DEPARTMENT OF BENGALI
Saldiha College
Saldiha, Bankura

PROGRRAME SPECIFIC OUTCOME

By completing the honorary bachelor's degree course in Bengali (BNGH) & Bengali General (BNGG), students can benefit in the following ways: -------

PSO-1: Bengali-speaking students get a clear idea of the evolutionary diversity and richness of their language.

PSO-2: Students get acquainted with the great writer and their art style.

PSO-3: Gains the ability to read and taste literature.

PSO-4: Through close literary lessons, they can keep their human feelings alive and alert.

PSO-5: Students get help in journalism from their curriculum. Through radio and television they can be associated with subsequent earnings.

PSO-6: They can be financially supported in the form of proof correction, advertisement composition etc.

PSO-7: Through language and literature lessons, a person becomes a complete human being and learns to build a humane relationship with other people.

COURSE OUTCOMES

Semester - 1

CC-1

Just as we can gain knowledge about contemporary literature starting from Charyapadas by reading the history of literature of ancient times, so we can gain knowledge about the resources of medieval Bengali literature, Srikrishnakirtan, Mangalkavya, Biography, Narrative, Vaishnavism and Shakta verses. .

CC - 2

In this paper basic knowledge of rhyme and rhetoric is imparted and the students are informed about the grammatical and poetic beauty of rhyme and rhetoric.

Semester - 2

CC - 3

Vaishnava Padavali and Shakta Padavali are the text of this paper. Through this the students get acquainted with two very lively literary works of the Middle Ages and also awaken their knowledge about the living soul and paramatma.

CC - 4

In this paper, the students read some chapter of the Ramayana by Krittibas and Annadamangal , through which they became acquainted with the literary works of medieval Bengal and became acquainted with Indian epics.

Semester - 3

CC - 5

Here we introduce the students to the modern stage of the history of literature. In this paper, students can get acquainted with the religious, social and political environment of modern literature as well as how it is reflected in the field of literature.

CC-6

This paper enriches the knowledge of students about Bengali linguistics. From here they can learn about the morphological and phonological features of language, as well as the various techniques used to make words and sentences, to make sentences more beautiful.

CC-7

In this paper, we introduce students to two famous medieval poems, Michael Madhusudan's Patrakavya (Epistles) Birangana and Biharilal Chakraborty's Geetakavya(Lyric poem) Sardamangal.

Semester - 4

CC - 8

In this paper, Rabindra Kavita and modern poetry are taught to the students through their taste in poetry. Extensive enthusiasm can be noticed among them.

CC-9

Deenbandhu Mitra's famous play Nildarpan is known to us as the literary mirror of the blue rebellion of Bengal and India. The students were introduced to the drama of that mass movement. Besides, they were also introduced to Rabindranath's allegorical drama Sharadotsab. Enthusiasm arose in their minds about the various parts of the play.
CC-10

In this paper Bankimchandra's historical novel Chandrasekhar and Tarashankar's social and mass movement novel Ganadevata are taught to the students. They can also learn the technique of reading novels and later they can become a reader of Bengali literature through this lesson.

Semester – 5

CC -11

The students are brought to the courtyard of the Bengali short story. The habit of reading and tasting short stories is instilled in them and how literature is formed through contemporary realities is given knowledge to them.

CC-12

In this course students can learn about the forms of literature, various theories, etc., as well as the history of the various sections of literature, its origin and development from this letter. This paper is the culmination of their talents.

Semester - 6

CC -13

Attempts are made to make the students stand on the history of Sanskrit and English literature. Their literary sense is built on the traditions of India and the West.

CC-14

The paper seeks to increase students' knowledge of Bengali folklore as well as encourage them to write essays on various topics. They are encouraged to write about literature as well as folklore.

DSE papers

In this paper we see that our students are aware of Bengali novels, Bengali short stories and they have ideas about the origin and development of poetry and essay literature. Their research attitude gradually developed.

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DEPARTMENT OF ENGLISH

Saldiha College
Saldiha, Bankura

Programme-Specific Outcomes and Course Outcomes

➢ Programe-Specific outcomes

Literature courses in the Department of English offer students the opportunity to study influential writings from the British, American, and global Anglophone traditions. Courses may focus on a historical period, an issue or theme, a critical approach, or a literary genre. Literature provides imaginative and critical insights into all areas of human experience-war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the sacred and the profane, the burdens of history and the dreams of the future. Learning to attend to the complexities of literary texts helps students become more active and critical readers, and the creative aspects of literary texts highlight the ability of the written word to elicit feeling, to cultivate an imaginative openness to others' experiences, and to call us to account as humans. Studying literature at the college level encourages all graduates of Saldiha College to view the reading of challenging and imaginative texts as an essential and rewarding part of a life-long commitment to learning and growth. Apart from developing the literary skills, the English Honours course help students build skills of analytical and interpretive argument; become careful and critical readers; practice writing-in a variety of genres-as a process of intellectual inquiry and creative expression; and ultimately to become more effective thinkers and communicators who are well-equipped for a variety of careers in our information-intensive society.

***Goal 1*: Equip students with knowledge of English as a world language.**

1.1 Accurately and precisely communicate– both in speaking and writing – in a variety of contextsand genres.
1.2 Demonstrate a thorough command of English and its linguisticstructures.
1.3 Recognize and comprehend different varieties ofEnglish.

***Goal 2*: Equip student with analytical skills in linguistics, communications and literary criticism.**

2.1 Analyze oral and written discourse of various genres with regard to social, cultural, political,and historicalcontexts.
2.2 Analyze the structure and evolution of English words and texts from the point of viewof morphology, phonology, grammar, syntax andsemantics.
2.3 Apply theoretical frameworks to analyze media and other forms of publicdiscourse.
2.4 Identify and describe the nature and function of language as a human attribute, includinglanguage acquisition, language and society, language and culture, language andthought.

***Goal 3*: Train students for careers and advanced studies in a wide range of**

English,Public Relations, or Communicationsfields.

3.1 Produce and edit high quality, technical oral and written English communication andtranslation from English into Armenian and viceversa.

3.2 Tailor communication to, and engage in persuasive communication with, specific audiencesand media.

3.3 Apply theoretical frameworks for literary criticism, linguistic analysis, and communicationtheory.

3.4 Conduct original research and be prepared to pursue advanced studies in English, PublicRelations, or Communicationfields.

***Goal 4*: To Develop Faculty of Skill in Students**

4.1 The ability to read texts closely and to articulate the value of close reading in the study ofliterature andrhetoric.

4.2 The ability to explicate texts written in a wide variety of forms, styles, structures, andmodes.

4.3 The ability to recognize and appreciate the importance of major literary genres, subgenres,and periods.

4.4 The ability to respond imaginatively to the content and style oftexts.

4.5 The ability to write clearly, effectively, and imaginatively, and to accommodate writing style tothe content and nature of thesubject.

4.6 The ability to develop and carry out research projects and to articulate them withinappropriate conceptual and methodologicalframeworks.

Goal 5: **Increasing in-depth Knowledge of the Core Areas of the Subject:**

5.1 An understanding of the historical development of the English language and of literature writtenin English from Old English to thepresent.

5.2 An understanding of the relations between culture, history, andtexts.

5.3 An understanding of the twofold nature of textualanalysis:

5.4 objective study from varied analyticalperspectives

5.5 subjective experience of the text'saesthetic.

5.6 Familiarity with a wide range of British and American literary works, as well as withselected authors and works of other literatures, including folk and popularforms.

5.7 Familiarity with a wide range of literary terms and categories within literary history, theory,and criticism.

5.8 Familiarity with the nature of literary canons and ofcanon-formation.

5.9 Familiarity with basic practices of literary research and documentation, including electronicforms of information retrieval andcommunication.

Goal 6:**Developing a Sense of Experience amongst Students**

6.1 The exchange of ideas with faculty and students in classroom settings and officevisits.

6.2 The ability to complete cooperative projects with other students in discussion groups,writing activities, and studysessions.

6.3 Involvement in the cultural life of theInstitute.

Goal 7: **Nurturung the Notion of Value Education in the Course**

7.1 A sustained interest in language andliterature.

7.2 An awareness of the literarypast.

7.3 An enriched understanding of the complexities and nuances of the human experience acrosstime andculture.

7.4 Interest and involvement in intellectual, aesthetic, cultural, and sociopoliticalissues.

7.5 Increased critical awareness and intellectualindependence.

Goal 8: **Transferable Skills / Attitudes:**

8.1 Employ the acquired knowledge in criticism and interpretation in a variety ofcontexts
8.2 Show openness to and respect for the variety of cultures, religions and political affiliations thatthey come in contactwith
8.3 Adapt and transfer research skills and critical methods of the discipline into familiar andunfamiliar contexts including the workenvironment
8.4 Interact orally in a variety of social and academiccontexts
8.5 Develop a range of subject specific and transferable skills, including high order conceptual,literary and communication skills of value in graduate studies and/oremployment

Other Important Programme-Specific Outcomes:

- **Critical Thinking:** Students will be able to critically involve themselves with literary texts by processing information and identifying Patterns.
- **Effective Communication:** The capacity of expressing critical ideas in speech and writing would be one of the key outcomes of this course.
- **Social Interaction:** The students will interact effectively with peers, faculty and management and effectively develop themselves in holistic cognizance of their surroundings and appreciate aesthetics in everyday life.
- **Ethics:** The students will be able to discern the moral conundrums that are present in everyday life and be able to identify the right path based on the value system inculcated in them by the institution
- **Self-directed and Lifelong Learning:** The course will inspire students to constantly upgrade their knowledge and skills.

Course Outcomes:

General learning outcomes for English courses include the following:

1. **Reading:** Students will become accomplished, active readers who appreciate ambiguity and complexity, and who can articulate their own interpretations with an awareness and curiosity forother perspectives.

2. **Writing skills and process:** Students will be able to write effectively for a variety ofprofessional and social settings. They will practice writing as a process of motivated inquiry, engaging other writers' ideas as they explore and develop their own. They will demonstrate an ability to revise for content and edit for grammatical and stylistic clarity. And they will develop an awareness of and confidence in their own voice as awriter.

3. **Sense of Genre:** Students will develop an appreciation of how the formal elements of languageand genre shape meaning. They will recognize how writers can transgress or subvert generic expectations, as well as fulfill them. And they will develop a facility at writing in appropriate genres for a varietyof purposes andaudiences.

4. **Culture and History:** Students will gain a knowledge of the major traditions of literatures writtenin English, and an appreciation for the diversity of literary and social voices within–and sometimes marginalized by–those traditions. They will develop an ability to read texts in relation to theirhistorical and cultural contexts, in order to gain a richer understanding of both text and context, and to become more aware of themselves as situated historically andculturally.

5. **Critical Approaches:** Students will develop the ability to read works of literary, rhetorical, and cultural criticism, and deploy ideas from these texts in their own reading and writing. They willexpress their own ideas as informed opinions that are in dialogue with a larger community of interpreters, and understand how their own approach compares to the variety of critical and theoreticalapproaches.

6. **Research Skills:** Students will be able to identify topics and formulate questions forproductive inquiry; they will identify appropriate methods and sources for research and evaluate critically the sources they find; and they will use their chosen sources effectively in their own writing, citingall sourcesappropriately.

7. **Oral communication skills:** Students will demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively: listening carefully and respectfully to others' viewpoints; articulating their own ideas and questions clearly; and situating their own ideas inrelation to other voices and ideas. Students will be able to prepare, organize, and deliver an engaging oral presentation.

8. **Valuing literature, language, and imagination:** Students will develop a passion for literature and language. They will appreciate literature's ability to elicit feeling, cultivate the imagination, and callus to account as humans. They will cultivate their capacity to judge the aesthetic and ethical value of literary texts–and be able to articulate the standards behind their judgments. They will appreciate the expressive use of language as a fundamental and sustaining human activity, preparing for a life of learning as readers andwriters.

Chapter-Specific Course Outcomes:

Introduction to Literature

- Display a working knowledge of the genres of fiction, poetry, and drama by writersfrom various cultures and historicaleras.

- Identify and describe distinct characteristics of literarytexts.
- Analyze literary works for their structure andmeaning.
- Effectively communicate ideas related to the literary works during class and groupactivities.

Introduction to Poetry:

- Display a working knowledge of poetry as a literarygenre.
- Identify and describe distinct literary characteristics of poeticforms.
- Analyze poetic works for their structure and meaning, using correctterminology.
- Write analytically about poetry using MLAguidelines.
- Effectively communicate ideas related to the poetic works during class and groupactivities.

Readings in the Novel

- Display a working knowledge of the novel as a literarygenre.
- Identify and describe distinct literary characteristics of thenovel.
- Analyze novels for their structure and meaning, using correctterminology.
- Write analytically about novels using MLAguidelines.
- Effectively communicate ideas related to the novel during class and groupactivities.

Readings in the Short Story

- Display a working knowledge of the short story as a literarygenre.
- Identify and describe distinct literary characteristics of the short storyform.
- Analyze short stories for their structure and meaning, using correctterminology.
- Write analytically about short stories using MLAguidelines.
- Effectively communicate ideas related to the literary genre of the short story during classand groupactivities.

Paper-Wise Course Outcomes:

Core Courses (I-XIV) (Hons)

- ***History of English Literature, and Philology:*** Students will be able to understand therange, significance and scope of English Literature and the growth and evolution of theLanguage.

- ***Poetry from Romantic Revival to Modern Age:*** aholistic development of an understanding of English Poetry of the 19th and 20th Centuries, andacquirement of rudiments of Rhetoric and Prosody.

- ***Drama of the 16th, 17th and 18th Centuries:*** Close reading of some specific tetxts,enable students to examine the themes and structures and scope of Elizabethan drama and Antisentimental comedy.

