge:

The courses provide students with practical skills and applied knowledge in various professional fields. Through practical exercises, projects and real-life applications, students develop practical skills such as acting, screenwriting, language technology and historical research. Students learn to apply theoretical concepts in a practical setting and prepare them for careers in academia, performing arts, language technology, research and other similar fields, thus bridging the gap between academic learning and real-world applications. of.

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Programme Specific Outcome (PSO) Department of Santali

Programme Outcome (Hons)

- **PO 1:**The curriculum of Santali Honours is mainly literature based. Here an idea is given about different branches of Santali literature of ancient, middle and modern period. In other words, one has to read poems, stories, novels, dramas etc. by various poets and writers. The students of Santali department read about the rhetoric and rhythm of Santali poetry, read the history of Santali language, read grammar, read literary forms and customs. They have to study ancient manuscripts or parts of modern linguistics, learn literary criticism and theory of literature.Such diverse subjects open up new worlds of knowledge to the students. Due to this, students are interested to know more about this subject. They develop their own logic. In the light of their reasoning, they are able to find new ideas by analyzing various literary texts.As a result, they will be able to develop fundamental research perspectives. As a result, they will be able to do new research in this Santali language.
- **PO 2:**Santali Honours lessons have special importance in the professional field as well. There is an opportunity for education by doing B.A. with Honors in Santali. Apart from this, there is also an opportunity to become a Teacher by passing D. El.Ed, B. Ed, NET/SET after graduation and Post-graduation as well as.
- **PO 3:**There is scope for book criticism in magazine offices Exclusive rights of Santali Honours students there too.
- **PO 4:**There is an opportunity to become a translator. By reading Santali Honors, there is an opportunity to work as a translator in government or various private organizations.
- **PO 5:**Santali Honours students have job opportunities in various advertising agencies if they have skills in Santali language.
- **PO 6:**Currently students are getting jobs in various branches of print media Those who study with Santali Honours in the editing department of the publication have proven their competence. Students get job opportunities in various media. Besides, one can make a living by writing scripts for films or dramas. There are many people who studied Santali Honors who are living comfortably just by writing.
- **PO 7:**Apart from this, there are job opportunities in many other departments including editing and proof reading in publishing houses after studying Santali Honours. At present, candidates who study with Santali Honours have the opportunity to work in various government and private organizations.

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Programme Outcome (General)

Programme Outcome

- **PO 1:**The main objective of studying Santali in pass course at graduate level is to acquire general knowledge about Santali language and literature. Which will later help the students in their professional life.
- **PO 2:**Studying Santali means I can assume that his language and writing skills will be good. So if you have a desire to write, you can easily progress towards becoming a writer. Writing can be started with various newspapers, social media, stories and novels. In today's era, you can make your own page on social media and try to earn by slowly writing. This is a very good opportunity to earn working from home nowadays.
- **PO 3:**Proofreader jobs can be found in any publishing house with Santali reading.
- **PO 4:**Screenwriting jobs can be found in any Santali production house or media house.
- **PO 5:**Translation work can be found from books, writings in different languages into Santali. But in that case there should be knowledge about the language from which the translation will be done.
- **PO 6:**can be worked out, as linguists. There are many opportunities to work with Santali in this department. The history of Bengal gives an opportunity to work on the stratification of the Santali language etc.
- **PO 7:**If you have good language skills, you can get a job in advertising agencies very easily. If you have a talent for writing poetry, you can get a job as a tag line writer for an advertising agency. Apart from this, the demand of Santali language in all the news organizations of the present era is increasing continuously. But in this case it is very important to have a proper knowledge about the world of news.
- **PO 8:**One can work as a content writer, freelance content writer in any education firm or website design company, IT firm. The future of the content writing profession is very bright right now. Also, taking a course in digital marketing can increase job opportunities in a digital marketing firm.
- **PO 9:**Opportunity to sit for various governments job exams and get jobs, which can be done only after graduation in Bengal too. This time we did not see at a glance, what are the government job opportunities after reading about Santali?IAS/IPS exam can be conducted at All India level.State Police, WBCS these exams can be given and a major part covers Santali language and literature.Central State Group C, D posts can appear for the exam.If you have very good marks, you can sit the Indian Post Department exam. Bank, Municipality or any office for clerical post, school inspector etc. can also sit for the job exam and get a job if successful in the exam.
- **PO 10:**There are also various types of work in various events, presentations, recitals, radio jockeys, and digital media.

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Honours in History

Under CBCS

(w.e.f. Academic Year 2018-2019)

Programme Specific Outcome (PSO)

The Programme specific outcomes of a History Honours course at the undergraduate level may include:

- Understand the concept of history and various historical interpretations which evolved over time.
- A comprehensive understanding of various perspectives on civilizations and key historical events.
- Develop critical thinking skills to analyse historical sources both literary and archaeological.
- Acquire the ability to interpret the socio-economic, political and cultural aspects of a historical phenomenon.
- Understand the various historiographical perspectives and debates regarding the forces of change and continuity in a social structure.
- Acquire the skills to evaluate and synthesize historical information from a variety of sources which is must for further research.
- Acquire the necessary skills to express the historical thought and knowledge effectively through writings and oral presentation.
- Cultivate the ability to identify and negate the distorted interpretation of a historical phenomenon.

4-Year Undergraduate Programme

(w.e.f. Academic Year 2023-2024)

Under CCFUP,(2023) & NEP,(2020)

Programme Specific Outcome (PSO)

The Programme specific outcomes of a History Honours course at the undergraduate level may include:

- Understand the concept of history and various historical interpretations which evolved over time.
- A comprehensive understanding of various perspectives on civilizations and key historical events.
- Develop critical thinking skills to analyse historical sources both literary and archaeological.
- Acquire the ability to interpret the socio-economic, political and cultural aspects of a historical phenomenon.
- Understand the various historiographical perspectives and debates regarding the forces of change and continuity in a social structure.
- Acquire the skills to evaluate and synthesize historical information from a variety of sources which is must for further research.
- Acquire the necessary skills to express the historical thought and knowledge effectively through writings and oral presentation.
- Cultivate the ability to identify and negate the distorted interpretation of a historical phenomenon.
- Prepare students for advanced studies in history or archaeology or museology and Public Administration or International Relations or in the field of Journalism and so on.
- Get job in Government Services like WBCS, IAS, IPS, IFS, etc.

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B.A. General in history

Under CBCS

(w.e.f. Academic Year 2018-2019)

Programme Specific Outcome (PSO)

The Programme specific outcomes of a History General course at the undergraduate level may include:

- At a general level, our courses are structured with the objective of giving requisite information about different aspects of the civilization to students.
- Teaching them the methods of analysing information, researching, framing arguments, and debating historical details
- Cultivating an understanding of how the present is linked to the past
- Equipping students with skills to comprehend and interpret the present through historical knowledge
- It is expected that on completion of the course students would have to acquire the skills of critical thinking, rational enquiry, effective communication.
- To pursue his/her higher studies in journalism, public relation. Study for D.EL. ED, B. ED, M.A, MBA.
- Participation in various competitive government job exams like Primary School Service, Secondary School Service, PSC, WBCS, UPSC (IAS, IPS, IFS) etc.

Bachelor of Arts with History
(Multidisciplinary Studies)
3-Year Undergraduate Programme
(w.e.f. Academic Year 2023-2024)
Under CCFUP, (2023) & NEP, (2020)

Programme Specific Outcome (PSO)

- At a general level, our courses are structured with the objective of giving requisite information about different aspects of the civilization to students.
- Teaching them the methods of analysing information, researching, framing arguments, and debating historical details
- Cultivating an understanding of how the present is linked to the past
- Equipping students with skills to comprehend and interpret the present through historical knowledge
- It is expected that on completion of the course students would have to acquire the skills of critical thinking, rational enquiry, effective communication.
- To pursue his/her higher studies in journalism, public relation. Study for D.EL. ED, B. ED, M.A, MBA.
- Participation in various competitive government job exams like Primary School Service, Secondary School Service, PSC, WBCS, UPSC (IAS, IPS, IFS) etc.

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DEPARTMENT OF SOCIOLOGY
PSO & CO(Hons)

PROGRAM SPECIFIC OUTCOME(PSO)

For B.A. HONOURS IN SOCIOLOGY

The B.A. Honours Programme in Sociology is designed to initiate students holistically to the nuances of the discipline of Sociology. On successful completion of the entire programme a student should develop the following faculties:

- Critical and analytical thinking about society and social issues. Sociological knowledge and skills would provide students the ability to perceive their own society objectively. Vivid sociological understanding of all social phenomena of social structures, processes and institutions conceptually as well as in their varied forms across societies.

- In-depth learning about social causes and consequences of common human behaviour and experiences. Students can use this knowledge across multiple sectors, from politics to social welfare. Help in becoming active and informed citizens.

- Better understanding of real-life situation. Students are able to deal with their everyday realities better by applying sociological theories and methodologies to those.

- Since students have to go beyond classroom learning and engage in fieldwork activities, they inculcate good communication skills and social interaction power.

- Engagement in research-based learning thrusts the ability to formulate effective and convincing oral and written arguments.

- Through learning about facets of diverse cultures, social inequalities, population composition, population policies of India students are instilled with a sense of ethical and social responsibility.

- Developing skills that are both theoretical as well as practical thereby facilitating students' success in varied career fields in both government as well as private sectors.

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DEPARTMENT OF SOCIOLOGY
PSO & CO(Gen)

PROGRAM SPECIFIC OUTCOME

For B.A. GENERAL IN SOCIOLOGY

The B.A. General Programme in Sociology is designed to introduce students to the concepts, theories and methods in Sociology. The primary aim is to sensitize students with the discipline. On successful completion of the programme a student will be provided with the following:

- An overall knowledge of the development of sociology and its distinctiveness as a social science discipline.
- Enriched concept of how the society operates, exists and continues. Along with these imbibe the sense of possible changes and developments.
- Basic knowledge of how to do sociological research.
- Sociological perception about the components of Indian society.
- Specialised sociological knowledge on certain areas like gender, social stratification, research methodology.
- Comprehensive expertise on social issues and critical thinking beneficial for appearing in competitive examinations related to governmental jobs.

Government General Degree College Salboni

4-year B. A. Honours Major in Philosophy & 3-year B. A. Multi disciplinary studies with Philosophy (CCFUP)

Programme Specific Out comes (PSO)

Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020.

The 4-year Undergraduate Program major in Philosophy and 3-years Undergraduate Multi disciplinary studies in Philosophy introduces students to Indian Philosophy, History of Western Philosophy and Ethics, Logic (Indian and Western), Philosophy of Religion, Analytical Philosophy, Social and Political Philosophy, Psychology and Philosophy of Mind, Philosophy of Human Rights, Gender Studies, and Value Education.

The course encourages an interest in learning philosophy with clarity while also examining philosophical concepts through philosophical contemplation and analysis. The course also promotes critical thinking. After successfully completing the three-year degree course, students are expected to achieve the following Programme Specific Outcomes.

Study and research: Read books, articles, and papers written by philosophers and scholars to gain an understanding of the current state of philosophical knowledge. Explore various branches of philosophy such as metaphysics, epistemology, ethics, logic, and aesthetics to grasp a broad overview.