- ***Novel, Essay and Short Stories:*** Advancement of their acquaintance with fiction and nonfiction of writers from the Jacobean period to the 20th Century.

- ***Poetry from the Elizabeth Age to the Neo-Classical Period:*** Understanding ofantiquated vocabulary and structures and capability to appreciate the work of great writers of the16th to the 18th centuries.

- ***European Classical Literature:*** Special insight on the antiquarian European legacy of the English literary art isachieved through specific studies of ancient Greek dramatic texts.

- ***Indian Classical Literature & Indian Writing in English:***Awareness towards the problems of interpreting Indian Culture via the EnglishLanguage and acquaintance with the work of significant Indian writers of poetry,prose fictions and drama is pursued in this Course.Literature produced in English language in the Indian post-colony is a vital part of critical literary understanding in this discipline. Awareness towards the problems of interpreting Indian Culture via the English Language and acquaintance with the work of significant Indian writers of poetry, prose fictions and drama is pursued in this Course.

- ***British Literature: Old English Period to 14th Century:***Enabling students to understand and appreciate the cultural range, historicalsignificance and applicable scope of English Literature.

- ***British Poetry & Drama: 14th to 17th Centuries:***Through the study of some specific literary texts, e.g. Shakespearean sonnets,Metaphysical Poems, plays of masters like Shakespeare and Marloweempowerment of the students to examine on their own the themes andstructures of Elizabethan drama, the upsurge of Humanism and the poeticsensibility of Western metaphysical creativity of the Caroline age issystematically targeted.

- ***British Poetry & Drama: 17th and 18th Centuries:***A thoroughbred understanding of the literary and cultural implications of theRestoration of the Stuart line of monarchy on the English throne and theeventual maturation of the great 18th c. Neo-Classical mindset is studied througha selection of mock-heroic satires, epic poems, anti-sentimental comedies andnovels.

- ***British Literature: 18th Century:*** This paper enhances the scope and purpose of the previous one as the 18th centuryBritish literature is uniquely important in understanding the basic mode of culturalproduction of the upcoming centuries in England and the Continent as well.

- ***British Romantic Literature:*** By dint of some specific literary texts, long poems, ballads, odes and novels ofwriters ranging from the era of the Precursors of Romanticism to the middle ofthe 19th c. a holistic development of the understanding of one of the mostremarkable phases of the English Literature, i.e. Romantic Poetry & Prose, isardently sought after.

- ***British Literature: 19th Century:***Facilitating students' acquaintance with poems, fictions and non-fictionsproduced within the span of Victorian period from the mid-nineteenth centuryto the beginning of the 20th c.

- ***Women's Writing:***This paper facilitates critical consciousness of gender-politics, its questions andfeminist perceptions regarding women as well as human empowerment through thestudy of feminism, feminist writings and feminism's history.

- ***British Literature:*** The Early 20th CenturyModern novels, poems, short stories and plays along with conclusive discussionson the events of the World Wars and the idea of Modernism, its cult and crisis aswell, are graphically approached and appreciated through the study of thisparticular paper.

- ***Modern European Drama:***Showcases the socio-economic and historical symptoms,

loose-ends, mores ofanxiety and resolution of the modernist existence erupting through the membraneof their dramatic productions.

- ***Postcolonial Literatures:***A brief but effective tour of Postcolonial literary production, its unique featuresand ground reality, is provided to the students through acquaintances andappreciation of texts selected from Indian English Literature, African EnglishLiterature, Caribbean and American Literature. Mastering an all-roundconception of the variety of English Literatures, produced on a broad scale indifferent English languages, is the outcome of this particular course.

DSE: Discipline Specific Electives (Hons)

- **Literary Theory & Criticism:** To learn relevant literary and critical theories of the latest import, specifically in the critical praxis since the early years of the 20th c. till date.

- **Popular literature:** To acquaint the student with plebeian imagination, its cause, modus operandi and variations and to make her/him flexible with the idea of literature on a much larger scale.

- **Partition Literature:** To inform the student of the problem, politics, pain and cause of the biggest historical burden of the Indian post-colony, the partition, and to make their understanding of the event more comprehensive.

- **Indian Literature in English Translation:** A brief but effective tour of Indian literary production, its unique features and ground reality, is provided to the students through acquaintances and appreciation of texts selected from Indian English Literature.

AECC2: Communicative English (Hons and General)

This paper is compulsory for all students of the Core and the ProgrammeCourses. General writing and comprehension skill of the students and theirelementary proficiency in English is nurtured by the study of this paper.

SEC: Skill Enhancement Courses(Hons and General)

- ***Creative Writing:*** Creativity in thought, writing and impromptu ability of preparing academic orprofessional writes-up is facilitated in this paper.

- **Business Communication:**This paper enhances skills in business communication, letter writing,advertisement copy writings etc. keeping the market demands of such writingskills in view.

- **Technical Writing:** Proficiency in technical writing is attempted keeping in view the professionaldeadlines in various sectors.

- **Film Studies:** Some of the course learning outcomes that students of this course are required to demonstraterun thus:

✓ demonstrate a systematic and historically-grounded knowledge of literature andcinema as expressive arts.
✓ identify and illustrate the distinction between literary and cinematic arts ofstorytelling.
✓ identify and describe the difference between cinematic and literary images.

- ✓ examine different theories of adaptation and link then to contexts of expression andreception.
- ✓ organize different sets of activities to identify and make use of skills that distinguishthe medium of cinema from that of literature.
- ✓ present a coherent view of the relationship between written and cinematic textscommunicate the role of location in adaptation.

Translation Studies: Some of the course learning outcomes that students of this course are required to demonstraterun thus:

- ✓ critically appreciate the process of translation
- ✓ engage with various theoretical positions on Translation
- ✓ think about the politics of translation
- ✓ assess, compare, and review translations
- ✓ translate literary and non-literary

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DEPARTMENT OF HISTORY

Saldiha College
Saldiha, Bankura

Programme Specific Outcome (PSO) for History Students (Honours & General)

History (Honours & General) Syllabus under CBCS and its outcome for the students

PART-I (SEMESTER-I)

CC Paper-I History of India I (From Earliest Times to 600 AD) (for HISH students)

Students of history will acquire knowledge regarding the primitive life and cultural status of the people of ancient India. They can gather knowledge about the society, culture, religion and political history of ancient India as well. They will learn about the origin of the Indian empire, trade and urbanizations of ancient civilization, like Harappan civilization, Vedic civilizations, later Vedic civilizations etc. and they also learn about Paleolithic, Neolithic and Chalcolithic cultures of India in pre-Harappan period.

CC Paper-II Social Formations & the Cultural Patterns of the Ancient World (for HISH students)

Students can acquire knowledge about the evolution of human Society & how the society of agricultural and animal husbandry had begun in Ancient Times. They also learn how the human society had transformed from Nomadic to civilized society in ancient history of the World. They can acquire knowledge about the origin, features, nature and class composition of ancient Greek and Polis society. They can compare to each and other among the several societies of the world.

CC/GE Paper - IA History of India (From Earliest Times Up to 300 CE) (for HISG students)

A student will learn from this paper about the status of the society and culture of the Paleolithic, Mesolithic, Neolithic, Harappa and Bronze ages in ancient India. They will learn how to interpret the historical sources of ancient India. They can acquire knowledge about the Vedic and later-Vedic Period of India and gather knowledge about the rising of Jainism and Buddhism and related cultures in ancient India. They will gather knowledge about the rise of Magadha Empire as a major power from the sixteen MahaJanapadas. They will realize about the religion and messages (*dhamma*)from Ashoke, the great Mourya Emperor from this paper.

PART-I (SEMESTER-II)

CC Paper-III History of India III (600 - 1206 AD) (for HISH students)

Students can achieve knowledge about how to develop Indian feudalism and evolution of the political structures of early-medieval north and south India. They can learn how the conquering of Islam had initiated in India and had transformed the Indian culture, society, religion and agrarian structures under the Islamic power of medieval India. They will achieve knowledge about the religious and cultural changing scenarios after the advent of the Islam in India. They will gather knowledge how the Sultanate of Delhi had been established in 1206 AD.

CC Paper-IV Social Formation and Cultural Pattern of the Medieval World (for HISH students)

Students will learn about the religion, culture, literature and philosophy of the ancient Roman civilization, as well as they will acquire knowledge about how the crises of the Roman Empire had been made and it had been transitioned to Principate. They will acquire knowledge about how the economic, social and religious development had been initiated during the medieval European social formation. They can learn about the socio-economic and political condition of the feudal organization or production, town's formation, trade and commerce, technological developments and crisis of feudalism in Europe etc.

CC/GE Paper-IB History of India (300 to 1206 CE) (for HISG students)

They will learn how to rise & Growth of the Gupta's Empire in ancient India and to raise regional Kingdoms in different parts of India after downfall of the Empire. They can acquire knowledge towards the society, economy and culture in early medieval India. They can gather knowledge towards the Arabs conquest of Northern part of India from this paper. They can understand how the land of India becomes handed over to the foreign powers gradually from the ancient times to medieval.

PART-II (SEMESTER-III)

CC Paper-V History of India IV (Circa 1206CE - Circa1525 CE) (for HISH students)

Students of history will learn about the foundation, expansion and consolidation of the Sultanate of Delhi and also to the downfall of the Delhi Sultanate. They will learn towards the emergence of provincial dynasties & Consolidation of regional identities like, Bahamanis, Vijayanagar and Bengal. They also acquire the knowledge about the Changing scenarios of the urban and rural societies after consolidation of the rule of the Sultanate of Delhi. They can learn about the activities of Delhi Sultanate i.e., revenue systems monetization, market regulations, growth of urban centers, trade and commerce, Indian Ocean trade etc.

CC Paper-VI Rise of Modern West – I (15th& 16th Centuries) (for HISH students)

Students of history will learn about the rise of the modern west world and transition the society and economy from feudalism to capitalism. They will learn how

to rise of Renaissance in Italy and spread of humanism in Europe and results of the European Reformation in the 16th century and Shift of economic balance from the Mediterranean to the Atlantic, Commercial Revolution, Influx of American silver and the Price Revolution. They gathered knowledge towards the emergence of European state system like Spain, France, and England etc.

CC Paper-VII History of India (1526 - 1757 CE) (for HISH students)

They acquire knowledge towards the Turkey's invasion & Struggle for Empire in North-Western India and foundation of the Mughal Rule in India. Students will learn about the Mugham Indian society, economy and culture after consolidation of the Mughal rule India. They will learn about how the Regional Powers had been raised in different parts of India after downfall of the Mughal Empire of Delhi. They can gather knowledge to the downfall of the Mughal Empire only lack of unity among the Mughal courtiers and resulted to raise provincial kingdoms in Bengal, Hyderabad, Ayodhya, Mysore and Maratha in Western
India.

SEC Paper-I Archives & Museums in India (for HISH students)

Students will learn how to maintain documentary, visual and material remains of the past either in house or in Institutions. Students will be encouraged to undertake collection, documentation and exhibition of such materials in their localities and colleges. They can understand the importance and significance of the Museum and Archives to build the history of India. Thus, educational tour to the National Archives and National Museum is an integral part of the curriculum of the history students.

OR

SEC Paper-I Understanding Heritage (for HISH students)

Students are to understand the different facets of heritage and their significances. They also understand about the legal and institutional frameworks for heritage protection in India as the challenges facing it. They can examine the implications of the rapidly changing interface between heritage and history. They will gather knowledge about the heritage by doing projects and visit to Museums and Archives.

CC/GE Paper-I(C) History of India from 1206-1707 (for HISG students)

Students can learn how the foundation, expansion and consolidation of the Delhi Sultanate had established and ruled under five dynasties i.e., Ilbari Turks, Khaljis, Tughlaqs, Syed and Lodis for a long time. They also learn about the nature of the state and nobility and the polity guided by the Ullemas during Sultanate and Mughal rule in medieval India. They also come to know how after the downfall of the Delhi Sultanate, the Mughal dynasty had come to power in India in 1526 AD and ruled up to 1707 AD. They can acquire knowledge about the polity, economy, Religion, Art, Architecture and Society during Mughal rule in India.

SEC Paper- I- Archives& Museums in India (for HISG students)

Students learn how to maintain documentary, visual and material remains of the

past either in house or Institutions. Students are encouraged to undertake collection, documentation and exhibition of such materials in their localities and colleges. They can understand the importance and significance of the Museums and Archives to write down the history of India. Thus, educational tour to the National Archives and National Museum is an integral part of the history syllabus for the students of the B.A. courses of Bankura University.

OR

SEC Paper-I Indian History & Culture (for HISG students)

Students can learn about the environment, culture, tradition, practices of Indian people. They acquire knowledge towards the urbanization and changing socio-cultural scenarios of India, as well as they can gather knowledge about the cultural heritage, cultural forms and cultural expressions, performing arts, fairs and festivals. That knowledge will be fruitful while acquired through the field work organized by the Department of History of the respective college for the students.

PART-II (SEMESTER-IV)

CC Paper-VIII Rise of Modern West – II (17th & 18th Centuries) (for HISH students)

History students can learn about the European crises of economic, social and political dimensions as well as the English Revolution, major issues like political and intellectual currents in 17th century. They learn about the rise of modern science in relation to European society by the Renaissance and the European politics in the 18th century like Parliamentary Monarchy, Patterns of Absolutism in Europe and prelude to the Industrial Revolution in England and other European countries.

CC Paper-IX History of India VI (C.1757 -1857) (for HISH students)

Students learn how to establish the Company's Rule in India after the battle of Plessey and this way legitimization of the Regulating Act, Pitt's India Act, Charter Acts of 1813, 1833 and 1853. They learn the Administrative, Military, Police and Educational Reforms of the early British rule in India, as well. They learn about the land revenue systems under the company's rule in India at the same time. The Bengal Renaissance and socio-religious reform movements initiated by Rammohan Roy (Brahma Samaj), Young Bengal, Vidyasagar under the rule of the British East India Company in Bengal.

CC Paper-X History of India (1858 - 1964) (for HISH students)

Students can learn from this paper about the local rebellion and movements like the Indigo Rebellion, the Deccan Riots, the growth of the new middle class; the age of associations, the Aligarh movement, the Arya and the Prarthana Samaj aftermath of 1857. They will learn the real historiography of Indian Nationalism; Birth of Indian National Congress, The Moderates and the Extremists, Partition of Bengal, the Swadeshi movement in Bengal in 1905. They can acquire knowledge about how to rise of Gandhi to power in Indian politics and his activities towards the freedom of India like, Rowlatt Satyagraha, Khilafat and Non- Cooperation Movement, The Swarajya Party, Poona Pact, Civil Disobedience Movement, Quit India Movement.

They also learn about the rising of the communal politics and opposition politics on the eve of the freedom movement in India and aftermath of the partition of India.

CC Paper-ID History of India from 1707-1950 (for HISG students)

Students of history will learn how to raise regional powers in India after the downfall of the Mughal Empire and in the course of time how to rise of the Company's absolute power in India. They can understand about the colonial nature of state during 200 years rule of the British power in this land. Hey can gather knowledge about how the Indian society, politics, religion and economy had changed during the Company's rule in India. They will aware about in which situation the Indian Nationalism had raised among the Indian people for freedom. They will acquire knowledge about the freedom struggle and partition of India and aftermath.

SEC Paper-II Understanding Heritage (for HISG students)

Students will gather knowledge regarding the popular culture through audio-visual expressions like, Folk Art, Calendar Art and Photography. They will acquire knowledge about the Theatre, Music, folk songs and Jatras by performance and Participations in real life. They can realize about the impact of the internet and audio-visual media on popular culture of the World.

OR

SEC Paper-II Art Appreciation: An introduction to Indian Art (for HISG students)

Students will learn about the Indian art, from ancient to contemporary times, in order to understand and appreciate its diversity and its aesthetic richness. As well as student will equip with the abilities to understand art as a medium of cultural expression. It will give students direct exposure to Indian art through visuals, and visits to sites and museums.

PART-III (SEMESTER-V)

CC Paper-XI History of Modern Europe II (1789 - 1870) (for HISH students)

Students will learn about the French Revolution and its impact of European countries. Unity and power make people strong to raise voice against the age-old oppressions which has been observed in the French revolution in 1789. How the Industrialization had occurred and its effects on socio- economic transformation of Europe. They will know about the politics of super power among the European countries. They also learn that how the sense regarding the nationalism and unification had developed among the European people on eve of the 2nd world war.

CC Paper-XII Studying History Writing: Indian & Western (for HISH students)

Students of history will acquire knowledge about the importance of Time, Space & Human Agency and sources in History. They will gather knowledge about the primary and secondary sources of Indian history. They can understand regarding the historiography, subjectivity, objectivity and the relation between history and other disciplines. They can gather knowledge about the process of research in history.

DSE Paper –I History of the United State of USA (1776-1864) (for HISH students)

Students will learn about the land and aborigines of USA and early colonial society and politics, indentured labour like White and Black. They will gather knowledge how the Europeans were made settlement and started colonization. They will learn how the evolution of American Democracy had formed after colonization of USA. They will acquire knowledge about how the USA had been developed from slavery to super power of the World.

OR

DSE Paper-I Life & Culture in Pre-Colonial Bengal: Prehistoric times to mid-18th century (for HISH students)

Students will acquire knowledge about the socio-economic, cultural and religious life of Bengal from earliest time to colonial period by going through this paper, as well as they will acquire knowledge about the rising and development of Bengali language and literature and also about the origin of Folk traditions of Bengal. They acquire knowledge about how to raise Vaisnavism, Spread of Buddhism, Jainism, and Islamism in Bengal.

DSE Paper-II Life & Culture in Colonial Bengal (1757-1947) (for HISH students)

Students will learn about the rise and establishment of East India Company's rule in Bengal after the downfall of the Nawab's regime. As well as they will gather knowledge towards the changing scenarios of the socio-cultural and economic life up to 19th Century. They can also acquire knowledge about the missionaries' activities and influence on the contemporary society and how this led to raise renaissance in Bengal. Above all, they will gather knowledge about the impact of the company's Rule in Bengal and emergence of Nationalism up to Freedom in 1947.

OR

DSE Paper –II History of the United States of America (1865-1945) (for HISH students)

The students will learn about the socio-political and economic status of USA after consolidation of colonial power. They acquire knowledge that how to growth capitalism in USA and thus it becomes a World power. They will gather knowledge about how the USA introduced New Deal and remained refrained from all warfare activities of the World and ultimately turned as a Controller of Worldpolitics.

DSE Paper -I-(A) Some Aspects of Society & Economy of Modern Europe (15th to 18th Centuries) (for HISG students)

Students will learn political and economic structure of Feudal society in 15th century and its crisis in 18th century. They will gather knowledge about the nature of Feudal Society, regional variation, crisis in Feudalism and Transition Debate. They will acquire knowledge about the rise of Renaissance in Europe after the downfall of feudal society and also learn how the European Society transformed from Feudalism to Capitalism.

GE Paper-I-Women Studies in India (for HISG students)

Students will learn about the basic Concepts & Theories of women Studies as well as defining gender, ideology, practice and relationship between gender, caste, class religion & politics. They will acquire knowledge about the emergence of women studies in India from 1980 to till present time. They will gather knowledge about the contribution of women towards the society through political, social and religious

fields. They will be aware about the violence against the women and preventive laws for their safety. Now the government becomes active to the development of women empowerment by introducing new rules and regulations which also can be learnt by the students.

OR

GE Paper-I- Political History of Modern Europe 17th-18th Century (for HISG students)

Students will learn about the nature of Feudal Society and its regional variations, political dimensions of feudal and Economic crisis. They also learn about the emergence of Absolutist States in European countries and their formation patterns. They will acquire knowledge about the political situation of the 15th to 18th century Europe which brings impetus to form the modern European society.

SEC-III-Understanding Popular Culture (for HISG students)

Students will gather knowledge about the popular culture through audio-visual expressions like, Folk Art, Calendar Art and Photography. They will acquire knowledge about the Theatre, Music, folk songs and *Jatras* by performance and participation in real life. They can realize about the impact of the internet and audio-visual media on popular culture of the world.

OR

SEC-III- An Introduction to Archaeology (for HISG students)

Students will gather knowledge about definition &components of archaeology. They will acquire knowledge from this paper about how to write historiography and research methodology in history. They will learn how to identify archaeological sites and explorations of ancient history. Students of this paper will acquire a huge knowledge towards the documentation, codification, classification, analysis of findings through field work.

PART-III (SEMESTER-VI)

CC Paper-XIII History of Modern Europe II (1871-1945) (for HISH students)

Students of history will learn about how the world became divided after the First World War among the super powers of the world. They also learn how the aggressive foreign policy of Italy and Germany influenced the European countries and compelled to form allied powers of the world. Gradually, the 2nd world war had occurred and the League of Nations was established aftermath of the war which affected the world politics. Ultimately, the world became divided into two super powers. On the one hand, USSR and associate countries and on the other hand USA and their associate powers.

CC Paper-XIV Making of the Contemporary World (1946 – 2000) (for HISH students)

Students will learn about the post-war developments of social, political and economic scenarios of the world and decolonization and the emergence of the Third

world, as well as they will learn about the origin of the Cold War and changing world political scenarios and emerging trends in culture, media and revolution among the European countries.

DSE Paper-III History of Modern East Asia -I (1840-1919) (for HISH students)

Students will learn about the nature and structure of the traditional Chinese society and how to transform the Chinese society from traditional to modern one. They can also learn about how the strong countries of the world captured the Chinese society, culture and economy during the nineteenth century. They will be aware of how the Chinese were united to combat the foreign colonial powers to defeat them and ultimately won to freedom.

OR

DSE Paper III History of the USSR (1917 – 1945) (for HISH students)

Students will be aware about the Russian War of 1917 which affected the contemporary society and politics of the European countries. They will gather knowledge on how to raise Communist Power of Russia on the eve of the World War-II. They will learn about the foreign policy of Russia which affected the entire world as well as they will be aware about several treaties, alliances and conferences during the period of World War-II.

DSE Paper-IV History of China & Japan (1919-1939) (for HISH students)

Students will be aware about the emergence of the communist party of China and its effects to the entire Asian world. They will learn how the Chinese Republic came out of colonial pressure and bondage, as well as they will gather knowledge about the emergence of Japan as a military state of East Asia on the eve of the World War-II and this incidence had influenced the World War-II.

OR

DSE Paper –IV History of the USSR-II (1945-1964) (for HISH students)

Students will learn how the USSR emerged as a powerful state in opposition to that of the USA after the World War II. They gather knowledge towards the society, polity and economy of the USSR which influenced the under- developed countries of the South-East Asia. On the other hand, they also come to know how the USSR opposed towards the oppressive activities of the USA and protected the under-developed countries, as well as they acquire the knowledge about the rise of non-aligned powers.

DSE Paper-I (B) Some Aspects of European History (1789 - 1945) (for HISG students)

Students will learn about the French Revolution and its impact of European countries. Unity and power made people a strong nation which has been resembled in the French revolution in 1789. How the Industrialization had been occurred and its effects on socio economic transformation of Europe also would be learnt by them. They will know about the politics of super powers among the European countries. They also learn that how Italy and Germany's aggressive foreign policies formed joint opposition against the allied powers of the world. Gradually, the 2nd world war had occurred and the League of Nations was established aftermath of the war which affected the world politics. Ultimately, the world became divided into two super

powers i.e., USSR and associate countries on the other hand USA and their associate powers.

GE Paper-I Gender & Education in India (for HISG students)

Students will gather knowledge about the history of education in India and the status of women's education from earliest times to modern age. They will be aware about the women's education in medieval times as well as regional trends of women's education in pre-colonial India. They will be aware about the role of Christian missionaries in spreading female education, recent debates and indigenous initiatives to develop women's education and empowerment in India. They will be aware about the role of schools and colleges to spread women's education in colonial and post-colonial period through expansion of infrastructural facilities in education, technical and vocational education for women. At last, they will learn that education acts as a tool of Empowerment forWomen,today.

OR

GE Paper-I History of Indian Journalism (for HISG students)

Students acquire knowledge towards the history of Indian journalism from colonial to post-colonial period by going through this paper. They can understand about the importance of the documents either written or oral. They will be aware of the advent of print media and culture in India. They can also be aware about how the journalism influenced the Indians towards acquiring freedom. They will gather knowledge about how to preserve document and writing pattern of a research-based article, from this paper.

SEC-I (A) Art Appreciation: An Understanding to Indian Art (for HISG students)

Students will gather knowledge about the Indian art- from ancient to contemporary times, in order to understand and appreciate its diversity and its aesthetic richness. The course will equip the history students with the abilities to understand art as a medium of cultural expression. Students will acquire direct knowledge to Indian art through direct exposure to visuals by visiting the sites and museums.

OR

SEC-I (A) Orality & Oral Culture in India (for HISG students)

Students of this paper will learn about the orality by its definition and the importance of it in history and historiography. They will be aware about how to search historical documents from oral history which spread in the human society. Thus, they will gather methodological knowledge of research in history. They will acquire knowledge towards the documentation of any research work.

COURSE OUTCOME (CO)FOR HISTORY STUDENTS

After completion of this course, it helps to grow ethical values among the history students. They gather knowledge about the socio-cultural heritage of India and world as well. This course helps to grow intellectual values among history

students and to develop liberal values among them. As a branch of social science, this course helps to develop social values among history students. Above all, it helps to grow national and international understanding and ethics among history students.

Careers of history students – they can be engaged as educators/teachers in elementary schools, secondary schools and postsecondary institutions, can work in Archaeological Sites, Archives and Museums etc., as a researcher they will be associated in several fields like, Museums and Historical Organizations, Cultural Resources Management and Historic Preservation etc. this course provides the students as communicator like Writers and Editors, Journalists, Documentary Editors and Producers of Multimedia Materials. History Student can be employed as Information Managers in different fields i.e., Archivists, Records Managers, Librarians and Information Managers. They can be engaged as Lawyer like, Lawyers and Paralegals, Litigation Support, Legislative Staff Work and Foundations. They might be involved in Business Associates as Historians, in Corporations or as Contract Historians, as Historians in Nonprofit Associations etc. They may directly be engaged in different ranks of the Archaeological Survey of India according to their performances like as Heritage Manager, Historic buildings inspectors or conservation Officers, Museum education Officer etc.

DEPARTMENT OF SANSKRIT
Saldiha College
Saldiha, Bankura

PROGRAM-SPECIFIC OUTCOMES:

- **Reading**: Students will become accomplished active readers who appreciate ambiguity and complexity, and who can articulate their own interpretations with an awareness and curiosity for other perspectives.
- **writings:** Students will be able to write Devanagari Scripts.
- **Culture and History:** Students will gain a knowledge of the major traditions of literatures written in Sanskrit.
- **Research Skills:** Students will be able to identify topics and formulate questions for productive inquiry.
- **Oral Communications**: Students will demonstrate the skills needed to participate in conversation that builds knowledge collaboratively.
- **Sanskrit as a Career Option**: Sanskrit is recognized as "mother of all languages" throughout the greater portion of the world. Even if you aiming for a bright career only, Sanskrit can provide it, till today. Harvard of Cambridge oxford to Trinity college Dublin – can end up with a faculty post in some highly ranked universities,
- **Mode of Hindu Survival :** Sanskrit and only Sanskrit is the language which should bubbles up in our mind even if we merely think about Hindu Survival.
- **Practical Advantages:** It someone does not know Sanskrit he is obviously missing something. He cannot get the clear perspective of Vedas, Geeta, Upaniskads, Ramayana, Mahavarata, Arthaspshtra and many the books, which are till regarded as the finest piece by a large portion of our society.
- **One step Towards Spiritual upliftment**: We need to keep in mind that it has a perfect grammar and nicely built structure.