Engage in philosophical discussions: Join philosophical discussion groups, forums, or debates to interact with others who are interested in similar topics. This can help you refine your thoughts, challenge your beliefs, and gain new insights from different perspectives.

Attend lectures and conferences: Participate in lectures and conferences organized by academic institutions, philosophical societies, or professional organizations. These events provide opportunities to listen to renowned philosophers presenting their research, engage in discussions, and network with fellow enthusiasts.

Take courses or pursue a degree: Consider enrolling in philosophy courses at a university or pursuing a formal degree in philosophy. This formal education will provide a structured path to systematically study philosophical problems, theories, and methodologies.

Engage with philosophical texts: Read classic philosophical works by renowned philosophers such as Plato, Aristotle, Descartes, Kant, Nietzsche, etc. These texts offer timeless insights and can serve as a foundation for understanding and analyzing present-day philosophical problems.

Reflect and contemplate: Dedicate time to introspection and personal reflection on philosophical questions and problems. This can involve meditation, journaling, or engaging in contemplative practices to develop one's own ideas and solutions.

Government General Degree College Salboni

B. A. Honours in Philosophy (CBCS)

Programme Specific Out comes (PSO)

The three year Under Graduate course in Philosophy Honours initiates students, Indian Philosophy, History of Western Philosophy and Ethics, Logic (Indian and western), Philosophy of Religion, analytical Philosophy, Social and Political Philosophy, Psychology and Philosophy of mind, Philosophy of human rights, Gender studies and value education.

The course develops interests 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 3 year degree course the following Programme Specific Outcomes outcome are expected of the students:

Study and research: Read books, articles, and papers written by philosophers and scholars to gain an understanding of the current state of philosophical knowledge. Explore various branches of philosophy such as metaphysics, epistemology, ethics, logic, and aesthetics to grasp a broad overview.

Engage in philosophical discussions: Join philosophical discussion groups, forums, or debates to interact with others who are interested in similar topics. This can help you refine your thoughts, challenge your beliefs, and gain new insights from different perspectives.

Attend lectures and conferences: Participate in lectures and conferences organized by academic institutions, philosophical societies, or professional organizations. These events provide opportunities to listen to renowned philosophers presenting their research, engage in discussions, and network with fellow enthusiasts.

Take courses or pursue a degree: Consider enrolling in philosophy courses at a university or pursuing a formal degree in philosophy. This formal education will provide a structured path to systematically study philosophical problems, theories, and methodologies.

Engage with philosophical texts: Read classic philosophical works by renowned philosophers such as Plato, Aristotle, Descartes, Kant, Nietzsche, etc. These texts offer timeless insights and can serve as a foundation for understanding and analyzing present-day philosophical problems.

Reflect and contemplate: Dedicate time to introspection and personal reflection on philosophical questions and problems. This can involve meditation, journaling, or engaging in contemplative practices to develop one's own ideas and solutions.

Remember, philosophical problems often have multiple perspectives and interpretations, and there may not be definitive solutions. The goal is to critically examine these problems, understand existing knowledge, and contribute to the ongoing philosophical discourse.

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PROGRAMME SPECIFIC OUTCOMES (PSO)	
B.A. Political Science Honours	
PSO1	To be able to differentiate the political from non-political. And will know what constitute the domain of political.
PSO2	To be able to know the traditions of political theory and be able to build a sound knowledge of recent development in the field of political theory.
PSO3	Be able to gather a profound knowledge of Indian Constitution and politics, which enable then to grasp the changing pattern of Indian polity and society.
PSO4	Using the knowledge Indian politics they can analyze voting behavior and to some extent predict the trends of Indian politics in near future.
PSO5	To enable students to gather knowledge of government and politics of various countries of the world.
PSO6	To be able to explain the existing socio-political reality.
PSO7	Enable students to realize the basic issues of society (freedom, rights, Justice, etc)
PSO8	Pursue higher study in Political Science or Public Administration or International Relations.
PSO9	The Student will be able to compete in Government Services like WBCS, IAS, IPS, etc.

PROGRAMME SPECIFIC OUTCOMES (PSO) OF CCFUP-NEP PROGRAMMES	
B.A. Political Science Honours	
The subject of Political Science intends to equip students with an understanding of Power relations in society through the study of the following:	
PSO1	The State, especially the structure, functions and processes of the Government in terms ofexisting written/ unwritten constitutions.
PSO2	The 'value' and 'causal' theories and also the long and rich history of political ideas andphilosophy.
PSO3	Indian Government and Politics, as well as Comparative Government and Politics; International/ Global relations and politics and the theories and practices of a newly developed areas of Public Administration and Public Policy;
PSO4	Various socio-political issues like Gender, Environment, Exclusion and Inclusion, Human Rights, Social and Political Movements are also given due importance.
PSO5	Research Methodology and hands-on experiences from the field.
PSO6	Various Skill Enhancement Courses like Media and Politics, Panchayati Raj ManagementSystems and Legal Awareness
PSO7	It seeks to introduce the learners with various skills and experiences towards socialchange as well as being responsible citizens.

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PROGRAMME SPECIFIC OUTCOMES (PSO)	
B.A. Political Science General	
PSO1	To be able to know the traditions of political theory and be able to build a sound knowledge of recent development in the field of political theory.
PSO2	Be able to gather a profound knowledge of Indian Constitution and politics, which enable then to grasp the changing pattern of Indian polity and society.
PSO3	To enable students to gather knowledge of government and politics of various countries of the world.
PSO4	To be able to explain the existing socio-political reality.
PSO5	Pursue higher study in Political Science or Public Administration or International Relations.
PSO6	The Student will be able to compete in Government Services like WBCS, IAS, IPS, etc.

B. Sc. Honours (CBCS) in Physics

Programme Outcome of B.Sc. Honours Courses

1. Foundational Knowledge and Rigorous Lab Exposure:

- Students will demonstrate a strong foundation in their chosen field of study, acquiring comprehensive knowledge of core concepts, theories, and principles.
- After passing the program, students will become adept at solving rigorous laboratory-related problems, applying theoretical knowledge to practical scenarios, and conducting experiments with precision and accuracy.

2. Critical Thinking and Problem-solving Skills:

- Students will develop critical thinking skills and problem-solving abilities, enabling them to analyze complex issues, evaluate evidence, and generate innovative solutions.
- This skill set will empower students to approach challenges with confidence, think critically about scientific problems, and develop creative solutions that contribute to advancements in their field.

3. Research and Inquiry Skills:

- Students will cultivate research and inquiry skills, including formulating research questions, conducting literature reviews, designing experiments, collecting and analyzing data, and drawing evidence-based conclusions.
- This proficiency will prepare students for careers in research, academia, and industry, where they will contribute to the generation of new knowledge and innovations.

4. Effective Communication and Computer Skills:

- Students will communicate effectively in written, oral, and visual formats, presenting ideas, arguments, and findings coherently and persuasively to diverse audiences.
- Alongside, students will acquire expertise in computer skills, including the use of software, programming languages, mathematical modeling, and computational methods, enhancing their ability to analyze data and communicate scientific findings effectively.

5. Information Literacy and Familiarity with Recent Developments:

- Students will acquire information literacy skills, including locating, evaluating, and synthesizing information from a variety of sources, and applying it ethically and responsibly in academic and professional contexts.
- Additionally, students will stay abreast of recent developments in science and technology through seminars, workshops, special lectures, and exposure to current scientific trends, fostering a culture of continuous learning and innovation.

6. Collaboration, Teamwork, and Leadership:

- Students will engage in collaborative learning and teamwork, effectively working with peers, faculty, and professionals from diverse backgrounds to achieve common goals and solve problems.
- Moreover, students will develop leadership qualities and initiative, taking responsibility for their learning, initiating and managing projects, and inspiring others to achieve excellence, preparing them for leadership roles in academia, industry, and society.

7. Ethical and Social Responsibility, and Global and Cultural Awareness:

- Students will demonstrate ethical awareness and social responsibility in their academic and professional endeavors, adhering to ethical standards, promoting inclusivity and diversity, and contributing positively to society.
- They will also develop global and cultural awareness, understanding the interconnectedness of global issues, appreciating cultural diversity, and engaging with perspectives from different cultures and contexts, fostering a sense of global citizenship and empathy.

8. Adaptability, Lifelong Learning, and Holistic Development:

- Students will cultivate adaptability and a growth mindset, embracing change, learning from experiences, and continuously updating their knowledge and skills to meet evolving challenges and opportunities.
- This process of continual improvement and innovation will contribute to the holistic development of students, preparing them to navigate the complexities of the modern world with resilience, agility, and a commitment to lifelong learning.

9. Professional Development and Career Opportunities:

- After completion of the program, students will be well-prepared for diverse career opportunities, including positions in chemical and pharmaceutical industries, academia, government, public sectors, and research institutions.
- They will also have the option to pursue higher education in premier institutes nationally and internationally, opt for research careers, or enroll in professional courses such as BCA, MCA, MBA, and others, enhancing their employability and career prospects.

10. Engagement in Independent Thinking and Lifelong Learning:

- The program will foster independent thinking and lifelong learning among students, empowering them to engage critically with scientific and societal issues, adapt to new technologies and advancements, and contribute meaningfully to their communities and professions.

Overall, the B.Sc. (Hons.) CBCS program will equip students with the knowledge, skills, and values necessary for success in their chosen fields, while instilling a commitment to excellence, ethical conduct, and societal responsibility, thereby contributing to their personal, professional, and intellectual growth, and the advancement of science and society as a whole.

Program Specific Outcomes (PSOs) of B.Sc. (Hons) CBCS Physics Course

Program Specific Outcomes (PSOs) for students graduating with a B.Sc. (Honours) degree in Physics and those studying General Education (GE) Courses in Physics:

1. Demonstrate Profound Knowledge in Foundational Areas:

Graduates will exhibit in-depth knowledge in foundational areas of physical science, including mechanics (classical, quantum, statistical), electromagnetic theory, electronics, modern physics, mathematical physics, and condensed matter physics.

2. Effective Communication of Physical Concepts:

Students will develop written and oral communication skills to effectively convey physics-related topics using numerical, graphical, and symbolic representations, fostering clarity and precision in communication.

3. Analytical and Critical Thinking Skills:

Graduates will analyze, test, and interpret technical arguments, forming independent judgments based on a thorough understanding of physical principles and experimental evidence, cultivating analytical and critical thinking skills.

4. Problem-solving and Experimental Proficiency:

Students will solve complex problems by identifying and applying relevant physical concepts, demonstrating proficiency in experimental design, data collection, analysis, and interpretation, adhering to the scientific method and processes.

5. Acquisition and Analysis of Experimental Data:

Graduates will demonstrate proficiency in acquiring data using laboratory instruments, analyzing data using analytical and numerical techniques, and interpreting results to draw meaningful conclusions, enhancing their experimental and analytical skills.

6. Application of Numerical Techniques for Modelling:

Students will apply numerical techniques to model physical systems where analytical methods are inappropriate or limited, gaining proficiency in computational methods and enhancing their ability to simulate and analyze complex phenomena.