COURSE OUTCOMES

Classical Sanskrit Literature: (Poetry)

- Display a working knowledge of the genres of fiction, poetry, and drama by writers from various cultures and historical eras.
- Identify and describe distinct characteristics of literary texts.
- Analyze literary works for their structure and meaning.
- Effectively communicate ideas related to the literary works during class and group activities.
- Identify and describe distinct literary characteristics of poetic forms.
- Analyze poetic works for their structure and meaning, using correct terminology.
- Effectively communicate ideas related to the poetic works during class and group activities.

Classical Sanskrit Literature (Prose and Story):

- Display a working knowledge of the prose as a literary genre.
- Identify and describe distinct literary characteristics of the prose.
- Reading Sanskrit Prose and story they can gain various moral value.
- They will be able to engage a wider variety of people in conversation and in turn
- improve their knowledge and conversation skill.

GITA (SELE MANAGEMENT IN THE GITA):

- This teaching are considered to be ultimate it encompasses each and every aspect of life. One surly can lead a peaceful life if the teaching of Gita are followed.
- The primary purpose of Gita is to illuminate for all of humanity the realization of the true nature of divinity.
- The Gita talks a lot about meditation and its importance.
- Students can develop their personality of godhead is the ultimate support of any human being.
- They learn that what they have as everything would be left over here in this material world we won't be able to take anything with us.

Poetics and literary criticism:

- Students can applies as a term to any argumentation about literature, whether or not specific works are analyzed.
- They learn many notable works of criticism combine discussions of texts with broad arguments about the nature of literature and the principles of assessing it.
- Criticism will help the students to cover all phases of literary understanding.
- Students can evaluate and interpret of a topic.

Indian Social Institutions and Polity :

- Students can learn that king created from eternal particles of main demigods.
- They can learn relationship to Brahmanas, results of money given to Brahmanas.
- Students also learn taxes maintain and protect Brahmanas, Brahmanas activities increase kings life.
- They learn war strategy, pleasure and duty.
- They can learn how British were successful in overpowered India, after Mughals were weakened.
- One must also know how Indian education system "Gurukul System" was overtaken by convert school culture under a well drafted plan to produce Indians who thinks and behave like Englishman.

Indian Epigraphy and Chronology:

- Understand the social conditions.
- Students will be able to know political career of Samudragupta and the kingdoms conquered by him.
- Understand the education and learning system during these respective times.
- Understand the economic life of the past.
- Student will be able to write different scripts.
- They can be undertaken on more detailed basis of different regions and various languages.

Modern Sanskrit Literature:

- Reading the Modern Sanskrit Literature students mind revived its old interesting thirst.
- Marked by a strong and intentional break with tradition. This break includes a strong reaction against established religious political and social views.

Vedic Literature:

- Students can learn Vedic agriculture in Ancient India.
- They can analyze between women's education in ancient India and modern education system.
- They came to know Vedic society, Vedic age society, Vedic culture and tradition.
- Origin of caste system in India.
- After the study of Sanskrit literature and Vedas students can find several scientific Elements in all the Sanskrit branches.

Sanskrit Grammar:

- Learning the Sanskrit Grammar they clearly communicate in Sanskrit language.
- Learning the proper grammar they express their thoughts and ideas.
- They can write and speak correctly.
- They gain the knowledge of Sutra, Vartika, Bhasya, Smaso, Karaka etc.
- Analyzing the Paninian Grammar.

Linguistics:

- Comparison of different languages.
- Understand that language in an historical context.
- They can learn what the culture finds important or unimportant, its history, its expectations, its fears and its hopes.
- It gives a deeper understanding of the language through its history, development etc.

Indian Ontology and Epistemology :

- A conceptual perspectives that human behaviors and actions are largely determined by stimuli which are not of their own making.
- The relevance of the emergence of debate for philosophical activity in India.
- The significance of epistemology in Indian philosophy and the sense in which religion is involved in it.
- An attempt to extract some intercultural aspects of the history of Indian Philosophy.

Dramaturgy:

- Some of the books of rhetorics are prescribed here to know the formulation concerning theory of aesthetics pleasure. That is why Sahityadarpana deserve and inclusion in the syllabi.

- Sahityadarpana is the earliest rhetoric literature which gives us the main concept of esthetics like concept of Rasa, patakasthan of nataka characteric feature of the heroes and considering rasa as dwarf image of bramhaswada.
- Students can learn about dhani, rasa,vaba.
- Understanding how to apply the dramaturgy in the practical of the drama on the stage.
- Students will be figure out the different structure of theatre or auditorium and the various things related with stated design.
- The students will be able to know the origin and development of Sanskrit Drama.
- Learners will know how the state of society depicted in the play.

DEPARTMENT OF POLITICAL SCIENCE

Saldiha College
Saldiha, Bankura

Programme Specific Outcomes

Political Science is a social science discipline that has the utmost practical applicability. Its subject matter is concerned with the everyday life of an individual living in a society and state. Political Science is the study of political behavior, governance and power and how these are shaped by institutional settings and by the ideas, interests and resources of political actors. Therefore, a degree in political science not only enables students to enhance their grasp of the basic structures and processes of governmental systems, public policies and political forces that directly impact their lives, but also help them analyze political problems, arguments, information and theories and to apply methods appropriate for accumulating and interpreting data applicable to this discipline. Above all, it aids students in becoming informed citizens by amplifying knowledge on their entitlement to the rights and duties within a state.

A Honours graduate of Political Science of this institute should able to do:

- Demonstrate an understanding of fundamental political processes, institutions, actors, behavior, and ideas; and familiarity with major theories, methods, and concepts in Political Science and its four major sub-fields.
- Demonstrate proficiency in thinking systematically about political interactions in national, global, and international contexts.
- Demonstrate proficiency in thinking systematically about the ethical dimensions of politics.
- Write effectively, engage in intellectually grounded oral debate, and form and express cogent arguments.
- Synthesize, analyze, and critically evaluate major arguments in the discipline.
- Comprehend the basic structures and processes of government systems and/or theoretical underpinnings.
- Analyze political problems, arguments, information, and/or theories.
- Apply methods appropriate for accumulating and interpreting data applicable to the discipline of political science.

COURSE OUTCOMES

CO 1. POLITICAL THEORY

- Accruing advance level of knowledge in political theory:
- Helping the students in the future preparation of their course of study in political theory:
- Updating their knowledge level in the field o0f study of political theory with latest information
- Helping the students in preparing them for different competitive examinations.

CO 2. WESTERN POLITICAL THOUGHT

- It helps students discover the political philosophy that forms the basis of politics in the western world, to interpret the poltical philosophies of the Greek, Roman, French, English and German philosophers in historical context as well as relate them to contemporary politics.
- Origin of the knowledge in Political Thought: Concretizing their base in political thought:
- Differences of thought in the different phases of the History of political thought: Getting enlighted with fundamental features of political thought:
- Helping the students in the future preparation of their course of study in political thought.

CO 3. GOVERNMENT AND POLITICS OF INDIA

- To understand Functions of Government.
- To understand Judiciary of India.
- To understand Bureaucracy of India.
- To understand biggest Democracy of the World.
- Know the Ministries, their role & responsibilities.
- What are the roles & responsibilities of Members of Parliament from Lok Sabha and Rajya Sabha?
- Know the process of drafting & presenting a Bill in the Parliament / Assembly.

CO 4. COMPARATIVE GOVERNMENT AND POLITICS

- Accruing knowledge about the structure & functioning of four major governments in the world:
- Having a comparative study of these governments in a glance:
- Helping the students in building their base in the study of comparative government:
- Accruing knowledge about different forms of government found in different political systems in the world.
- Students have a stronger and more informed perspectives on approaches to studying politics, governments and political systems comparatively. They become familiar with the primary theories and concepts that form the building blocks of the subfield, specially as they apply to different states in the world.

CO 5. INTERNATIONAL RELATIONS

- With a focus on politics at the transnational or global level, it demonstrates a generalized understanding of the diplomatic relationship between nation- states, the functioning of international organizations, international law and economy, disarmament and peace efforts, foreign policies of states, the behaviour and roles of nation-states in diverse political situations and also help gain an insight into subjects of Human Rights law and theory.
- Understand the major concepts of international relations, including: power, the international system, balance of power, hegemony, conflict, cooperation, integration, globalization, interdependence, dependence, regimes, globalization, equality, justice, sustainability, and international political economy.
- Understand and critically evaluate the theories and approaches to international relations, including realism, liberalism, classical and neo-Marxism, Neo-Gramscian, critical, post-modernist, post-colonial, sexuality and feminist.
- Identify the key actors in international relations—including states, intergovernmental organizations, non-governmental organizations, transnational corporations, global civil society, and individuals—and understand how these actors interact to give substance to international relations.
- Demonstrate a knowledge of the key dimensions, events and processes of international relations within their historic context, such as: the formation of the modern state system, the Treaty of Westphalia, the evolution of global capitalism, the origins of the Cold War, the shift to the post-Cold War system, the role of race, gender and class in the structure of the modern world system, major conflicts, such as the world wars, US intervention in various places in the world, ascendant conflicts, the features and effects of globalizing market capitalism, growing environmental problems, and human rights.
- Demonstrate knowledge of the multi-disciplinary nature of international relations by establishing connections with the disciplines that have shaped and continue to influence international relations: politics, economics, society, culture, history, language, race, ethnicity, gender and sexuality.

CO 6. POLITICAL SOCIOLOGY

- It promotes knowledge on basic concepts such as politics, power, gender, civil society, citizens, culture and behavior of individuals, how they developed over time and where they stand today. It also helps formulate independently generated and theoretically based research questions within political sociology.

CO7. PUBLIC ADMINISTRATION

- Demonstrate broad understanding of public affairs, policy development, policy analysis, economic analysis, management skills, and organization theory and their applications to public service.
- Conduct a purposeful inquiry exploring the problem/issue a client is experiencing. Apply critical thinking and appropriate technology for public policy analysis.
- Work with and for others in ways that translate community need into policy solutions & public service action to promote a just and humane world.

CO8. INDIAN POLITICAL THOUGHT

- Helping the students in accruing knowledge in the field of Indian Political thought in the initial stage of their study:
- Apprising the students about India' contribution towards the enrichment of the field of political thought
- Gathering knowledge regarding India's orientation towards politics:
- Helping the students in their future course of study in India's political thought.

DEPARTMENT OF ECONOMICS
Saldiha College
Saldiha, Bankura

Programme Specific Outcomes

1. Identify the necessary conditions for market economies to function well. Supply and demand pattern of all goods and their pricing.
2. Discuss various revenue or income generating sources and expenditure pattern of Government.
3. Understanding of the economic role of government policy like fiscal and monetary policy and trading policies.
4. Define and analyze macro-economic problems using algebra and statistics.
5. Identify the ups and downs of business cycle in domestic as well as global economy.
6. Identify the effectiveness of all macroeconomic policies.
7. Understanding importance of international relations to trade and the Federal Reserve.
8. Understanding of economic theory through econometrics to encounter different problems of government and business.
9. Understanding the structure of stock market specially BSE and NSE and role of SEBI.
10. Identify the nature of State Government economy and their policies.

Course Outcomes

Introductory Microeconomics

Upon successful completion of the course a student will be able to:

- Understand how households (demand) and businesses (supply) interact in various market structures to determine price and quantity of a good produced.
- Understand the links between household behavior and the economic models of demand.
- Represent demand, in graphical form, including the downward slope of the demand curve and what shifts the demand curve.
- Understand the links between production costs and the economic models of supply.
- Represent supply, in graphical form, including the upward slope of the supply curve and what shifts the supply curve.
- Understand the efficiency and equity implications of market interference, including government policy.

- Understand how different degrees of competition in a market affect pricing and output.
- Apply economic reasoning to individual and firm behavior.
- Understand the meaning of marginal revenue and marginal cost and their relevance for firm profitability.
- Understand the major characteristics of different market structures and the implications for the behavior of the firm.

Introductory Macroeconomics

Upon successful completion of the course a student will be able to:

- Understand why household, business, government and global behavior determine the aggregate demand for goods and services
- Understand why the behavior of businesses and the rest of the world determine the aggregate supply of goods and services
- Understand how aggregate demand and aggregate supply interact to drive a free market economy
- Understand the implications of interference in a market economy, including government policy
- Understand the basics of national income accounting
- Understand the causes and consequences of business cycles
- Understand the roles of fiscal and monetary policy in fighting recessions and inflation Understand factors that contribute to and detract from long-term economic growth
- Apply economic reasoning to understand the operation of an economy
- Understand the interaction between the domestic economy and the rest of the world
- Be able to apply basic international trade and finance concepts to global pricing issues, including working with exchange rates

Intermediate Microeconomics

Upon successful completion of the course a student will be able to:

- Make decisions using marginal analysis and opportunity costs.
- Use supply and demand to determine changes in market equilibrium (price and output), changes in welfare, and analyze the impact of government policies.
- Understand the relationship between marginal utility and price in equilibrium. Explain why firms exist.
- Develop cost functions from production functions.
- Be able to determine the profit maximizing price and output for a firm operating in a competitive environment.