7. Understanding of Physics' Impact on Society:

Graduates will realize and appreciate the impact of physics and science on society, recognizing the contributions of physics to technological advancements, societal progress, and addressing global challenges.

8. Application of Physics in Real-world Situations:

Students will apply conceptual understanding of physics to real-world situations, analyzing physical problems and developing accurate solutions using natural laws, thereby demonstrating the practical relevance of physics principles.

9. Understanding of Scientific Methodology:

Graduates will describe the methodology of science and understand the relationship between observation and theory, recognizing the iterative nature of scientific inquiry and the importance of empirical evidence in theory development.

10. Minimization of Variables and Equipment Limitations:

Students will learn to minimize contributing variables and recognize the limitations of equipment, ensuring accurate experimental results and developing critical thinking skills in experimental design and execution.

11. Interdisciplinary Application of Physics Concepts:

Graduates will discover physics concepts in other disciplines such as mathematics, computer science, engineering, and chemistry, fostering interdisciplinary perspectives and contributing to the integration of physics with other scientific domains.

These Program Specific Outcomes aim to prepare students for diverse career paths in academia, research, industry, and beyond, equipping them with the knowledge, skills, and values necessary for success in the field of physics and its applications in various contexts.

4-Year B.Sc. Honours Major in Physics Under CCFUP-2023 & NEP-2020

Programme Outcomes (POs) of 4-Year B.Sc. Honours Major in Physics

- **Comprehensive Knowledge and Understanding:** Graduates will acquire in-depth knowledge of fundamental and advanced concepts in physics, including classical mechanics, electromagnetism, quantum mechanics, statistical mechanics, and modern physics. They will be able to apply this knowledge to solve complex physical problems.

- **Practical and Experimental Skills:** Graduates will develop strong laboratory skills, enabling them to design and conduct experiments, analyze data, and interpret results. They will be proficient in using modern scientific equipment and computational tools for experimental physics.

- **Critical Thinking and Problem Solving:** Graduates will demonstrate the ability to critically analyze and solve theoretical and practical physics problems. They will be skilled in formulating hypotheses, designing experiments, and interpreting scientific data.

- **Research and Innovation:** Graduates will be capable of undertaking independent research projects, contributing to the advancement of knowledge in the field of physics. They will be adept at using scientific literature, formulating research questions, and employing appropriate methodologies.

- **Interdisciplinary Approach:** Graduates will possess the ability to integrate knowledge from various disciplines, recognizing the interconnectedness of physics with other scientific fields such as mathematics, chemistry, and biology. They will be prepared to work on interdisciplinary projects.

- **Communication Skills:** Graduates will be proficient in communicating scientific concepts and research findings effectively to both scientific and non-scientific audiences. They will be able to write clear and concise scientific reports and present their work orally.

- **Ethical and Social Responsibility:** Graduates will understand the ethical implications of scientific research and technological advancements. They will be committed to responsible conduct in research and aware of their role in addressing societal challenges through scientific innovation.

- **Lifelong Learning:** Graduates will recognize the importance of lifelong learning and be prepared to engage in continuous professional development. They will be equipped with the skills to adapt to rapidly evolving scientific and technological landscapes.

- **Teamwork and Leadership:** Graduates will develop the ability to work effectively in teams, demonstrating leadership and collaborative skills. They will be capable of managing projects, coordinating with team members, and contributing to collective goals.

- **Global and Environmental Awareness:** Graduates will be aware of global scientific developments and their environmental impact. They will be committed to sustainable practices and the application of physics to address environmental issues.

- **Technical Proficiency:** Graduates will be proficient in using modern scientific software, programming languages, and computational techniques relevant to physics. They will be capable of modeling physical systems and analyzing complex data sets.

- **Innovation and Entrepreneurship:** Graduates will possess the entrepreneurial skills necessary to translate scientific knowledge into technological innovations and commercial ventures. They will be able to identify opportunities for innovation and develop strategies for bringing ideas to market.

Program Specific Outcomes (PSOs) of 4-Year B.Sc. Honours Major in Physics

- **Mastery of Core Physics Concepts:** Graduates will demonstrate a comprehensive understanding of core physics areas, including mechanics, electromagnetism, thermodynamics, quantum mechanics, and statistical physics, and be able to apply these principles to solve complex problems.

- **Advanced Laboratory Techniques:** Graduates will be skilled in using advanced laboratory techniques and instruments, including spectroscopy, laser systems, and nuclear physics equipment, to conduct experiments and analyze results accurately.

- **Computational Physics Proficiency:** Graduates will be proficient in computational physics, employing numerical methods and programming languages (such as Python, MATLAB, or C++) to model physical systems, analyze data, and solve problems that are analytically intractable.

- **Specialization in Cutting-Edge Areas:** Graduates will gain specialized knowledge in emerging areas of physics such as condensed matter physics, astrophysics, nanotechnology, or biophysics, preparing them for advanced studies or careers in these fields.

- **Research Methodology and Scientific Inquiry:n**Graduates will be adept at formulating research questions, designing experiments, and employing scientific methodologies to investigate physical phenomena. They will be able to critically analyze scientific literature and contribute original research findings.

- **Interdisciplinary Applications:** Graduates will be capable of applying physics principles to interdisciplinary fields such as material science, environmental science, and medical physics. They will be able to collaborate effectively with professionals from other scientific disciplines.

- **Theoretical and Mathematical Rigor:** Graduates will possess strong theoretical and mathematical skills, enabling them to develop and analyze physical models using advanced mathematical techniques. They will be able to derive and solve complex equations governing physical systems.

- **Data Analysis and Interpretation:** Graduates will be proficient in statistical analysis and data interpretation, using software tools to handle large datasets, extract meaningful insights, and present data-driven conclusions in a clear and concise manner.

- **Scientific Communication:** Graduates will be capable of effectively communicating their research findings through written reports, scientific publications, and oral presentations. They will be able to articulate complex physical concepts to both scientific and non-scientific audiences.

- **Ethical Conduct and Professional Integrity:** Graduates will adhere to the highest standards of ethical conduct in their research and professional activities. They will understand the societal implications of their work and commit to using their knowledge responsibly.

- **Innovation and Problem-Solving:** Graduates will demonstrate innovation and creativity in approaching scientific problems. They will be able to develop new experimental setups, theoretical models, or computational algorithms to advance the field of physics.

- **Preparation for Higher Studies and Careers:** Graduates will be well-prepared for pursuing higher studies in physics or related fields, as well as for careers in academia, research institutions, industry, and government organizations. They will possess the necessary skills and knowledge to excel in their chosen paths.

B. Sc. General (CBCS) in Physics

Programme Outcome of B.Sc. General Courses

1. Foundational Knowledge: Students will acquire a foundational understanding of various disciplines within the natural and applied sciences, including physics, chemistry, mathematics, biology, and environmental science.

2. Interdisciplinary Understanding: Students will develop an interdisciplinary perspective, recognizing the interconnectedness of different scientific disciplines and their applications in addressing real-world problems and challenges.

3. Critical Thinking and Problem-solving Skills: Students will cultivate critical thinking skills and problem-solving abilities, enabling them to analyze complex issues, evaluate evidence, and generate innovative solutions across different domains of science.

4. Quantitative and Analytical Skills: Students will develop proficiency in quantitative and analytical skills, including mathematical reasoning, data analysis, and statistical interpretation, enhancing their ability to analyze and interpret scientific data.

5. Communication Skills: Students will communicate effectively in written, oral, and visual formats, presenting scientific concepts, theories, and findings coherently and persuasively to diverse audiences, fostering clarity and precision in communication.

6. Information Literacy: Students will acquire information literacy skills, including locating, evaluating, and synthesizing information from a variety of sources, and applying it ethically and responsibly in academic and professional contexts.

7. Experimental and Laboratory Skills: Students will gain hands-on experience in experimental techniques, laboratory procedures, and instrumentation, developing proficiency in conducting experiments, collecting data, and analyzing results.

8. Ethical and Social Responsibility: Students will demonstrate ethical awareness and social responsibility in their academic and professional endeavors, adhering to ethical standards, promoting inclusivity and diversity, and contributing positively to society.

9. Global and Environmental Awareness: Students will develop awareness of global scientific developments, environmental issues, and sustainability challenges, understanding the role of science in addressing global challenges and promoting sustainable development.

10. Career Readiness and Lifelong Learning: Students will be prepared for diverse career opportunities in academia, research, industry, government, and non-profit sectors, equipped with the knowledge, skills, and values necessary for success in their chosen fields, while fostering a commitment to lifelong learning and professional development.

11. Community Engagement and Outreach: Students will engage in community-based projects, outreach activities, and initiatives, applying scientific knowledge and skills to address community needs, promote scientific literacy, and contribute to the welfare of society.

12. Continuous Improvement and Quality Enhancement: Institutions offering B.Sc. General Courses will engage in continuous improvement and quality enhancement efforts, including curriculum review, faculty development, infrastructure upgrades, and stakeholder feedback mechanisms, to ensure the relevance, currency, and effectiveness of the program.

These Program Outcomes aim to provide a comprehensive education in the natural and applied sciences, preparing students for successful careers, lifelong learning, and active participation in the scientific community and society at large.

Program Specific Outcomes (PSOs) of B.Sc. (General) CBCS Physics Course

1. Foundational Understanding: Students will develop a foundational understanding of fundamental concepts in physics, including mechanics, electromagnetism, thermodynamics, optics, and modern physics.

2. Quantitative and Analytical Skills: Students will acquire proficiency in quantitative and analytical skills, including mathematical modeling, data analysis, and problem-solving techniques, enabling them to apply physical principles to solve real-world problems.

3. Experimental Proficiency: Students will gain hands-on experience in experimental techniques and laboratory procedures, demonstrating proficiency in conducting experiments, collecting data, and analyzing results with accuracy and precision.

4. Application of Physical Principles: Students will apply physical principles to analyze and interpret natural phenomena, technological advancements, and scientific innovations, demonstrating the practical relevance of physics in various domains.

5. Interdisciplinary Perspective: Students will develop an interdisciplinary perspective, recognizing the interconnectedness of physics with other scientific disciplines and their applications in addressing complex challenges in fields such as engineering, materials science, environmental science, and biophysics.

6. Communication Skills: Students will communicate scientific concepts, theories, and findings effectively in written, oral, and visual formats, fostering clarity, coherence, and persuasiveness in scientific communication.

7. Critical Thinking and Problem-solving Abilities: Students will cultivate critical thinking skills and problem-solving abilities, enabling them to analyze complex issues, evaluate evidence, and generate innovative solutions using logical reasoning and scientific methodologies.

8. Ethical and Social Responsibility: Students will demonstrate ethical awareness and social responsibility in their scientific endeavors, adhering to ethical standards, promoting integrity, inclusivity, and diversity, and contributing positively to society.

9. Global and Environmental Awareness: Students will develop awareness of global scientific developments, environmental issues, and sustainability challenges, understanding the role of physics in addressing global challenges and promoting sustainable development.

10. Career Readiness and Lifelong Learning: Students will be prepared for diverse career opportunities in academia, research, industry, government, and non-profit sectors, equipped with the knowledge, skills, and values necessary for success in their chosen fields, while fostering a commitment to lifelong learning and professional development.

3-Year B. Sc. Multidisciplinary Studies with Physics Under CCFUP-2023 & NEP-2020

Programme Outcome (POs) of 3-Year B. Sc. Multidisciplinary Studies with Physics

- **Integrated Knowledge Across Disciplines:** Graduates will acquire a broad understanding of concepts across multiple disciplines, with a strong foundation in physics, enabling them to appreciate and apply interdisciplinary knowledge to solve complex problems.

- **Foundational Physics Expertise:** Graduates will have a solid grounding in fundamental physics principles, including mechanics, electromagnetism, thermodynamics, and quantum mechanics, and the ability to apply these concepts to real-world situations.

- **Analytical and Critical Thinking:** Graduates will develop strong analytical and critical thinking skills, enabling them to evaluate scientific data, identify patterns, and solve complex problems using logical reasoning and evidence-based approaches.

- **Experimental and Laboratory Skills:** Graduates will be proficient in designing and conducting experiments, utilizing modern laboratory equipment.

- **Interdisciplinary Research and Innovation:** Graduates will be equipped to engage in interdisciplinary research, leveraging their knowledge of physics and other sciences to innovate and contribute to scientific advancements across various fields.

- **Effective Communication:** Graduates will possess strong communication skills, allowing them to clearly and effectively convey scientific ideas.

- **Ethical and Social Responsibility:** Graduates will understand the ethical implications of scientific research and practice, demonstrating a commitment to ethical behavior, social responsibility, and the application of science for the betterment of society.

- **Lifelong Learning and Adaptability:** Graduates will recognize the importance of lifelong learning and continuous professional development, staying abreast of advancements in their field and adapting to changing scientific and technological landscapes.

- **Teamwork and Collaboration:** Graduates will develop the ability to work effectively in diverse teams, demonstrating leadership, collaboration.

- **Global and Environmental Awareness:** Graduates will be aware of global scientific and environmental issues, understanding the impact of science and technology on the environment and society, and contributing to sustainable practices and solutions.

Program Specific Outcomes (PSOs) of 3-Year B. Sc. Multidisciplinary Studies with Physics

- **Foundational Physics Knowledge:** Graduates will have a thorough understanding of fundamental physics concepts, including mechanics, electromagnetism, thermodynamics, and quantum mechanics, and the ability to apply these principles to practical problems.

- **Interdisciplinary Integration:** Graduates will be adept at integrating knowledge from physics with other scientific disciplines such as mathematics, chemistry, biology, and environmental science, to develop comprehensive solutions to complex problems.

- **Experimental Proficiency:** Graduates will be skilled in designing, conducting, and analyzing experiments, using modern laboratory techniques and instruments to gather accurate and meaningful data.

- **Computational Skills:** Graduates will possess proficiency in computational tools and programming languages relevant to physics, enabling them to model physical systems, perform simulations, and analyze large data sets.

- **Research and Inquiry:** Graduates will be capable of conducting independent and collaborative research projects, formulating research questions, employing appropriate methodologies, and critically analyzing scientific literature.

- **Problem-Solving Abilities:** Graduates will demonstrate strong problem-solving skills, utilizing their knowledge of physics and other disciplines to address and resolve theoretical and practical challenges.

- **Effective Communication:** Graduates will be able to communicate scientific ideas and research findings effectively through written reports, scientific publications, and oral presentations, tailoring their communication to diverse audiences.

- **Ethical Practice and Professionalism:** Graduates will understand the ethical responsibilities of a scientist, demonstrating integrity, responsibility, and ethical behavior in their research and professional activities.

- **Awareness of Contemporary Issues:** Graduates will be informed about current scientific and technological developments, understanding their impact on society and the environment, and contributing to discussions on contemporary issues.

- **Preparation for Diverse Careers:** Graduates will be well-prepared for a variety of career paths, including advanced studies in physics or related fields, teaching, research, industry, and roles that require strong analytical and interdisciplinary skills.

GOVERNMENT GENERAL DEGREE COLLEGE, SALBONI

GOVERNMENT OF WEST BENGAL

AFFILIATED TO VIDYASAGAR UNIVERSITY

DEPARTMENT OF MATHEMATICS
PROGRAMME OUTCOME (PO)
CBCS BACHELOR OF SCIENCE

The Program outcomes of Mathematics Honours typically include :

PO	Description
PO1	**Teaching & Higher Study :** To prepare the students for a successful career in teaching or other professions as well as to motivate them for higher education .
PO2	**Knowledge Acquisition :** To provide strong foundation in basic sciences and mathematics. Gain a deep understanding of fundamental mathematical concepts, theories and techniques.
PO3	**Problem Solving:** To identify, formulate and analyze complex scientific problems reaching substantiated conclusions. Develop strong analytical and problem-solving skills to apply mathematical principle in various context.
PO4	**Individual and team working ability:** To develop individual and team work by functioning effectively as an individual or as a member in a group in computer laboratory classes.
PO5	**Solving Mathematical Problem:** To develop computational, logical and analyzing ability in solving different problems of Mathematics.
PO6	**Communication Skill :** To develop communicating ability, prepare effective presentations, andgive and receive clear instructions. Effectively communicate mathematical ideas and solutions both orally and in writing.
PO7	**Technology Integration**: To develop the ability to engage in independent and life-long learning inthe current context of technological change. Utilize the mathematical software and tools to enhance problem solving capacity.
PO8	**Scientific temperament** : To inculcate scientific temperament in the young minds and outside the scientific community.
PO9	**Critical thinking**: Cultivate the ability to think critically, logically and abstractly when approaching mathematical problem.
PO10	**Mathematical Rigor** : Demonstrate a high level of mathematical rigor in proof construction and analysis.
PO11	**Research Skill:** Acquire proficiency in conducting independent mathematical research and investigations.
PO12	**Collaboration:** Work collaboratively in a team environment, especially in interdisciplinary setting involving mathematics.
PO13	**Ethical Consideration:** Understand and apply ethical considerations in mathematical research and applications.

These outcomes provide a comprehensive overview of the skills and knowledge that students are expected to gain during their Mathematics Honours Programs may have variations in their outcomes based on the student.

PROGRAMME OUTCOME (PO)
BACHELOR OF SCIENCE - MATHEMATICS (GENERAL)
(CBCS SYLLABUS)

Programme Specific Outcomes No.	Programme Specific Outcomes (PSO)
PSO1	To apply knowledge in emerging and varied areas of Mathematics forhigher studies, research and industries related to software applications.
PSO2	To develop leadership and managerial skills and understanding the need for lifelong learning to be a competent professional.
PSO3	To equip with front level communication technologies (ICT) for innovatingideas and solutions to existing/novel challenges.
PSO4	To be acquainted with good laboratory practices.

4-YEAR UNDERGRADUATE PROGRAMME

PROGRAMME OUTCOME (PO)
BACHELOR OF SCIENCE (HONOURS) – MAJOR IN MATHEMATICS
(CCFUP & NEP)

Programme Specific Outcomes No.	Programme Specific Outcomes (PSO)
PSO1	To apply knowledge in emerging and varied areas of Mathematics forhigher studies, research and industries related to software applications.
PSO2	To develop leadership and managerial skills and understanding the need for lifelong learning to be a competent professional.
PSO3	To equip with front level communication technologies (ICT) for innovatingideas and solutions to existing/novel challenges.
PSO4	To be acquainted with good laboratory practices and develops proficiency in handling data using software programming plotting and data manipulation tools. It improves critical thinking and analytical skills through the application of software programming to real world problem.

PROGRAMME OUTCOME (PO)
BACHELOR OF SCIENCE - MATHEMATICS (GENERAL)
(CCFUP & NEP SYLLABUS)

Programme Specific Outcomes No.	**Programme Specific Outcomes (PSO)**
PSO1	To apply knowledge in emerging and varied areas of Mathematics forhigher studies, research and industries related to software applications.
PSO2	To develop leadership and managerial skills and understanding the need for lifelong learning to be a competent professional.
PSO3	To equip with front level communication technologies (ICT) for innovatingideas and solutions to existing/novel challenges.
PSO4	To be acquainted with good laboratory practices.

Course Outcomes and Program Specific Outcomes

B.Sc. (Honours)-CBCS Curriculum				
Semester	**Course**	**Course Title**	**Program Specific Outcomes**	**Course Outcomes**
SEMESTER-I	**CC-1**	Organic Chemistry-I (Theo)	Students will be able to understand the structures, bonding, and physical properties of organic molecules and reactive intermediates. They will also gain concepts of basic stereochemistry.	• Students will be able to learn valence bond theory, molecular orbital theory and MO picture of different types of organic molecules. • Students will gain knowledge of hybridization and shape of organic molecules. • Students will know the influence of hybridization on bond properties of organic molecules. • Students will learn different types of reactive intermediates. • Students will learn molecular projection interconversions and symmetry elements, as well as to describe the stereochemical characteristics of organic molecules.
		Organic Chemistry-I (Lab)	Students will be able to detect solid and liquid organic compounds by chemical tests.	• Students will be able to separate components of a binary solid mixture. • Students will be able to determine boiling point of common organic liquid compounds. • Students will be able to identify pure organic solid and liquid compounds.
	CC-2	Physical Chemistry-I (Theo)	Students will gain elementary knowledge of kinetic theory of gases, thermodynamics and chemical kinetics.	• Students will know about ideal gas model, real gas models-especially van der Waals' gas model. • Students will learn the fundamentals of thermodynamics with different thermodynamic processes. • Students will be able to derive thermodynamic relations. • Students will learn the laws of thermochemistry.

				• Students will gain knowledge of rate law, order and molecularity of a reaction. • Students will know about half-life of a reaction. • Students will be able to understand the effect of temperature on reaction rate.
		Physical Chemistry-I (Lab)	Students will learn to study the reaction kinetics of some well-known reactions, technique to determine pH of unknown solution and heat of neutralization.	• Students will be able to learn the determination of pH of unknown solution by colour matching method. • Students will be able determine the heat of neutralization of a strong acid by a strong base. • Students will be able to study the kinetics of acid-catalyzed hydrolysis of methyl acetate. • Students will be able to study study of kinetics of decomposition of H_2O_2. • Students will be able determine the heat of solution of oxalic acid from solubility measurement.
	GE1	Inorganic Chemistry-I (Theo) & Organic Chemistry-I (Theo)	Students will gain the elementary concepts of atomic structure, chemical periodicity, acids and bases, redox reactions. They will also learn about fundamental organic chemistry, basic stereochemistry and preparation and reactions of alkenes and alkynes.	• Students will be able to acquire knowledge about different theories of structure of atom and their application. • Students will learn about importance of periodicity in chemical and physical properties. • Students will gain knowledge of pH, buffer, Acid-base neutralization curves, indicator, choice of indicators etc. • Students will know the method of balancing equation of redox reaction, standard redox potentials with sign conventions, redox titration. • Students will get elementary idea of inductive effect, resonance, hybridization. • Students will learn about isomerism in organic compounds.