- Determine profit maximizing price and output for a monopoly firm. Evaluate various policies for regulating monopolies.
- Be able to determine profit maximizing price and output for a firm in a quasi-competitive market (oligopoly or monopolistic competition).
- Develop and evaluate the impact of government regulations.
- Explain relationship between wages and productivity and apply the model to real-world businesses.
- Be able to apply the concepts of supply and demand to markets with external costs and benefits (understand market failure, implications for regulation, optimal pollution level).
- Use comparative static analysis (changes in supply and/or demand), measures of consumer and producer welfare, government intervention (price ceilings and floors).
- Understand the nature and consequences of general equilibrium (Pareto optimality).

Intermediate Macroeconomics

Upon successful completion of the course a student will be able to:

- Measure living standards, inflation, and unemployment for use as economic indicators.
- Understanding the perspective of classical economists on the nature and causes of the wealth of nations.
- Understand the factors determining gross domestic product, employment, the general level of prices, and interest rates.
- Explain the differences between the classical and Keynesian approaches to understanding the macro economy, including the political implications of each approach and the role of an activist fiscal policy in the Keynesian approach.
- Analyze the determinants of the relative strengths of fiscal and monetary policy for affecting gross domestic product.
- Understand the importance of wage flexibility and price expectations for the impact of spending behavior on gross domestic production, the unemployment rate, and the rate of inflation.
- Understand monetarist, supply-siders', and New Classical approaches to macroeconomic issues.
- Learn the determinants of long-term economic growth, including the role of saving and investment on the rate of growth.
- Understand the role of international trade, international finance and exchange rates in affecting living standards.
- Analyze the factors that determine currency exchange rates and the impact of changes in exchange rates on exports and imports.

Mathematical Economics

Upon successful completion of the course a student will be able to:

- Understand and replicate the connections between diagrammatic models and their underlying formal mathematical structures using algebra and calculus
- Develop numerical examples and algebraic models to illustrate a variety of theoretical economic results
- Understand and use the mathematical tools of algebra, calculus and probability in a variety of economic models
- Recognize the strengths and shortcomings of mathematical models in economics

Statistics

Upon successful completion of the course a student will be able to:

- Distinguish between different types of data.
- Interpret examples of methods for summarising data sets, including common graphical tools (such as histograms) and summary statistics (such as mean, median, mode and variance).
- Assess which methods for summarising a data set are most appropriate to highlight interesting features of the data.
- Identify the features that describe a data distribution.
- Recall rudimentary mathematical properties of probability. Describe the sample space for certain random experiments.
- Explain probability in terms of long—term relative frequencies in repetitions of experiments.
- Find probabilities of single events, complementary events and the unions and intersections of collections of events.
- Describe the main properties of probability distributions and random variables. Calculate the mean and variance of a discrete random variable.
- Apply general properties of the expectation and variance operators.
- Find the following for a Normal distribution: (i) the probability over a set of values, (ii) a percentile, (iii) the mean or variance given the other and either a percentile or a probability over a set and (iv) the mean and variance given probabilities over two sets.
- Recognize cases where the Binomial distribution could be an appropriate model. Recall characteristics of the Binomial distribution, such as the mean and variance. Compute probabilities for a Binomial distribution.
- Approximate Binomial probabilities using a Normal distribution, incorporating a continuity correction as appropriate.

Development Economics

Upon successful completion of the course a student will be able to:

- Identify and analyse key development economic theories affecting a number of contemporary development issues, such as economic growth, trade, and e-development.
- Review the policy implications of these key development economic theories.

- Reflect on and critically examine the links between various development economic theories and approaches.
- Critically analyse how the theory of development economics impacts upon practical implementation macro development policies in varying local and global contexts.
- Determine and apply the specialist knowledge and technical skills required to creatively solve problems, demonstrating expert judgment and ethical responsibility in your professional practice in international development.
- Critically analyse, synthesize and reflect on personal awareness and lived experience, theories and practices of development, both local and international, to extend and challenge knowledge and practice in the discipline.
- Critically reflect on the causes and impacts of poverty in global contexts and to evaluate the theories and practice of development institutions.

International Economics

Upon successful completion of the course a student will be able to:

- Understand the various reasons why countries engage in international trade, including the direction and volume of trade between nations.
- Use models of trade to demonstrate the gains from exchange as well as the effects on income distribution within countries due to trade with foreign nations.
- Understand how international factor mobility affects an economy.
- Analyze current issues and policies using the concepts of international trade theory.
- Understand the role key international institutions play in affecting trade flows across the world.
- Understand the accounting methods and concepts used by countries to keep track of international transactions.
- Understand the role of exchange rates and how they are determined in the short-run and long-run.
- Analyze how various policies, both domestic and foreign, may affect exchange rates and economic welfare.
- Understand the functioning of various exchange rate regimes, (such as gold standards and floating exchange rate mechanisms).

- Understand the role played by various international institutions with regards to exchange rate values and the flow on international assets.

Money and Banking

Upon successful completion of the course a student will be able to:

- Understand the importance of the financial sector in directing the use of scarce capital.
- Understand the concepts of present value and internal rate of return. Explain the determinants of interest rates.
- Understand the term structure of interest rates.
- Understand the likely path of interest rates in the aftermath of a change in monetary policy.
- Understand the impact of inflation on interest rates.
- Understand various concepts of yield or rate of return.
- Understand the concept of duration and its implications for the magnitude of changes in asset prices following changes in interest rates.
- Explain the various ways to hedge interest rate risk. Understand various money market instruments.
- Understand how monetary and fiscal policy affects the financial system.
- Explain the components of the balance of payments, the factors that determine currency exchange rates, and ways to cope with exchange rate risk.

Basic Econometrics

Upon successful completion of the course a student will be able to:

- Use the many variations of the multiple regression model to study the relationships between variables.
- Understand the concept of a random variable and probability distributions. Use various sample statistics to estimation population values.
- Interpret relationships using confidence intervals. Analyze economic data.
- Make effective use of the statistical tools used by economists. Understand the assumptions underlying those statistical tools. Apply the statistical tools that economists use to analyze data.
- Understand estimation issues and their implications including, biased selection, non-linearity, heteroskedasticity and mulitcollinearity

Environmental Economics

Upon successful completion of the course a student will be able to:

- Apply basic principles of economics to environmental issues.
- Explain how something can be both "environmentally destructive" and "economically optimal"; and how something can be environmentally beneficial and economically suboptimal.
- Understand the relationship between economic development and population growth; how population growth affects economic development; how economic development affects population growth; the economics of traffic congestion.
- Know basic economic models pertaining to the use of depletable resources; depletable vs. renewable resources.
- Understand risk-benefit analysis; the economics of nuclear power. Understand the economics of solid-waste disposal and recycling.
- Understand the economics of water conservation; the impact of alternative property rights structures.
- Understand the economics of forests and fisheries; whaling; bioeconomic models; applications to other forms of wildlife.
- Understand basic approaches to pollution control; "optimal" pollution and optimal pollution control.
- Understand the economics of controlling air pollution from stationary vs. mobile sources.
- Understand the economics of water pollution; toxic wastes. Understand the economics of climate change.

Public Economics

Upon successful completion of the course a student will be able to:

- Apply microeconomic theories to public decision making.
- Explain public goods, externalities, and government interventions using microeconomic theories.
- Critically assess Indian tax policy from practical and theoretical economic perspectives.
- Effectively communicate the rationales for government intervention in the economy and their shortcomings.

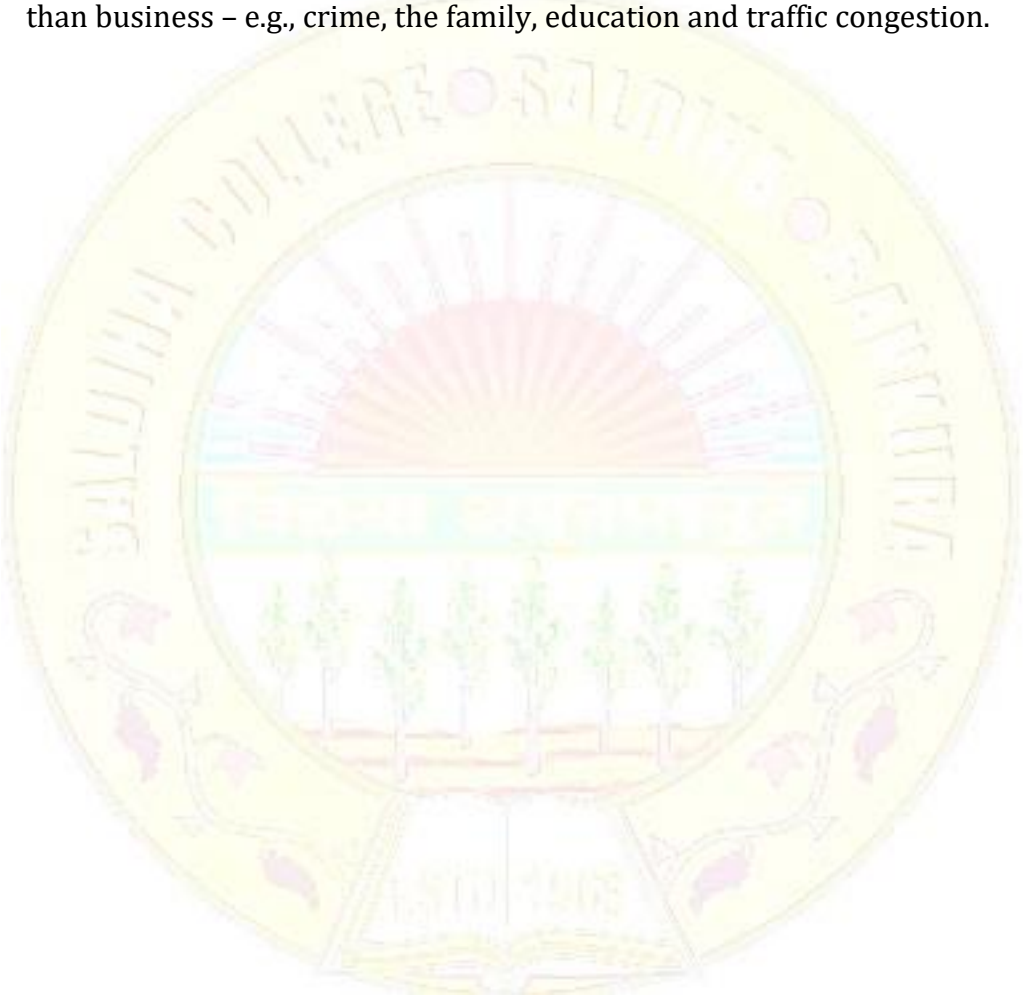
Political Economy

Upon successful completion of the course a student will be able to:

- Articulate how it is possible that even when a majority of voters is opposed to a policy, politicians will adopt the policy.
- Articulate the concepts of the form of government and the scope of government. For example, the form may be democracy, but if the scope is unlimited – i.e., if a

majority can enact whatever it wants without constitutional restraint – we have what Jefferson called an "elective despotism."

- Articulate the historical and logical implications of different property rights regimes. Articulate the phenomenon called the "tragedy of the commons" and the implications
- of the variety of solutions that have been offered to this problem.
- Articulate how economic theory can be applied in a wide variety of areas other than business – e.g., crime, the family, education and traffic congestion.



DEPARTMENT OF GEOGRAPHY
Saldiha College
Saldiha, Bankura

Programme Outcomes and Programme Specific Outcomes (Geography)

Geography offers an integrative perspective on the relations among social, political, economic, and physical phenomena in space and place which shape the world. The programme in geography is designed to achieve the students' educational, research and professional development. It focuses on qualitative as well as quantitative studies and emphasizes on man-environment relationship. This programme offers the opportunity to advance student's career aspirations through advanced study in the classroom and in the field. Our college delivers good IT services, academic support, various teaching tools and technical resources which make it fruitful to achieve the goals of our programme. It develops the skills and expertise for a diverse range of career opportunities. Appropriate and effective methods are used to assess student achievement, so the learning outcomes of the courses and programs are clear and appropriate.

Programme Outcomes

PO 1: Students will able to gain the knowledge about the geographical phenomena, geographical processes and geographical principles and also can able to interrelate the knowledge with their perceived practical experience.

PO 2: Upon completion of this programme students will be able to Acquire, analyze, evaluate, and interpret geographic data. Students will able to draw the qualitative and quantitative conclusion. So, qualitative and quantitative analytical skill enhanced.

PO 3: Students will gain preparedness for professional careers in geography and allied fields. Through the study of geography their technical, analytical or subjective knowledge automatically developed, so the carrier building opportunity build up and take important part in any kind of jobs.

PO 4: Geographical study developed sympathy and social feelings among the students for lives. It built up international co-operation and understanding among the students. Students can feel the global interdependence which helps to built internationalism among them as a result they take a important role as global citizen.

PO 5: Inculcate Ethical and moral values and a sense of discipline among the students which will increase Social Responsibility.

PO 6: After the completion of the programme, they will be efficient in their communication skill as well as power of social interaction.

PO 7: Students will be able to critically *analyze* the problems because this programme will strength the observation power. They will able to apply geographic concepts in the workplace and in everyday life to solve real-world problems.

PO 8: The programme deals extensively on environment and man-nature relationship. This will create a sense of awareness and social responsibility among the students towards the environment. It will build up a sense of environmental ethics among the students.

PO 9: Students are involved in collecting, analyzing, evaluating, applying information to solve the issues which will generate cooperation and team work among students which will create constructive work by sharing each other's view points and reaching consensus.

PO 10: The programme will enhance the ability of Management and students will acquire skills and ability for life-long learning.

Programme Specific Outcomes

PSO-1. This specific programme designed with knowledge, concepts, methods, and theories of various geographical aspects at local, regional, national and global level which will enhance the understanding of the natural world and human society.

PSO-2: In this programme Skill enhancement course are equipped with the fundamental statistics and Computer-based techniques which will build up the ability to perform data analysis based on critical thinking skills.

PSO-3: The Ability Enhancement Course strives to develop good communication skills in both written and verbal.

PSO-4: Computer-based techniques and software (QGIS) are incorporated in the syllabus which prepares the students for further analytical studies.

PSO-5: In the course of field surveys students acquire vast knowledge about the socio-economic and cultural dimensions of the populations. Here the students will focus on various environmental issues along with the causes, consequences and remedial measures.

PSO-6: Trained the students for handling modern Geographical and Meteorological instruments like Dumpy level, Prismatic Compass, Theodolites, Barometer, Hygrometer etc.

PSO-7: This programme will introduce the students with many recent techniques in Remote Sensing and Geographic Information System and they can interpret the Aerial Photographs and Satellite Imagery.

PSO-8: Students will be able to *formulate* an original research Design and conduct independent research in their chosen field in the discipline.

PSO-9: The syllabus is oriented towards emerging job opportunities and future prospects for the students so the students will gain preparedness for professional careers in geography and allied fields.

PSO-10: Students become equipped with the ability to respond to both natural and man-made disasters and acquire management skills. This is attained through the curriculum by studying and analyzing hazards, disasters, their impact and management.

Course Out Comes:

Our geography department course is structured under CBCS (CHOICE BASED CREDIT SYSTEM) in which some Core Course subject, Ability Enhancement Course (AECC) subject ,Skill Enhancement Course (SEC) subject, Discipline Specific Elective (DSE) subject, Generic Elective (GE) subject have studied. Course title is focusing the outcomes of this subject clearly. All the courses demonstrate via course projects, field assignments, seminar representation etc. Actually Geography is a multidisciplinary subject and this subject enrich with various such subject materials which have different applied forms in nature. The outcomes can be studied specifically according to different branches and courses.

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
1st SEM	CC-1	Geotectonic and Geomorphology	6	➢ Understand the work of internal and external forces and their associated Landform. ➢ They will able to understand the morphology of the landscape and related processes. ➢ Students can learn basic techniques and apply basic statistics to analysis the landscape.
	CC2	Cartographic Techniques and Geological map study	4+2	➢ Recognize basic themes of map making ➢ Understand and prepare different kinds of maps. ➢ Interpreting, reading, analyzing and identifying features from Geological and Topographical Maps. ➢ Identifying rocks and minerals and listing their properties. ➢ Acquire knowledge different types of map projection.
2nd SEM	CC3	Human Geography	6	➢ Understand the relationship of man and environment ➢ Understand the approaches and processes of Human Geography as well as the diverse patterns of habitat and adaptations. ➢ Acquire knowledge about space and society ➢ Students shall be well-versed with the world population
		Cartograms, Survey And		➢ Study and understand the techniques of surveying, using Dumpy level, Prismatic Compass and Theodolite for practical ➢ Use data representation by various techniques of maps and

	CC4	**Thematic Mapping**	**4+2**	Diagrams. ➢ Students can learn to Interpret the Land use and land cover maps ➢ Ability to understand and read maps and develop cartographic skills by which they will be able to create maps on their own ➢ Explain how maps work, conceptually and technically and will be able to understand science and art of cartography
3rd SEM	**CC5**	**Climatology**	**6**	➢ Students will learn to critical analysis the interactions between the atmosphere and the earth's surface and apply this for environmental problem solution. ➢ Able to understand the weather forecasting and acquire the ability to interpret climatic data and synoptic chart. ➢ They understand how the global atmospheric circulation, wind systems, and ocean currents are generated. ➢ Students can explain the important role of water in the atmosphere and the processes that lead to condensation, cloud formation, and precipitation. ➢ Students will able to predict the future trend of climate.
	CC6	**Statistical Methods in Geography**	**4+2**	➢ Understand the Importance and significance of Statistics in Geography. ➢ Know about different types of sampling. ➢ Recognize the importance and application of Statistics in Geography.
	CC 7	**Geography of India**	**6**	➢ Enable the students to understand the physical geography of India. ➢ Enable the students to comprehend the trends and composition of population change in India. ➢ Students shall be well-versed with the existing resource base and the economic systems in India.

				➢ Understand the variation in industrial development in India.
	SEC 1	**Computer Basics and Computer Applications** **OR**	**2**	➢ Understand the various statistical techniques and irs application ➢ Learn to handle statistical data using computer software.
		Remote Sensing	**2**	➢ Understand the basic concept of R,S GIS& GPS. ➢ Develop knowledge about the scientific principles, types and application of remote sensing Techniques and satellite based remote sensing data. ➢ Students gets Hands on training on QGIS software. ➢ They can create GIS data base and learn to use GIS tools and also able to do spatial analysis.
4th SEM	**CC8**	**Regional Planning and Development**	**6**	➢ Understand regional approach for the study regionalization and planning. ➢ Build an idea about theories and models for regional planning. Know about measuring development indicators. ➢ Enable the students to analyze various characteristics and parameters used for delineating the planning regions. ➢ Understand about the Regional Inequality and Disparity
	CC 9	**Economic Geography**		➢ Students shall be acquainted with different forms of economic activities and its geographical dimensions in detail. ➢ Understand about the basic Economic Processes- Production, Exchange, Consumption and its applications ➢ Identify the economic region in respect of world's physical condition. ➢ Evaluate the economic policies

			6	of different countries. ➢ enable the students to understand the different forms of economic activities and its geographical patterning. ➢ Inculcate the knowledge of changing dynamics in the industrial and agricultural sector. ➢ Understand the fundamental theories in economic geography.
	CC 10 :	**Environmental Geography**	**4+2**	➢ Students will able to address the environmental challenges facing the earth. ➢ Increased the environmental consciousness among the pupils. ➢ Learn Environmental Programmes and Policies at global and national levels. ➢ It gives the opportunity to study the human impacts on the environment through the study of natural resource management, environmental law and environmental policies.
	SEC-2	**Advanced Spatial Statistical Techniques** **OR**	**2**	➢ Clear the facts about the probability, types of probability and applications and uses in different field of geography. ➢ Gain knowledge about Correlation and Regression Analysis, t-test, Spearman's Rank Correlation, Product Moment Correlation; Linear Regression etc. and their application geography.
		Field Work	**2**	➢ Students able to understand fundamental concepts and issues related to field work. ➢ Social interaction is possible beyond the class room at the time of data collection and can able to observe closely the human behavior. ➢ Good communication skill developed to interact the local people.

5th SEM	**CC 11**	**Research Methodology and Field Work**	**4+2**	➢ Understand the research problems, research design, research plan and sampling design. ➢ Students learn about the types of data and methods of data collection and also study the processing and analysis of data. ➢ Enable the students to write the research report and ready for oral presentation. ➢ Develop the skills in photography, mapping and video recording.
	CC 12	**Remote Sensing and GIS**	**4+2**	➢ Gain knowledge about the basic principles of remote sensing, sensor resolutions and image referencing schemes. ➢ Students learns about the Image Processing and image interpretation. ➢ This course shall enable the students to understand the EMR Interaction with Atmosphere and Earth Surface, Sensor resolutions and their applications with reference to IRS. ➢ Understand the data product, types of data product and its applications and uses in remote sensing. ➢ Understand the application of GIS in the various kinds of fields, agriculture, populations, watershed planning and land use planning.
	DSE-1	**Urban Geography** **OR**	**6**	➢ Develop deeper understanding of Urban geography & its Recent Trends ➢ Address a variety of contemporary issues related to rapid urbanization. ➢ Helps to understand, analyse and interpret the morphology of urban centres.
				➢ Students gain the basic ideas about the settlement Pattern ,morphology of rural and urban

		Cultural and Settlement Geography	**6**	settlements, Urban Agglomeration etc. ➢ Understand the settlement planning of India. ➢ Understand difference in rural and urban social and cultural life style with reference of settlement patterns. ➢ Understand the concept of cultural hearth and realm, cultural diffusion, Cultural Landscape, Cultural Diversity etc. ➢ Know about the racial groups of the world and their life style. ➢ Students will learns about cultural groups and their diversity, language groups, religion and man-environmental relationship. ➢ Learn to access the cultural value and cultural consciousness.
	DSE-2	**Population Geography** **OR**	**6**	➢ Students able to understand the fundamental Concepts related to Population such as density, over, Optimum & under population, fertility & mortality etc. ➢ Students will able to address the issues and problems related with the Population. ➢ Understand the various factors responsible for World Population growth and Distribution. ➢ Understand the theories related to migration and population growth.
		Social Geography		➢ Learn to evaluate the contemporary social issues like racism, cast conflict, social discrimination etc. ➢ Understand the causes of social inequalities and their impact on society. ➢ Enable the students to understand about the social institutions, social norms and values, public and private space . ➢ Realize the Social Behaviour,

			6	Social Structure and Social Process. ➢ Students can learn about the social operating system and also find out the geographical diversity in the world.
6th SEM	**CC13**	**Evolution Of Geographical Thought**	**6**	➢ Perceive the historical Evolution Geography as a discipline in india as well as in the world. ➢ Gain knowledge about the philosophy and scope of the discipline. ➢ Understand the contemporary issues of this subject. ➢ Establishing relationship of Geography with other disciplines and man-environment relationships. ➢ Understand the dualisms in geography such as determinism and possibilism, systematic vs regional and physical Vs human geography.
	CC 14	**Disaster Management**	**4+2**	➢ Understand the fundamental concept of hazard, disaster, vulnerability, resilience and risk. ➢ Dwell upon the issues of adaptation and mitigation strategies. ➢ Assess risk, perception and vulnerability assessment with respect to hazards. ➢ Learn about the techniques of Hazards mapping.
	DSE - 3	**Fluvial Geomorphology** **OR**	**6**	➢ Understand the fluvial system and drainage pattern in respect of landscape evolution. ➢ Broad understanding about the river network and flood dynamics of the stream. ➢ Ability to understand process and mechanism involved in fluvial action for landform development.
				➢ Understand the concept and classification of resources, approaches to resource utilization

		Resource Geography	**6**	➢ Appreciate the significance of resources ➢ Develop the skill of mapping forest cover and water bodies from satellite images ➢ Understand the distribution, utilization, problems and management of metallic and non-metallic mineral resources. ➢ Address the Problems of Resource Depletion with Special Reference to Forest, Water and Fossil Fuels. ➢ Understand the issues of Contemporary Energy Crisis and Future Scenario Sustainable Resource Development.
	DSE - 4	**Soil and Bio Geography**	**6**	➢ Able to understand the properties of soil, and classification of soil. ➢ Provide the knowledge about the Soil Degradation and Management. ➢ Recognize the various types of Ecosystem and Biomes. ➢ Recognize the significance of biogeochemical cycles and biodiversity.
		Agricultural Geography	**6**	➢ Understand the influence of physical, Economic and Technological factors on agriculture patterns. ➢ Understand the agricultural regionalization and agricultural models and some theories. ➢ Gain the knowledge about Crop Combination and Crop Diversification. ➢ Recognize the Agro-climatic Regions of India.

DEPARTMENT OF EDUCATION
Saldiha College
Saldiha, Bankura

PROGRAM SPECIFIC OUTCOME (B.A Honours & General in Education)

Individual Development

Education enables a human being to attain the greatest possible harmony, internal and external, spiritual and material, for the fullest possible development of human potentialities and capacities. Development of an individual – physically, mentally and spiritually is well known aim of education. Aim of education should be to make children self- confident and self dependent, and to make them strong physically and mentally.

Social and National Development

Education produces effective individuals in the sense that they realize their responsibilities towards the society. Social aims and goals in education are equally important because an individual lives in society and has his obligations towards his nation and National developments.

Social Transformation

Education not merely equips an individual to adjust with society to its customs and conventions, but it enables him/her to bring desirable changes in the society as every educational institution from school to college and university work as an agency of change.

Modernization

Education enables us to move with times and attain excellence in science and technology**.** One of the suggestions explicitly points out that, our education should integrate and unite the people of India, modernise society while preserving what is authentically Indian in our cultural and spiritual heritage.

Acquisition of Values

Acquisition of Values is needed for social transformation. Moral, cultural and spiritual values in education have been given immense importance. Thus the new education policy of India should be built on the foundation of ancient spirituality and modern culture and technical sophistication. It should develop scientific temper and spirit of enquiry in the students.

Community Participation

The education system in all its branches and sectors get itself involved in activities related to problems of local community life and shall thus endeavour through the desirable community

participation community involvement in the educational field to bring all education of its rightful place in community life.

Development of Democratic Values

Education is worthwhile when an educated person does translate democratic values in his/her behaviour and thus democracy survives for long. Hence, education makes deliberate and planned effort on development of these values in the people.

National Integration

It means harmonizing religions, language, caste, and class and community differences as they exist in India causing social tensions. It is essential that the people of India in spite of these differences live peacefully and cooperatively and utilize their varied talents for the enrichment of the national life as a whole. Education through various programmes and tailored curriculum makes efforts to develop in the people such attitudes and values. It is difficult but possible.

Sustainable Development

Education spreads the awareness regarding sustainable development among students. Thus education is an important weapon to remove those issues and challenges concerning environment.

Universalization

Emphasis is given in cultivating good qualities like cooperation, good will, forgiveness, tolerance, honesty, patience etc. in order to encourage universal brother-hood and to prepare students worthy citizens of the country. Values of optimism and secularism, and service to the poor should be stressed on the young minds.