				• Students will learn about absolute configuaration of chiral molecules. • Students will learn about structure of organic molecules on the basis of VBT. • Students will get idea of different types of elimination reactions for synthesis of alkenes. • Students will learn about electrophilic addition reactions to alkenes and alkynes.
		Inorganic Chemistry-I (Lab) & Organic Chemistry-I (Lab)	Students will gain experimental knowledge of titrimetric estimations and qualitative analysis of single solid organic compounds.	• Students will be able to estimate sodium carbonate and sodium hydrogen carbonate present in a mixture. • Students will be able to estimate oxalic acid by titrating it with $KMnO_4$. • Students will be able to estimate water of crystallization in Mohr's salt by titrating with $KMnO_4$. • Students will be able to estimate Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. • Students will be able to estimate Cu (II) ions iodometrically using $Na_2S_2O_3$. • Students will be able to detect special elements (N, Cl, and S) in organic compounds. • Students will be able to acquire the techniques for detection of functional groups: Aromatic-NO_2, Aromatic -NH_2, -COOH, carbonyl (no distinction of –CHO and >C=O needed), -OH (phenolic) in solid organic compounds.
SEMESTER-II	**CC-3**	Inorganic Chemistry-I (Theo)	Students will gain the basic concepts of atomic structure, chemical periodicity, acids and bases, redox reactions.	• Students will gain knowledge of different theories of structure of atom and their application. • Students will know about the electronic configuration of atoms and modern IUPAC Periodic table.

				• Students will understand the importance of periodicity in chemical and physical properties. • Students will learn different concepts of acid-base theory. • Students also learn about pH, buffer, Acid-base neutralization curves, indicator, choice of indicators etc. • Students will be able to balance equation of redox reactions. • Students will get elementary idea of standard redox potentials with sign conventions, redox titration.
		Inorganic Chemistry-I (Lab)	Students will be able to acquire knowledge through hands-on experience of titrations.	• Students will be able to do acid and base titrations. • Students will be able to do oxidation-reduction titrimetric analysis.
	CC-4	Organic Chemistry-II (Theo)	Students will have understanding of stereochemistry of compounds having chiral axes as well as detailed knowledge of reaction mechanism.	• Students will know about chiral axis and stereoisomerism arising out of chiral axis. • Students will acquire knowledge of conformation and relative stability of conformers. • Students will learn about free energy, enthalpy and entropy factor, calculation of enthalpy change via BDE. • Students will gain concepts of organic acids and bases. • Students will be able to draw comparison between nucleophilicity and basicity. • Students will know about tautomerism and application of thermodynamic principles in tautomeric equilibria. • Students will know kinetic control and thermodynamic control of reactions.

				• Students will learn about primary and secondary kinetic isotopic effect. • Students will know different types of nucleophilic substitution reactions at sp^3centre and elimination reactions.
		Organic Chemistry-II (Lab)	Students will be able to prepare some important organic compounds with the help of common organic reactions in the laboratory.	Students will be able to experimentally conduct • Nitration of aromatic compounds. • Hydrolysis of amides/imides/esters. • Acetylation of phenols/aromatic amines. • Benzoylation of phenols/aromatic amines. • Diazo coupling reactions of aromatic amines. • Bromination of anilides using green approach (Bromate-Bromide method). • Green 'multi-component-coupling' reaction. • Selective reduction of m-dinitrobenzene to m-nitroaniline.
	GE2	Physical Chemistry-I (Theo) & Inorganic Chemistry-II (Theo)	Students will gain elementary knowledge of kinetic theory of gases, liquid and solid states of matter. They will also be able to understand various types of bonding in molecules with suitable examples.	Students will gain knowledge of • Maxwell's distribution of speed and kinetic energy of gas molecules. • Van der Waals equation and its features, derivation and application • Viscosity of gases and effect of temperature and pressure on coefficient of viscosity. • Effect of temperature on surface tension and coefficient of viscosity of a liquid. • Bravais Lattice and Laws of Crystallography. • Indexing of crystal planes and Bragg's law of diffraction. • Rate law, order and molecularity of a reaction. • Effect of temperature on reaction rate. • Qualitative idea of valence bond and band theories.

				• Molecular orbital concept of bonding and MO diagrams of different inorganic compounds. • Group trends in electronic configuration.
		Physical Chemistry-I (Lab) & Inorganic Chemistry-II (Lab)	Students will be able to do hands-on experiments on viscosity and surface tension measurements of liquids, reaction kinetics and inorganic semimicro analysis.	• Students will be able to determine the surface tension of a liquid using Stalagmometer. • Students will be able to determine relative and absolute viscosity of a liquid using an Ostwald's viscometer. • Students will be able study the kinetics of acid hydrolysis of methyl acetate with hydrochloric acid. • Students will be able to do qualitative semimicro analysis of mixtures containing three radicals.
SEMESTER-III	**CC-5**	Physical Chemistry-II (Theo)	Students will learn the laws which govern transport processes and can apply the laws of thermodynamics to various physical and chemical processes. Students will also acquire some knowledge on basics of quantum mechanics.	• Students will learn about viscosity of fluid. • Students will learn about conductance of strong and weak electrolytes. • Students will understand partial properties and Chemical potential. • Students will know about chemical potential and other properties of ideal substances. • Students will gain elementary concepts of operators. • Setting up of Schrodinger equation for one-dimensional box and its solution. • Setting up of Schrodinger equation for simple Harmonic Oscillator.
		Physical Chemistry-II (Lab)	Students will gain knowledge through hands-on experiments on conductometric study of ionic solutions, viscosity of liquids and conductometric titrations.	• Students can determine the viscosity of unknown liquid (glycerol, sugar) with respect to water. • Students can determine the partition coefficient for the distribution of I_2 between water and CCl_4.

				• Students can determine the Keq for $KI + I_2 = KI_3$, using partition coefficient between water and CCl_4. • Students can study the conductometric titration of an acid (strong, weak/ monobasic, dibasic) against base strong. • Students can verify the Ostwald's dilution law and can determine Ka of weak acid.
	CC-6	Inorganic Chemistry-II (Theo)	Students will be able to understand various types of bonding in molecules with suitable examples, nuclear chemistry, radioactivity.	• Students will acquire qualitative idea of valence bond and band theories. • Students will learn about Molecular orbital concept of bonding and MO diagrams of different inorganic compounds. • Students will know about various type nuclear reactions. • Students will learn the principles of determination of age of rocks and minerals, radiocarbondating.
		Inorganic Chemistry-II (Lab)	Students will acquire some practical knowledge on inorganic estimations.	• Students will be able to estimate Vitamin C. • Students will learn the estimation method of available chlorine in bleaching powder by iodometric titration. • Students will be able to estimate Cu in brass. • Students will learn the estimation method of Cr and Mn in Steel.
	CC7	Organic Chemistry-III (Theo)	Students will be able to investigate the mechanisms of electrophilic addition reactions, elimination reactions, and some reactions related to carbonyl compounds.	• Students will learn about electrophilic addition reactions to C=C and C≡C bonds • Students will know about electrophilic and nucleophilic aromatic substitution. • Students will gain knowledge of nucleophilic addition reaction to carbonyl group.

				• Students will gain knowledge of some important name reactions e.g. Aldol, Knoevenagel, Claisen-Schmidt, Dieckmann, Stobbe, Mannich, Perkin reactions. • Students will gain knowledge of the preparation and use of organometallic reagents. • Students will learn about twelve (12) principles of green chemistry.
		Organic Chemistry-III (Lab)	Students will acquire the ability to identify functional group(s) present in an organic compound.	• Students will be able to detect special elements (N, S, Cl, Br) by Lassaigne's test. • Students will learn to detect the functional groups ($-NO_2$), ($-NH_2$), phenolic –OH, (-COOH) etc. by systematic chemical tests. • Students will be able to determine melting point of a given organic compounds.
	SEC 1	Pharmaceutical Chemistry (Theo)	Concepts will be built on the design and synthesis of drug molecules.	• Students will understand basic retrosynthetic approach for drug synthesis. • Students will gain knowledge of synthesis of some potent drugs which are used as analgesics agents, antipyretic agents, anti-inflammatory agents, antibiotics, antibacterial and antifungal agents, antiviral agents etc.
		Pharmaceutical Chemistry (Lab)	Students will learn to synthesize drug molecules.	• Students will learn to prepare aspirin. • Students will learn to prepare magnesium bisilicate (antacid).
	GE3	Physical Chemistry-II (Theo) &	Concept will be built on chemical energetics, chemical equilibrium and ionic equilibrium, aromatic hydrocarbons, organometallic compounds and carbonyl compounds.	• Students will gain fundamental understanding of thermodynamics with different thermodynamic processes. • Students will learn to derive thermodynamic relations. • Students will learn laws of thermochemistry.

		Organic Chemistry-II (Theo)		• Students will know equilibrium constant and standard Gibbs free energy change. • Students will learn about K_P, K_C and K_X and relation among them. • Students will learn mechanism and scope of Nucleophilic aromatic substitution. • Students will acquire concepts of preparation of benzene from phenol, acetylene and benzene sulphonic acid. • Students will acquire concepts of preparations and uses of Grignard reagents. • Students will learn name reactions of aromatic compounds viz. Reimer-Tiemann reaction, Houben-Hoesch condensation, Schotten-Baumann reaction, Aldol, Cannizaro, Wittig, benzoin condensation reactions.
		Physical Chemistry-II (Lab) & Organic Chemistry-II (Lab)	Students will have experimental learing on thermochemistry and pH measurement. They will be able to detect solid and liquid organic compounds.	• Students will be able to determine heat capacity of calorimeter for different volumes. • Students will be able to determine enthalpy of neutralization of hydrochloric acid with sodium hydroxide. • Students will be able to determine enthalpy of ionization of acetic acid. • Students will be able to determine enthalpy of hydration of copper sulphate. • Students will be able to measure pH of different solutions like aerated drinks, fruit juices, shampoos and soaps. • Students will be able to identify of pure organic solid and liquid compounds.
SEMESTER-IV	**CC8**	Physical Chemistry-III (Theo)	Students will gain knowledge about solution chemistry and understanding of quantum	Students will be able to acquire knowledge of • Students will know about colligative properties.

			mechanical treatment of H-like system.	• Students will get the concept of phase, component and degrees of freedom. • Students will be able to understand phase diagram of one, two and three component systems • Students will learn Debye-Huckel limiting law. • Students will be able to derive mean ionic activity coefficient. • Students will learn Faraday's laws of electrolysis. • Students will learn the rules of oxidation/reduction of ions based on half-cell potentials. • Students will get some concept of dipole moment and polarizability. • Students will learn the Schrödinger equation in spherical polar coordinates. • Students will acquire concepts of quantum mechanical problem related to hydrogen atom and hydrogen like system.
		Physical Chemistry-III (Lab)	Students will acquire the hands-on skill to study the solubility product, effect of ionic strength on ionic reactions, phase diagram of liquid-liquid binary system.	• Students will be able to determine solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator). • Students will be able to perform potentiometric titration of Mohr's salt solution against standard $K_2Cr_2O_7$ solution. • Students will be able to determine Ksp for AgCl by potentiometric titration of $AgNO_3$ solution against standard KCl solution. • Students will be able to study the effect of ionic strength on the rate of Persulphate – Iodide reaction.

				• Students will be able to study the phenol-water phase diagram. • Students will be able to study the pH-metric titration of acid (mono- and di-basic) against strong base.
	CC9	Inorganic Chemistry-III (Theo)	Students will gain an introduction of industrially important inorganic materials and their extraction, preparation and application in various field.	• Students will know about the chief modes of occurrence of metals based on standard electrode potential. • Students will learn about the methods of purification of metals. • Students will acquire concepts on relative stability of different oxidation states and anomalous behaviour of s- and p- block elements. • Students will have understanding on structural aspects and applications of silicones and siloxanes, borazines, silicates and phosphazenes. • Students will learn Werner's theory of coordination complexes. • Students will learn IUPAC nomenclature of coordination complexes.
		Inorganic Chemistry-III (Lab)	Students will learn to synthesize some coordination compounds in laboratory.	• Students will be able to perform complexometric titration e.g. Zn(II) in a mixture of Zn(II) and Cu(II), • Students will be able to estimate hardness of water. • Students will be able to learn the techniques of preparation of some inorganic complexes.
	CC10	Organic Chemistry-IV (Theo)	Students will learn about nitrogenous compounds, organic spectroscopy and their various applications.	Students will be able to acquire knowledge of • Preparation, separation and identification of primary, secondary and tertiary amines. • Preparation and reactions of aliphatic and aromatic nitro compounds, alkyl nitrile and isonitrile.

				• Reactions of diazonium salts and their related compounds. • Rearrangement to electron-deficient carbon, nitrogen and oxygen atoms. • Aromatic rearrangement reactions and rearrangement reactions by green approach. • Retrosynthetic analysis, strategy of ring synthesis and asymmetric synthesis. • UV, IR and NMR Spectroscopy and their applications for identification of simple organic molecules
		Organic Chemistry-IV (Lab)	Students will acquire some practical knowledge on estimations of organic compounds.	• Students will be able to estimate glycine by Sörensen's formol method. • Students will be able to perform estimation of glucose by titration using Fehling's solution. • Students will be able to estimate sucrose by titration using Fehling's solution. • Students will be able to perform estimation of vitamin-C (reduced). • Students will be able to estimate aromatic amine (aniline) by bromination (Bromate-Bromide) method. • Students will be able to estimate phenol by bromination (Bromate-Bromide) method. • Students will be able to perform estimation of acetic acid in commercial vinegar.
	SEC 2	Pesticides Chemistry (Theo)	Students will get an overall knowledge of pesticide synthesis and uses.	Students will come to know about • Benefits and adverse effects of pesticides • Structure activity relationship of pesticides. • Synthesis and uses of representative pesticides viz. DDT, Malathion, Carbofuran, Chloranil etc.

		Pesticides Chemistry (Lab)	Students will learn to prepare some commercially important pesticides as well as to calculate acidity/alkalinity of a pesticide sample.	Students will be able to learn about • The calculation of acidity/alkalinity in given sample of pesticide formulations as per BIS specifications. • The preparation of simple organophosphates, phosphonates and thiophosphates.
	GE4	Physical Chemistry-III (Theo) & Analytical and Environmental Chemistry (Theo)	Students will gain elementary knowledge of Phase equilibria, conductance and electromotive force. They will also gain brief knowledge of Environmental Chemistry.	• Students will be able to acquire knowledge of ideal solutions and Raoult's law. • Students will have understanding of phases, components and degrees of freedom of a system. • Students will learn Gibbs Phase Rule and its thermodynamic derivation. • Students will be able to derive Clausius – Clapeyron equation. • Students will learn about conductance of strong and weak electrolytes. • Students will learn electromotive force of a cell and its measurement. • Students will have concept on solubility product and common ion effect.
		Physical Chemistry-III (Lab) & Analytical and Environmental Chemistry (Lab)	Students will be able to do hands-on experiments on phase diagram of a binary system, conductometric titrations and potentiometric titrations.	• Students will be able to determine the critical solution temperature and composition of the phenol water system. • Students will be able to determine dissociation constant of a weak acid by conductometric titration. • Students will be able to perform the conductometric titrations of strong acid vs strong base and strong acid vs strong base.

				• Students will be able to perform the potentiometric titrations of weak acid vs. strong base, potassium dichromate vs. Mohr's salt.
SEMESTER-V	**CC11**	Inorganic Chemistry-IV (Theo)	Solid concept will be built on the theory and application of coordination chemistry as well as on the general properties of d- and f-block elements.	• Students will know about valence bond description and its limitations. • Students will be able to acquire knowledge on elementary Crystal Field Theory. • Students will learn about magnetism and colour of coordination compounds. • Students will have understanding of 3d, 4d and 5d elements in term of electronic configuration, oxidation states, redox properties. • Students will learn electronic configuration, oxidation states, colour, spectral and magnetic properties of lanthanides and actinides.
		Inorganic Chemistry-IV (Lab)	Students will gain practical knowledge on Chromatographic separation of metal ions and gravimetry.	• Students will be able to perform paper chromatographic separation of metal ions. • Students will learn gravimetric estimation of Ni(II) using Dimethylglyoxime (DMG). • Students will be able to estimate copper as CuSCN gravimetrically. • Students will learn gravimetric estimation of Al(III) by precipitating with oxine. • Students will be able to measure of 10Dq by spectrophotometric method.
	CC12	Organic Chemistry-V (Theo)	Basic knowledge of pericyclic reactions, dynamic stereochemistry, structure and synthesis of carbohydrates,	Students will be able to acquire knowledge about • Students will be able to acquire knowledge of synthesis of polynuclear hydrocarbons and their derivatives.

			biomolecules and heterocyclic compounds.	• Students will learn the synthesis of heterocyclic compounds (5- and 6-membered) and their important chemical reactions. • Students will gain concepts on conformational analysis, symmetry properties and optical activity of cyclohexane and its derivatives. • Students will have understanding of reaction mechanism e.g. elimination (E2, E1), nucleophilic substitution (S_N1, S_N2, S_Ni, NGP), rearrangements in cyclohexane system. • Students will be able to acquire knowledge on mechanism, stereochemistry, regioselectivity in case of electrocyclic reactions, cycloaddition reactions and sigmatropic reactions. • Students will know about the structure of monosaccharides, disaccharides and polysaccharides. • Students will learn reactions and transformations of monosaccharides. • Students will learn synthesis and chemical reactions of amino acids. • Students will have understanding of primary, secondary and tertiary structures of peptides and proteins. • Students will learn about details structural analysis and chemical reactions of nucleic acids.
		Organic Chemistry-V (Lab)	Chromatographic separations of biomolecules, dyes and pigments and spectroscopic analysis of various organic compounds.	• Students will be able to acquire hands-on learning of thin layer, column and paper chromatographic separation techniques of mixture of amino acids, dyes and pigments. • Students will be able to analyse IR and ^{1}H NMR spectra of some common organic compounds.

	DSE1	Advanced Physical Chemistry (Theo)	Students will gain basic knowledge of solid-state chemistry, statistical thermodynamics, polymer chemistry and dielectric properties of molecules.	• Students will be able to gather knowledge on Bravais Lattice and Laws of Crystallography. • Students will learn about indexing of crystal planes and Bragg's law of diffraction. • Students will have knowledge about the structures of NaCl and KCl crystals. • Students will have understanding of relation between entropy and probability. • Students will know Boltzmann distribution formula (with derivation). • Students will learn about polymer science and dielectric properties of molecules.
		Advanced Physical Chemistry (Lab)	Computer programs based on numerical methods related physical chemistry.	• Students will be able to understand numerical methods of computation with the help of programming.
	DSE2	Analytical Methods in Chemistry (Theo)	Students will get the basic learning on quantitative and qualitative aspects of analysis, optical methods of analysis, thermal methods of analysis, electroanalytical methods & solvent separation techniques.	• Qualitative and quantitative aspects of analysis. • Students will learn basic principles of instrumentation for single and double beam UV-visible spectrophotometer. • Students will learn basic principles of instrumentation for single and double beam IR spectrophotometer. • Students will gain knowledge on Flame Atomic Absorption and emission Spectrometry. • Students will learn the theory of thermogravimetric analysis and the techniques for quantitative estimation of Ca and Mg from their mixture. • Students will have concept of basic principle of pH metric, potentiometric and conductometric titrations.

				• Students will have concept of chromatographic separation techniques.
		Analytical Methods in Chemistry (Lab)	Students will be able to learn chromatographic separation techniques and spectrophotometric techniques.	Students will be able to acquire hands-on learning of • Chromatographic separation of organic molecules, dyes and active ingredients of plants, flowers and juices. • Spectrophotometric determination of pKIn. • pH determination of soil.
SEMESTER-VI	**CC13**	Inorganic Chemistry-V (Theo)	Concept will be built on bioinorganic chemistry, organometallic chemistry, reaction kinetics of inorganic compounds.	Students will be able to learn • Students will learn about essential and beneficial elements, major, trace and ultra-trace elements. • Students will have knowledge of basic chemical reactions in the biological systems and the role of metal ions ((specially Na^{+}, K^{+}, Mg^{2+}, Ca^{2+}, $Fe^{3+/2+}$, $Cu^{2+/+}$, and Zn^{2+}). • Students will have knowledge of dioxygen management proteins, electron transfer proteins. • Students will know organometallic compounds and their classification depending of bond types. • Students will have knowledge of preparation and structure of some important Organometallic compounds e.g. Zeise's salt, ferrocene. • Students will learn the reaction mechanisms in inorganic compounds. • Students will learn trans-effect and its application in complex synthesis
		Inorganic Chemistry-V (Lab)	Students will have practical knowledge of qualitative semimicro analysis.	Students will be able to learn through hands-on experiments of qualitative semimicro analysis of mixtures containing four radicals and to assign the most probable composition.

	CC14	Physical Chemistry-V(Theo)	Concepts will be built on molecular spectroscopy, photochemistry and colloids.	• Students will be able to gather knowledge Rotational, Vibrational, Raman and Nuclear magnetic Resonance (NMR) spectroscopy. • Students will learn principle and applications of Electron Spin Resonance (ESR) spectroscopy. • Students will learn the Lambert-Beer's law and its limitations. • Students will know the physical significance of absorption coefficients. • Students will learn Laws of photochemistry. • Students will have the concepts of photochemical processes and rate of photochemical processes. • Students will learn about surface tension, surface energy and capillary action of liquid. • Students will gain concepts on physical and chemical adsorption and different adsorption isotherm. • Students will learn about lyophobic and lyophilic colloids, their stability and zeta potential.
		Physical Chemistry-V (Lab)	Students will have expertise on spectrophotometric studies.	• Students will be able to determine the surface tension of a liquid using Stalagmometer. • Students will be able to determine the CMC from surface tension measurements. • Students will be able to verify Beer and Lambert's Law for $KMnO_4$ and $K_2Cr_2O_7$ solution, spectrophotometrically. • Students will be able to study the kinetics of $K_2S_2O_8$ + KI reaction, spectrophotometrically. • Students will be able to determine the pH of unknown buffer spectrophotometrically. • Students will be able to determine the CMC from Spectrophotometric measurement.