Digital Literacy

Digital literacy refers to the skills needed to live, learn, and work in a society where communication and access to information is increasingly through digital technologies like internet platforms, social media, computer and mobile devices.

COURSE OUTCOMES

Educational Philosophy (CC-1 & 3 for EDCH, & CC-1A/GE-1 for EDCG)

After completion of this course students will be able ....

1. to understand the meaning, aims, functions and role of education.
2. to understand the relation between education and philosophy.
3. to be acquainted with Indian and western schools of philosophy and their impact on education.
4. to be acquainted with the contribution of great educators.

Educational Psychology (CC-2 & 4 for EDCH & CC-1B/GE-2 for EDCG)

After completion of this course students will be able ....

1. to understand the meaning of Psychology & Educational Psychology and be acquainted with its different perspectives.
2. to realize the relationship between Psychology and education.
3. to know the patterns of different aspects of human developments and relate this knowledge with Education.
4. to be acquainted with the concepts like learning, intelligence, creativity, personality and memory and their significance upon education.
5. to be acquainted with the cognitive approach to development and thus to understand the processes and factors of cognition.

Educational Sociology (CC-5 & 8 for EDCH & CC-1C/GE-3 for EDCG)

After completion of this course students will be able ....

1. to understand the meaning of Sociology and Education and realize its pertinence to education.
2. to become aware of the different social factors that influence education.
3. to become aware of social stratification, social mobility and social control and their impact on education.
4. to become aware of the processes of social change and its impact on education.
5. to be acquainted with current social issues and their relationship with education.

Development of Education in India- Ancient, Medieval, British & Post Independent Period (CC-6,7 & 9 for EDCH & CC-1D/GE-4 for EDCG)

After completion of this course students will be able ....

1. to be acquainted with the salient features of education in India in Ancient & Medieval times.
2. to be acquainted with the development of education in British India.
3. to be acquainted with the development of education in Independent India, including significant points of selected Education.
4. to be acquainted with current issues and trends in Education.

Value Education (SEC-1 for EDCH & SEC-2 for EDCG)

After completion of this course students will be able ....

1. to become responsible citizens in the personal and social life
2. to develop proper attitude towards self and fellow being of one's own country, people of other countries leading to international understanding

Educational Management and Administration (CC-10 for EDCH)

After completion of this course students will be able ....

1. to understand the concept of school organization.
2. to be acquainted with modern aspects of school organization.
3. to understand the difference between educational Management & Administration at different levels of education.

Educational Guidance & Counselling (CC-11 for EDCH & SEC-3 for EDCG)

After completion of this course students will be able ....

1. to understand the concept of guidance and counselling.
2. to become aware about tools and techniques for conducting guidance and counselling services.

Educational Technology (CC-12 for EDCH & DSE-1B for EDCG)

After completion of this course students will be able ....

1. to enable the student to understand the concept of educational technology.
2. to expose the students to the basic developments in educational technology.
3. to acquaints students with different instructional techniques.
4. to develop the ability to analyze classroom teaching – learning and the ability to observe classroom behaviour and group dynamics.

Measurement & Evaluation in Education (CC-13 for EDCH & SEC-1 for EDCG)

After completion of this course students will be able ....

1. to develop understanding of the concepts of measurement and evaluation in education
2. to be acquainted with different types of measuring instruments and their uses.
3. to acquaint with the principles of test construction.
4. to develop understanding of the concepts of validity and reliability and their importance in educational measurement.
5. to develop the ability to organize relevant educational data.
6. to develop the ability to use various statistical measure in analysis and interpretation of educational data.
7. to develop the ability to interpret test data.
8. to develop the ability to represent educational data through graphs. To develop skill in analyzing descriptive measures.

Comparative Education (CC-14 for EDCH)

After completion of this course students will be able ....

1. to analyze and compare Indian educational system with abroad.

2. to criticize the bad practices of Indian educational system in the light of good practices by other countries.

Current Issues in Indian Education (DSE-1 for EDCH & GE-1 for EDCG)

After completion of this course students will be able ....

1. to be acquainted with the current status and quality of education at various level in India.
2. to develop understanding about the concept and requirement of universalization of education in India.
3. to be able to understand the role and functions of various educational organizations: UGC, NAAC, NCERT, NUEPA, NCTE, DIET, SCERT
4. to develop understanding regarding the modern trends and contemporary Issues in Indian education system.

Teacher Education (DSE-2 for EDCH)

After completion of this course students will be able ....

1. to develop understanding about the aim, objectives, need and scope of teacher education in India.
2. to develop understanding about the development of teacher education in India.
3. to be able to understand the role and functions of various agencies of teacher education: NCERT, NCTE, DIET, SCERT
4. to be acquainted with the various components of teacher education like student teaching, teaching practice, internship, supervision and evaluation of student teaching.
5. to develop understanding regarding the professional ethics and role of good a teacher.

Great Educators (SEC-2 & DSE-3 for EDCH & DSE-1A for EDCG)

After completion of this course students will be able ....

1. to be acquainted with the contribution of great Indian educators.
2. to be acquainted with the contribution of great Western educators.

Special Education (DSE-4 for EDCH)

After completion of this course students will be able ....

1. to be able to understand the education of children with visual and hearing impairment and with speech and language disorders and language disabilities.
2. to be able to understand the education of children with multiple disabilities.

Distance Education (SEC-4 for EDCG)

After completion of this course students will be able ....

1. to be acquainted with the characteristics, significance, growth and current status of distance education.
2. to be able to understand the contribution of designing and preparing of self learning materials, self-support service, electronic media and ICT in distance education.
3. to be acquainted with the contribution of distance education in technical and vocational programmes.
4. to be acquainted with the necessity of quality assurance in distance education and with the role of Distance Education Council in India.

Psychology of Mental Health and Hygiene (GE-2 for EDCG)

After completion of this course students will be able ....

1. to be acquainted with the meaning, concept and characteristics of mental health and hygiene and their relationships with education.
2. to be able to understand the concepts of adjustment and maladjustment and thereof the role of family and schools in effective adjustment and in remedial measures for maladjustment.

DEPARTMENT OF CHEMISTRY
Saldiha College
Saldiha, Bankura

Programme-specific Outcomes and Course Outcomes

Chemistry is the science of everyday life – allowing us to explain properties of substances, their structures and the changes they undergo. Consequently, the chemical industry is central to the modern world economy and chemistry graduates have a wide range of employment options open to them in the field of research for human development and oil, gas, energy and also pharmaceutical industries, as well as in consumer products.

Programme Specific Outcomes

PSO-1: This specific programme has been designed with Critical comprehension, concepts, methods, and theories of diversified Chemical aspects regarding holistic development of the students.

PSO-2: In this programme Skill enhancement course are equipped with the IT skill in Chemistry or Basic analytical chemistry which will help to develop students 'ability to perform data analysis based on critical thinking skills.

PSO-3: The Ability Enhancement Course strives to develop good communication skills in both written and verbal.

PSO-4: Developing knowledge of chemistry through theory and practical.

PSO-5: Explaining molecules in terms of nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions.

PSO-6: Identify chemical formulae, structures and solve numerical problems.

PSO-7: Understanding good laboratory practices and safety.

PSO-8: Developing research-oriented skills.

PSO-9: Make aware and handle the sophisticated equipment's and advanced instruments.

Course Outcomes:

Our Chemistry department course is structured under CBCS (CHOICE BASED CREDIT SYSTEM) in which some Core Course subject, Ability Enhancement Course (AECC) subject, Skill Enhancement Course (SEC) subject, Discipline Specific Elective (DSE) subject, Generic Elective (GE) subject have studied. Course title is focusing the outcomes of this subject clearly. All the courses demonstrate via course projects, field assignments, seminar representation etc. Actually Geography is a centrally focused subject which is directly related to Pure science subject Mathematics and and Physics as well as Bio Science subject Zoology and Botany etc. This subject enrich with various applied stream like engineering and medical science material Science which have different applied forms in nature. As our Department is under the DBT star college scheme, in apart from normal

curriculum of the university some extra curriculum, some extra matters are included to strengthen the academic and physical infrastructure for achieving excellence in teaching and training some arrangement and conduction of specialized training programmes for faculty improvement for optimizing technical capabilities are also kept in mind for fulfilling the objectives. The outcomes can be studied specifically according to different branches and courses.

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
1ST SEM	CC-1	Organic Chemistry-I (Theo)	04	❖ Students will learn Bonding and Physical Properties of the organic molecules ❖ They will able to understand general Treatment of Reaction Mechanism ❖ Students will be acquainted with Stereochemistry-I
		Organic Chemistry-I (Prac)	02	❖ Students will learn to separate from composition of the mixture ❖ Students will be able to Determine boiling point of compounds ❖ They will learn to Identify of a Pure Organic Compound by Chemical Test(s)
	CC-2	Physical Chemistry-I (Theo)	04	➢ Student will learn Kinetic Theory and Gaseous state ➢ Students will able to learn Chemical Thermodynamics ➢ Learning of Chemical kinetics
		Physical Chemistry-I (Prac)	02	➢ Students will be able to learn on hand 1. Determination of pH of unknown solution (buffer), by color matching method; 2. Determination of the reaction rate constant of hydrolysis of ethylacetate in the presence of an equal quantity of sodium hydroxide; 3. Study of kinetics of acid-catalyzed hydrolysis of methyl acetate; 4. Study of kinetics of decomposition of H2O2 by KI; 5. Determination of solubility product of PbI2 by titremetric method
	GE-1	Generic Elective-1 (Theo.)	04	➢ Learning of Inorganic Chemistry which included . Atomic Structure, Chemical Periodicity, Acids and bases, Redox reactions ➢ Learning of Organic Chemistry which included Fundamentals of Organic Chemistry, Stereochemistry, Nucleophilic Substitution and Elimination Reactions, Aliphatic Hydrocarbons. Alkane, alkene, alkynes and Reactions: formation of metal acetylides,

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
		Generic Elective-1 (Pract)	02	addition of bromine and alkaline KMnO4, ozonolysis and oxidation with hot alkaline KMnO4. ➢ Learning of practical on Inorganic Chemistry: Students will learn to estimate : 1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with $KMnO_4$. 3. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$. 4. Estimation of Fe (II) ions by titrating it with $K2Cr_2O_7$ using internal indicator. 5. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$. Organic Chemistry: Learning of Qualitative Analysis of Single Solid Organic Compound(s)
2ND SEM	CC-3	Inorganic Chemistry-I (Theo)	04	➢ To learn Extra nuclear Structure of atom Including Chemical periodicity, Acid-Base reactions, Redox Reactions and precipitation reactions
		Inorganic Chemistry-I (Prac)	02	➢ To learn and hand on practice in laboratory : Oxidation-Reduction Titrimetric 1. Estimation of Fe(II) using standardized $KMnO_4$ solution 2. Estimation of oxalic acid and sodium oxalate in a given mixture 3. Estimation of Fe(II) and Fe(III) in a given mixture using K2Cr2O7 solution. 4. Estimation of Fe(III) and Mn(II) in a mixture using standardized KMnO4 solution 5. Estimation of Fe(III) and Cu(II) in a mixture using K2Cr2O7. 6. Estimation of Fe(III) and Cr(III) in a mixture using K2Cr2O7.
	CC-4	Organic Chemistry-II (Theo)	04	➢ Learning of Stereochemistry II: Chirality arising out of stereoaxis: Concept of prostereoisomerism: Conformation:andGeneral Treatment of Reaction Mechanism IIcontaingReaction thermodynamics: Concept of organic acids and bases: Tautomerism: Reaction kinetics: Substitution and Elimination Reactions, Free-radical substitution reaction: Nucleophilic substitution reactions: Elimination reactions:
		Organic Chemistry-II (Prac)	02	➢ Learning of Organic Preparations A. The following reactions are to be performed,

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				noting the yield of the crude product: 1. Nitration of acetanilide 2. Condensation reactions: Synthesis of 7-hydroxy-4-methylcoumarin 3. Hydrolysis of amides/imides/esters 4. Acetylation of phenols/aromatic amines (using Zn-dust/Acetic Acid) 5. Benzoylation of phenols/aromatic amines 6. Side chain oxidation of toluene and p-nitrotoluene 7. Diazo coupling reactions of aromatic amines 8. Bromination of acetanilide using green approach (Bromate-Bromide method) 9. Green 'multi-component-coupling' reaction: Synthesis of dihydropyrimidone 10. Selective reduction of m-dinitrobenzene to m-nitroaniline Students must also calculate percentage yield, based upon isolated yield (crude) and theoretical yield. B. Purification of the crude product is to be made by crystallisation from water/alcohol, crystallization after charcoal treatment, or sublimation, whichever is applicable. C. Melting point of the purified product is to be noted.
	CC-1B	Generic Elective-2 (Theo) States of Matter & Chemical Kinetics, Chemical Bonding & Molecular Structure, P-Block Elements		➢ Learning of Kinetic Theory of Gases and Real gases, Liquids, Solids, Chemical Kinetics ➢ Learning of Inorganic Chemistry which included chemical Bonding and Molecular Structure, Comparative study of p-block elements, States of Matter & Chemical Kinetics,
3RD SEM	CC-5	Physical Chemistry-II (Theo)	04	➢ Learning of Transport Processes: Fick's law, Viscosity, Conductance and transport number, Application of Thermodynamics – I: Partial properties and Chemical potential:ChemicalEquilibrium:Nernst's distribution law, Chemical potential and other properties of ideal substances- pure and mixtures: and foundation of Quantum Mechanics
		Physical Chemistry-II (Prac)	02	➢ Learning of practical on Study of viscosity of unknown liquid (glycerol, sugar) with respect to water. 2. Determination of partition coefficient for the distribution of I2 between water and CCl4. 3. Determination of Keq for KI + I2