	DSE3	Green Chemistry (Theo)	Students will come to know the principles of green chemistry, examples of green synthesis, reactions and some real-world cases, present scenario and future trends of green chemistry.	• Students will know twelve fundamental principles of green chemistry with their explanations and designing green syntheses using these principles. • Students will have knowledge of green synthesis of the some industrially important compounds e.g. adipic acid, catechol etc. • Students will have ability to design microwave assisted reactions in water, Ultrasound assisted reactions. • Students will know about combinatorial green chemistry. • Students will learn the role of green chemistry in sustainable development.
		Green Chemistry (Lab)	Students will learn to synthesize organic compounds using the principles of green chemistry.	• Students will learn to prepare and characterize gold nanoparticles of using tea leaves extract. • Students will learn to prepare biodiesel from vegetable/ waste cooking oil. • Students will be able to perform benzoin condensation using thiamine hydrochloride as a catalyst instead of cyanide. • Students will be able to perform solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
	DSE4	Polymer Chemistry (Theo)	Students will be able to learn functionality, kinetics of polymerisation, molecular wt. determination, glass transition temperature.	Students will gather knowledge of • Different types of polymerization processes. • Relationships between functionality, extent of reaction and degree of polymerization. • Nature structure and properties of polymers. • Determination of molecular weight of polymers. • Glass transition temperature (Tg) and determination of Tg.

		Polymer Chemistry (Lab)	Students will learn to prepare synthetic polymers.	• Students will be able to Prepare nylon 66/ polymer • Students will be able to prepare acrylamide by redox polymerization of • Students will be able to prepare acrylonitrile by precipitation polymerization. • Students will be able to prepare urea-formaldehyde resin. • Students will be able to prepare novalac resin/ resold resin. • Students will be able to determine the molecular weight of polymer by viscometry. • Students will be able to determine the viscosity-average molecular weight of poly(vinyl alcohol).
B.Sc. (General)-CBCS Curriculum				
SEMESTER-I	**DSC 1A/2A/3A**	Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Theo)	Students will gain the elementary concepts of atomic structure and chemical bonding. Students will also be able to know about fundamental organic chemistry, basic stereochemistry and organic reaction mechanism.	• Students will be able to acquire knowledge of different theories of structure of atom and their application. • Students will have the understanding of shapes of orbitals and quantum numbers. • Students will know about lattice energy and Born-Haber cycle. • Students will have qualitative idea of valence bond and band theories. • Students will understand molecular orbital concept of bonding and MO diagrams of different inorganic compounds. • Students will know about inductive effect, resonance, hybridization, isomerism in organic compounds. • Students will be able to determine absolute configuaration of chiral molecules.

				• Students will understand structure of organic molecules on the basis of VBT. • Students will know about different types of elimination reactions for synthesis of alkenes. • Students will learn different electrophilic addition reactions to alkenes and alkynes.
		Atomic Structure, Bonding, general organic chemistry & aliphatic hydrocarbons (Lab)	Students will gain experimental knowledge of titrimetric estimations and qualitative analysis of single solid organic compounds.	• Students will be able estimate sodium carbonate and sodium hydrogen carbonate present in a mixture. • Students will learn to estimate oxalic acid by titrating it with $KMnO_4$. • Students will be able estimate water of crystallization in Mohr's salt by titrating with $KMnO_4$. • Students will learn to estimate Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. • Students will learn to estimate Cu (II) ions iodometrically using $Na_2S_2O_3$. • Students will learn to detect special elements (N, Cl, and S) in organic compounds. • Students will learn to detect functional groups: Aromatic-NO_2, Aromatic -NH_2, -COOH, carbonyl (no distinction of –CHO and >C=O needed), -OH (phenolic) in solid organic compounds.
SEMESTER-II	**DSC 1B/2B/3B**	Chemical Energetics, Equilibria &Functional Organic	Concept will be built on chemical energetics, chemical equilibrium and ionic equilibrium, aromatic hydrocarbons, organometallic	Students will gain understanding of • Fundamentals of thermodynamics with different thermodynamic processes. • Laws of thermochemistry. • Equilibrium constant and standard Gibbs free energy change.

		Chemistry (Theo)	compounds and carbonyl compounds.	• Definitions of K_P, K_C and K_X and relation among them. • Mechanism and scope of Nucleophilic aromatic substitution. • Preparation of benzene from phenol, acetylene and benzene sulfonic acid. • Preparations and uses of Grignard reagents. • Name reactions of aromatic compounds viz. Reimer-Tiemann reaction, Houben-Hoesch condensation, Schotten-Baumann reaction, • Nucleophilic addition reaction to carbonyl group. • Some important name reactions e.g. Aldol, Cannizaro, Wittig, benzoin condensation reactions.
		Chemical Energetics, Equilibria &Functional Organic Chemistry (Lab)	Students will have experimental learing on thermochemistry and pH measurement. They will be able to detect solid and liquid organic compounds.	• Students will be able to determine enthalpy of neutralization of hydrochloric acid with sodium hydroxide. • Students will be able to determine enthalpy of ionization of acetic acid. • Students will be able to determine enthalpy of hydration of copper sulphate. • Students will be able to measure the pH of different solutions like aerated drinks, fruit juices, shampoos and soaps. • Students will be able to identify of pure organic solid and liquid compounds.
SEMESTER-III	**DSC 1C/2C/3C**	Solutions, Phase equilibrium, Conductance , Electrochemi	Students will gain elementary knowledge of Phase equilibria, conductance and electromotive force. They will also gain brief understanding of structure, synthesis and reactions of	Students will be able to acquire knowledge of • Ideal solutions and Raoult's law. • Phases, components and degrees of freedom of a system. • Gibbs Phase Rule and its thermodynamic derivation. • Derivation of Clausius-Clapeyron equation.

		stry & Functional Organic Chemistry (Theo)	aliphatic and aromatic acids, amines and biomolecules.	• Conductance of strong and weak electrolytes. • Electromotive force of a cell and its measurement. • Acidic and alkaline hydrolysis of esters. • Preparation and reactions of aliphatic and aromatic amines. • Reactions and transformations of monosaccharides. • Synthesis and chemical reaction of amino acids.
		Phase equilibrium, Conductance, Electrochemistry & Functional Organic Chemistry (Lab)		• Students will be able to detect the functional groups ($-NO_2$), ($-NH_2$), phenolic –OH, (-COOH) etc. by systematic chemical tests. • Students will be able to determine the critical solution temperature and composition of the phenol water system. • Students will be able to determine dissociation constant of a weak acid by conductometric titration. • Students will be able to perform the conductometric titrations of strong acid vs strong base and strong acid vs strong base. • Students will be able to perform the potentiometric titrations of weak acid vs. strong base, potassium dichromate vs. Mohr's salt. • Students will be able to separate amino acids by paper chromatography.
SEMESTER-IV	**DSC 1D/2D/3D**	Coordination Chemistry, States of matter Chemical Kinetics (Theo)	Students will acquire some elementary knowledge of kinetic theory of gases, solid and liquid states and chemical kinetics.	Students will gain some understanding on • Ideal gas model, real gas models-especially van der Waals' gas model. • Valence Bond theory and its limitations. • Elementary Crystal Field Theory.

				• Magnetism and Colour of coordination compounds • 3d, 4d and 5d elements in term of electronic configuration, oxidation states, redox properties. • Electronic configuration, oxidation states, colour, spectral and magnetic properties of lanthanides and actinides.
		Coordination Chemistry, States of matter Chemical Kinetics (Lab)	Students will have practical knowledge of qualitative semimicro analysis.	• Students will be able to determine the surface tension of a liquid using Stalagmometer. • Students will be able to determine relative and absolute viscosity of a liquid using an Ostwald's viscometer. • Students will be able study the kinetics of acid hydrolysis of methyl acetate with hydrochloric acid. • Students will be able to learn through hands-on experiments of qualitative semimicro analysis of acid and basic radicals.
SEMESTER-V	**DSE 1A**	Analytical Methods in Chemistry (Theo)	Students will get the basic learning on quantitative and qualitative aspects of analysis, optical methods of analysis, thermal methods of analysis, electroanalytical methods & solvent separation techniques.	• Students will know the qualitative and quantitative aspects of analysis. • Students will learn basic principles of instrumentation for single and double beam UV-visible spectrophotometer. • Students will learn basic principles of instrumentation for single and double beam IR spectrophotometer. • Students will gain knowledge on Flame Atomic Absorption and emission Spectrometry. • Students will learn the theory of thermogravimetric analysis and the techniques for quantitative estimation of Ca and Mg from their mixture.

				• Students will have concept of basic principle of pH metric, potentiometric and conductometric titrations. • Students will have concept of chromatographic separation techniques.
		Analytical Methods in Chemistry (Lab)	Students will be able to learn chromatographic separation techniques and spectrophotometric techniques.	Students will be able to acquire hands-on learning of • Chromatographic separation organic molecules, dyes and active ingredients of plants, flowers and juices. • Paper chromatographic separation of Fe^{3+}, Al^{3+}, and $Cr^{3+.}$ • Separation and identification of the monosaccharide present in the given mixture (glucose & fructose) by paper chromatography. Reporting the Rf values. • Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their Rf values. • Spectrophotometric determination of pKIn. • pH determination of soil.
	SEC 2	Analytical Clinical Biochemistry (Theo.)		Students will be able to acquire knowledge on • Structure and reactions transformations of monosaccharides. • Synthesis and chemical reactions of amino acids. • Classification and mechanism of action of enzymes. • Biological importance of triglycerides and phosphoglycerides and cholesterol. • Structural study and chemical reactions of nucleic acids.

		Analytical Clinical Biochemistry (Lab)	Students will be able to identify and estimate carbohydrates, lipids and proteins.	• Students will be to determine the iodine number of oil. • Students will be to determine the saponification number of oil. • Students will be to determine cholesterol using Liebermann- Burchard reaction. • Students will be to determine protein by the Biuret reaction.
SEMESTER-VI	**DSE 1B**	Green Chemistry (Theo)	Students will come to know the principles of green chemistry, examples of green synthesis, reactions and some real-world cases, present scenario and future trends of green chemistry.	• Students will know twelve fundamental principles of green chemistry with their explanations and designing green syntheses using these principles. • Students will have knowledge of green synthesis of the some industrially important compounds e.g. adipic acid, catechol etc. • Students will have ability to design microwave assisted reactions in water, Ultrasound assisted reactions. • Students will know about combinatorial green chemistry. • Students will learn the role of green chemistry in sustainable development.
		Green Chemistry (Lab)	Students will learn to synthesize organic compounds using the principles of green chemistry.	• Students will learn to prepare and characterize gold nanoparticles of using tea leaves extract. • Students will learn to prepare biodiesel from vegetable/ waste cooking oil. • Students will be able to perform benzoin condensation using thiamine hydrochloride as a catalyst instead of cyanide. • Students will be able to perform solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).

	SEC 4	Pesticide Chemistry (Theo)	Students will get an overall knowledge of synthesis and uses of pesticide.	Students will come to know about • Benefits and adverse effects of pesticides • Structure activity relationship of pesticides. • Synthesis and uses of representative pesticides viz. DDT, Malathion, Carbofuran, Chloranil etc.
		Pesticide Chemistry (Lab)	Students will learn to prepare some commercially important pesticides as well as to calculate acidity/alkalinity of a pesticide sample.	• Students will be able to calculate acidity/alkalinity in given sample of pesticide formulations as per BIS specifications. • Students will be able to prepare simple organophosphates, phosphonates and thiophosphates.
4-Year B.Sc. Honours Major in Chemistry (CCFUP-NEP)				
SEMESTER-I	**Major-1**	**CEMHMJ101**	Organic Chemistry-I	Students will be able to understand the structures, bonding, and physical properties of organic molecules and reactive intermediates. They will also gain concepts of basic stereochemistry.	• Students will be able to learn valence bond theory, molecular orbital theory and MO picture of different types of organic molecules. • Students will gain knowledge of hybridization and shape of organic molecules. • Students will know the influence of hybridization on bond properties of organic molecules. • Students will learn different types of reactive intermediates. • Students will learn molecular projection interconversions and symmetry elements, as well as to describe the stereochemical characteristics of organic molecules.
			Organic Chemistry Lab- I	Students will be able to detect solid and liquid organic compounds by chemical tests.	• Students will be able to separate components of a binary solid mixture. • Students will be able to determine boiling point of common organic liquid compounds. • Students will be able to identify pure organic solid and liquid compounds.

	SEC	**CEMSEC01**	Chemistry of Cosmetics & Perfumes (Lab)	Students will learn to prepare cosmetics and perfumes.	• Students will learn to prepare talcum powder. • Students will learn to prepare shampoo. • Students will learn to prepare enamels. • Students will learn to prepare hair remover. • Students will learn to prepare face cream. • Students will learn to prepare nail polish and nail polish remover. • Students will learn to prepare lipstick.
	Minor-1	**CEMMI01**	Inorganic Chemistry-I (Theo) & Physical Chemistry-I (Theo)	Students will gain the elementary concepts of atomic structure, acids-bases, redox reactions and states of matter.	• Students will be able to acquire knowledge about different theories of structure of atom and their application. • Students will gain knowledge of pH, buffer, Acid-base neutralization curves, indicator, choice of indicators etc. • Students will know the method of balancing equation of redox reaction, standard redox potentials with sign conventions, redox titration. • Students will learn Maxwell's distribution of speed and kinetic energy of gas molecules, Van der Waals equation, viscosity of gases and effect of temperature and pressure on coefficient of viscosity. • Students will know about the effect of temperature on surface tension and coefficient of viscosity of a liquid. • Students will gain knowledge of Bravais Lattice and Laws of Crystallography, indexing of crystal planes and Bragg's law of diffraction.
			Inorganic Chemistry-I (Lab) &		• Students will be able to estimate sodium carbonate and sodium hydrogen carbonate present in a mixture. • Students will be able to estimate oxalic acid by titrating it with $KMnO_4$.

			Physical Chemistry-I (Lab)		• Students will be able to estimate water of crystallization in Mohr's salt by titrating with $KMnO_4$. • Students will be able to estimate Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. • Students will be able to estimate Cu (II) ions iodometrically using $Na_2S_2O_3$. • Students will be able to determine the surface tension of a liquid using Stalagmometer. • Students will be able to determine relative and absolute viscosity of a liquid using an Ostwald's viscometer.
SEMESTER-II	**Major-2**	**CEMHMJ102**	Inorganic Chemistry-I	Students will gain the basic concepts of atomic structure, chemical periodicity, acids and bases, redox reactions.	• Students will gain knowledge of different theories of structure of atom and their application. • Students will know about the electronic configuration of atoms and modern IUPAC Periodic table. • Students will understand the importance of periodicity in chemical and physical properties. • Students will learn different concepts of acid-base theory. • Students also learn about pH, buffer, Acid-base neutralization curves, indicator, choice of indicators etc. • Students will be able to balance equation of redox reactions. • Students will get elementary idea of standard redox potentials with sign conventions, redox titration.
			Inorganic Chemistry Lab-I	Students will be able to acquire knowledge through hands-on experience of titrations.	• Students will be able to do acid and base titrations. • Students will be able to do oxidation-reduction titrimetric analysis.

	SEC	**CEMSEC02**	Medicinal & Pharmaceutical Chemistry (Lab)	Students will learn to extract phytochemicals from plant.	• Students will learn to extract eucalyptus leaf ingredient • Students will learn to extract eugenol from clove • Students will learn to extract nicotine from tobacco. • Students will learn to extract curumine from turmeric. • Students will learn to extract caffeine from tea/coffee.
	Minor-2	**CEMMI01**	Organic Chemistry-I & Physical Chemistry-II (Theo)	Students will learn about fundamental organic chemistry, basic stereochemistry and preparation and reactions of alkenes and alkynes. They will also gain elementary knowledge of chemical kinetics.	• Students will get elementary idea of inductive effect, resonance, hybridization. • Students will learn about isomerism in organic compounds. • Students will learn about absolute configuaration of chiral molecules. • Students will learn about preparation methods and reactions of alkanes, alkenes and alkynes. • Students will gain knowledge of rate law, order and molecularity of a reaction. • Students will know about half-life of a reaction. • Students will be able to understand the effect of temperature on reaction rate.
			Organic Chemistry-I & Physical Chemistry-II (Lab)		• Students will be able to detect special elements (N, Cl, and S) in organic compounds. • Students will be able to acquire the techniques for detection of functional groups in solid organic compounds. • Students will be able to study the kinetics of acid-catalyzed hydrolysis of methyl acetate. • Students will be able to study study of kinetics of decomposition of H_2O_2.

3-Year B.Sc. (Multidisciplinary Studies) with Chemistry (CCFUP-NEP)					
SEMESTER-I	**Major-1**	**CEMPMJ101**	Inorganic Chemistry-I (Theo) & Organic Chemistry-I (Theo)	Students will gain the basic concepts of atomic structure, redox reactions. Students will also gain elementary knowledge of fundamental organic chemistry, basic stereochemistry and preparation and reactions of alkenes and alkynes.	• Students will gain knowledge of different theories of structure of atom and their application. • Students will be able to balance equation of redox reactions. • Students will get elementary idea of standard redox potentials with sign conventions, redox titration. • Students will get elementary idea of inductive effect, resonance, hybridization. • Students will understand isomerism in organic compounds. • Students will learn about absolute configuaration of chiral molecules. • Students will learn about preparation methods and reactions of alkanes, alkenes and alkynes.
			Inorganic Chemistry-I (Lab) & Organic Chemistry-I (Lab)	Students will learn volumetric analysis of inorganic compounds. Students will also learn the methods of detection of special elements in organic compounds and paper chromatographic separation of amino acids and sugars.	• Students will be able to acquire hands-on learning paper chromatographic separation techniques of mixture of sugars (glucose, fructose), mixture of amino acids e.g. glycine, aspartic acid, glutamic acid etc. • Students will be able to estimate sodium carbonate and sodium hydrogen carbonate present in a mixture. • Students will be able to estimate oxalic acid by titrating it with $KMnO_4$. • Students will be able to estimate water of crystallization in Mohr's salt by titrating with $KMnO_4$. • Students will be able to estimate Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator.

					• Students will be able to estimate Cu (II) ions iodometrically using $Na_2S_2O_3$.
	Minor-1	**CEMMI01/C1**	Inorganic Chemistry-I (Theo) & Physical Chemistry-I (Theo)	Students will gain the elementary concepts of atomic structure, acids-bases, redox reactions and states of matter.	• Students will be able to acquire knowledge about different theories of structure of atom and their application. • Students will gain knowledge of pH, buffer, Acid-base neutralization curves, indicator, choice of indicators etc. • Students will know the method of balancing equation of redox reaction, standard redox potentials with sign conventions, redox titration. • Students will learn Maxwell's distribution of speed and kinetic energy of gas molecules, Van der Waals equation, viscosity of gases and effect of temperature and pressure on coefficient of viscosity. • Students will know about the effect of temperature on surface tension and coefficient of viscosity of a liquid. • Students will gain knowledge of Bravais Lattice and Laws of Crystallography, indexing of crystal planes and Bragg's law of diffraction.
			Inorganic Chemistry-I (Lab) & Physical Chemistry-I (Lab)		• Students will be able to estimate sodium carbonate and sodium hydrogen carbonate present in a mixture. • Students will be able to estimate oxalic acid by titrating it with $KMnO_4$. • Students will be able to estimate water of crystallization in Mohr's salt by titrating with $KMnO_4$.

					• Students will be able to estimate Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. • Students will be able to estimate Cu (II) ions iodometrically using $Na_2S_2O_3$. • Students will be able to determine the surface tension of a liquid using Stalagmometer. • Students will be able to determine relative and absolute viscosity of a liquid using an Ostwald's viscometer.
SEMESTER-II	**Minor-2**	**CEMMI02/C2**	Organic Chemistry-I & Physical Chemistry-II (Theo)	Students will learn about fundamental organic chemistry, basic stereochemistry and preparation and reactions of alkenes and alkynes. They will also gain elementary knowledge of chemical kinetics.	• Students will get elementary idea of inductive effect, resonance, hybridization. • Students will know about isomerism in organic compounds. • Students will learn about absolute configuaration of chiral molecules. • Students will get idea of different types of elimination reactions for synthesis of alkenes. • Students will learn about electrophilic addition reactions to alkenes and alkynes. • Students will gain knowledge of rate law, order, molecularity and half-life of a reaction. • Students will be able to understand the effect of temperature on reaction rate.
			Organic Chemistry-I & Physical Chemistry-II (Lab)		• Students will be able to detect special elements (N, Cl, and S) in organic compounds. • Students will be able to acquire the techniques for detection of functional groups in solid organic compounds. • Students will be able to study the kinetics of acid-catalyzed hydrolysis of methyl acetate. • Students will be able to study study of kinetics of decomposition of H_2O_2.

Program Outcomes

PO-1: Students will develop critical thinking skills and the ability to solve complex problems in chemistry by applying theoretical knowledge to practical situations.

PO-2: Students will possess strong laboratory skills, including the ability to perform experiments, analyse data, and interpret results using modern techniques and instrumentation.

PO-3: Students will be able to select, design and apply appropriate experimental techniques along with IT tools to solve chemical problems.

PO-4: Students will recognize the interdisciplinary nature of chemistry and its connections to other fields such as biology, physics, environmental science, and materials science.

PO-5: Students will effectively communicate scientific ideas, both orally and in writing, to diverse audiences including peers, instructors, and the broader community.

PO-6: Students will be able to conduct research, design experiments, and evaluate scientific literature in order to contribute to the advancement of knowledge in chemistry.

PO-7: Students will be able to communicate effectively through report writing, documentation and effective presentations.

PO-8: Students will demonstrate professionalism in their interactions with colleagues and the broader community.

PO-9: Program will provide knowledge and skills to the students that will enable them to undertake further studies in chemistry on related areas or multi-disciplinary areas that can be helpful for self-employment, entrepreneurship or further studies in the same domain.

PO-10: Students will be prepared for a variety of career paths including industry, academia, government, and healthcare, as well as for further study in graduate or professional programs.