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				⇔ KI3, using partition coefficient between water and CCl4. 4. Conductometric titration of an acid (strong, weak/ monobasic, dibasic) against strong base. 5. Study of saponification reaction conductometrically. 6. Verification of Ostwald's dilution law and determination of Ka of weak acid.
	CC-6	Inorganic Chemistry-II (Theo)	04	➢ Learning of Chemical Bonding-I: Ionic bond:Covalent bond, Chemical Bonding-II Molecular orbital concept of bonding Metallic Bond:, Weak Chemical Forces:
		Inorganic Chemistry-II (Prac)	02	➢ Learning of Radioactivity ➢ Skill development on Iodo/Iodimetric Titrations 1. Estimation of Cu(II). 2. Estimation of Vitamin C. 3. Estimation of arsenite by iodimetric method. 3. Estimation of Cu in brass. 4. Estimation of Cr and Mn in Steel.
	CC-7	Organic Chemistry-III (Theo)	04	
		Organic Chemistry-III (Prac)	02	➢ Learning of Chemistry of alkenes and alkynes, Aromatic SubstitutionCarbonyl and Related Compounds, Organometallics
	SEC-1	IT skill in Chemistry or Basic analytical chemistry	02	➢ Skill development on Qualitative Analysis of Single Solid Organic Compounds
	CC-1C (THeo)	Chemical energetic, equilibria, organic chemistry	04	➢ Skill on Introduction to Analytical Chemistry and its interdisciplinary nature Analysis of soil, water , food products
	CC-1C (Pract)		02	Chromatography Ion-exchange

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
	SEC-1	Analytical clinical biochemistry	02	Analysis of cosmetics ➢ Learning on Chemical Energetics, Chemical Equilibrium: . Ionic Equilibria: Organic Chemistry: Aromatic Hydrocarbons, . Organometallic Compounds, Aryl Halides, Alcohols, Phenols and Ethers, Carbonyl Compounds ➢ Learning of Practical on Physical Chemistry Ionic Equilibria 1. Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pHmeter and compare it with the indicator method 2. Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method (using following buffers) a. Sodium acetate-acetic acid b. Ammonium chloride-ammonium hydroxide 3. Study of the solubility of benzoic acid in water Organic Chemistry Identification of a pure organic compound by chemical test 1. Solid compounds: oxalic acid, succinic acid, resorcinol, urea, glucose, benzoic acid and salicylic acid. 2. Liquid Compounds: acetone, aniline and nitrobenzene. ➢ Learning of Review of core concepts including Carbohydrate, protein, Nuclic acids, Enzymes ➢ Learning of Biochemistry of disease: A diagnostic approach by blood/ urine analysis.
4TH SEM	CC-8	Physical Chemistry-III (Theo)	04	➢ Application of Thermodynamics – II Colligative propertiesPhase rule: First order phase transition and Clapeyronequation; Three component systems, water-chloroform-acetic acid system, triangular plotsBinary solutions:Electrical Properties of molecules,Ionic equilibria, Electromotive Force: Concentration cells with and without transference, liquid junction potential; Quantum Chemistry Angular momentum:

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				Qualitative treatment of hydrogen atom and hydrogen-like ions: LCAO and HF-SCF:
		Physical Chemistry-III (Prac)	02	➢ List of Practical 1. Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator). 2. Potentiometric titration of Mohr's salt solution against standard K2Cr2O7 solution. 3. Determination of Ksp for AgCl by potentiometric titration of AgNO3 solution against standard KCl solution. 4. Effect of ionic strength on the rate of Persulphate – Iodide reaction. 5. Study of phenol-water phase diagram.
	CC-9	Inorganic Chemistry-III (Theo)	04	➢ Learning of Inorganic Chemistry III: General Principles of Metallurgy: Chemistry of s and p Block Elements: ➢ Learning of Noble Gases: ➢ Learning of Inorganic Polymers: ➢ Learning of Coordination Chemistry-I :
		Inorganic Chemistry-III (Prac)	02	➢ Learning of Complexometric titration 1. Zn(II) 2. Zn(II) in a Zn(II) and Cu(II) mixture 3. Ca(II) and Mg(II) in a mixture 4. Hardness of water Inorganic preparations 1. [Cu(CH3CN)4]PF6/ClO4 2. Potassium dioxalatodiaquachromate(III) 3. Tetraamminecarbonatocobalt (III) ion 4. Potassium tris(oxalate)ferrate(III) 5. Tris-(ethylenediamine) nickel(II) chloride. 6. [Mn(acac)3] and Fe(acac)3] (acac= acetylacetonate).
	CC-10	Organic Chemistry-IV (Theo)	04	➢ Learning of Nitrogen compounds: Amines, Nitro compounds (aliphatic and aromatic):Containing Alkylnitrile and isonitrile: Diazonium salts and their related compounds: ➢ Learning of RearrangementsMechanism with evidence and stereochemical features for the following: 1. Rearrangement to electron-deficient carbon, nitrogen, oxygenAromatic rearrangementsMigration from nitrogen to ring carbon: ➢ Learning of Rearrangement reactions by green approach: The Logic of Organic

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
		Organic Chemistry-IV (Prac)	02	Synthesis, ➢ Learning of Retrosynthetic analysis which included Strategy of ring synthesis:Asymmetric synthesis ➢ Learning of Organic Spectroscopy: UV, IR, NMR and their application ➢ Learning of Practical on following: 1. Estimation of glucose by titration using Fehling's solution 2. Estimation of vitamin-C (reduced) 3. Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method 4. Estimation of phenol by bromination (Bromate-Bromide) method 5. Estimation of formaldehyde (Formalin) 6. Estimation of acetic acid in commercial vinegar 7. Estimation of urea (hypobromite method) 8. Estimation of saponification value of oil/fat/ester
	SEC-2	Pharmaceuticals Chemistry	04	➢ Learning of Drugs & Pharmaceuticals : Drug discovery, design and development; Fermentation
	CC-1D (Theo)	Solutions, Phase Equilibria, Conductance, Electrochemistry & Analytical and Environmental Chemistry	04	➢ Learning of Physical Chemistry which included Solutions, Phase Equilibria, Conductance, Electromotive force, ➢ Learning of Analytical and Environmental Chemistry: Chemical Analysis, Chromatography and Environmental Chemistry
	CC-1D (Pract)		02	➢ Physical Chemistry 1. Distribution Law Study of the equilibrium of one of the following reactions by the distribution method: Cu2 + (aq) + xNH2(aq) = [Cu(NH3)x]2+ 2. Conductance a. Determination of dissociation constant of a weak acid (cell constant, equivalent conductance are also determined) b. Perform the following conductometric titration: Weak acid vs. strong base 3. Potentiometry Perform the following potentiometric titration: Potassium dichromate vs. Mohr's salt Analytic and Environmental Chemistry 1. To find the total hardness of water by EDTA titration. 2. To find the PH of an unknown solution by comparing color of a series of HCl solutions + 1 drop of methyl orange, and a similar series

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				of NaOH solutions + 1 drop of phenolphthalein. 3. To determine the rate constant for the acid catalysed hydrolysis of an ester. 4. Determination of the strength of the H2O2 sample. 5. To determine the solubility of a sparingly soluble salt, e.g. KHTa (one bottle)
5TH SEM	CC-11	Inorganic Chemistry-IV (Theo)	04	➢ Learning of Coordination Chemistry-II which included VBT and CFT ➢ Learning ofChemistry of d- and f- block elements which included Transition Elements, Lanthanoids and Actinoids.
		Inorganic Chemistry-IV (Prac)	02	➢ Learning of practical on: Chromatography of metal ions Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: 1. Ni (II) and Co (II) 2. Fe (III) and Al (III) Gravimetry 1. Estimation of nickel (II) using Dimethylglyoxime (DMG). 2. Estimation of copper as CuSCN 3. Estimation of Al (III) by precipitating with oxine and weighing as Al(oxine)3 (aluminiumoxinate) 4. Estimation of chloride Spectrophotometry 1. Measurement of 10Dq of 3d metal complexes by spectrophotometric method. 2. Determination of λmax of KMnO4 and K2Cr2O7.
	CC-12	Organic Chemistry-V (Theo)	04	➢ Learning of Carbocycles and Heterocycles which included Polynuclear hydrocarbon and heterocyclic compounds ➢ Learning of Cyclic Stereochemistry ➢ Learning of Pericyclic reactions ➢ Learning of Carbohydrates, Biomolecules (amino acid peptide, nuclic acids), Alkaloids and Terpenoids
		Organic Chemistry-V (Prac)	02	➢ Learning of practical Chromatographic Separations 1. TLC separation of a mixture containing 2/3 amino acids 2. TLC separation of a mixture of dyes (fluorescein and methylene blue) 3. Column chromatographic separation of mixture of dyes 4. Paper chromatographic separation of a mixture containing 2/3 amino acids Spectroscopic Analysis of Organic Compounds 1. Assignment of labelled peaks in the 1H NMR spectra of the known organic compounds explaining the relative δ-values and splitting

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				pattern. 2. Assignment of labelled peaks in the IR spectrum of the same compound explaining the relative frequencies of the absorptions (C-H, O-H, N-H, C-O, C-N, C-X, C=C, C=O, N=O, C≡C, C≡N stretching frequencies; characteristic bending vibrations are included). 3. The students must record full spectral analysis of at least 15 (fifteen) compounds from the following list: a. 4-Bromoacetanilide b. 2/ -Bromo-4/ -methylacetophenone c. Vanillin d. 2/ -Methoxyacetophenone e. 4-Aminobenzoic acid f. Salicylamide g. 2/ -Hydroxyacetophenone h. 1,3-Dinitrobenzene i. Benzylacetate j. trans-4-Nitrocinnamaldehyde k. Diethyl fumarate l. 4-Nitrobenzaldehyde m. 4-Methylacetanilide n. Mesityl oxide o. 2-Hydroxybenzaldehyde p. 4-Nitroaniline q. 2-Hydroxy-3-nitrobenzaldehyde r. 2,3-Dimethylbenzonitrile s. Pent-1-yn-3-ol t. 3-Nitrobenzaldehyde u. 3-Ethoxy-4-hydroxybenzaldehyde v. 2-Methoxybenzaldehyde w. Methyl 4-hydroxybenzoate x. Methyl 3-hydroxybenzoate y. 3-Aminobenzoic acid z. Ethyl 3-aminobenzoate aa. Ethyl 4-aminobenzoate bb. 3-nitroanisole cc. 5-Methyl-2-nitroanisole dd. 3-Methylacetanilide
	DSE-1	Advanced Physical Chemistry (Theo)	04	➢ Learning of Crystal Structure which included Bravais Lattice and Laws of Crystallography:, Crystal planes, Determination of crystal structure: ➢ Statistical Thermodynamics which included Configuration, Boltzmann distribution, Partition function ➢ Special selected topics including Specific heat of solid, 3rd law, Polymers and Dipole moment and polarizability
		Advanced Physical Chemistry (Prac)	02	➢ Students will learn in hand practice containing List of Practical Computer Programming based on numerical methods for: 1. Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid) 2. Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				gas, potentiometric titrations) 3. Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values 4. Matrix operations (Application of Gauss-Siedel method in colourimetry)
	DSE-2	Analytical methods in chemistry (Theo)	04	➢ Learning of Qualitative and quantitative aspects of analysis ➢ Learning of Optical methods of analysis using spectroscopi containing methods of UV-vis, IR and Flame Atomic Absorption and Emission Spectroscopy: ➢ Learning of Thermal methods of analysisElectroanalytical methods ➢ Learning of Separation techniques involving Solvent extraction, Technique of extraction, Qualitative and quantitative aspects of solvent extraction, Chromatography, Development of chromatograms, Qualitative and quantitative aspects of chromatographic methods of analysis: TLC, LC, GLC, and HPLC.Stereoisomeric separation and analysis: and Role of computers in instrumental methods of analysis.
		Analytical methods in chemistry (Prac)	02	➢ Learning of practical onSeparation Techniques - Chromatography 1. Separation of mixtures Separation and identification of the monosaccharides in a mixture (glucose & fructose) by paper chromatography. Reporting the Rf values. 2. Separate a mixture of Sudan yellow and Sudan Red by TLC technique and identify them on the basis of their Rf values. 3. Separation of the active ingredients of plants, flowers and juices by TLC Solvent Extractions 1. To separate a mixture of Ni2+ & Fe2+ by complexation with DMG and extracting the Ni2+- DMG complex in chloroform, and determine its concentration by spectrophotometry. 2. Analysis of soil: a. Determination of pH of soil. b. Total soluble salt c. Estimation of calcium, magnesium, phosphate, nitrate 3. Ion exchange: a. Determination of exchange capacity of cation exchange resins and anion exchange resins. Spectrophotometry 1. Determination of pKa values of indicator using spectrophotometry 2. Determination of

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				chemical oxygen demand (COD) 3. Determination of Biological oxygen demand (BOD)
6TH SEM	CC-13	Inorganic Chemistry-V (Theo)	04	➢ Learning of Bioinorganic Chemistry,Organometallic Chemistry, Catalysis by Organometallic Compounds and Reaction Kinetics and Mechanism
		Inorganic Chemistry-V (Prac)	02	➢ Learning of Qualitative semimicro analysis Qualitative semimicro analysis of mixtures containing four radicals. Emphasis should be given to the understanding of the chemistry of different reactions and to assign the most probable composition. Cation Radicals: Na+ , K+ , Ca2+, Sr2+, Ba2+, Al2+, Cr2+, Mn2+/Mn4+ , Fe3+, Co2+/Co3+, Ni2+, Cu2+, Zn2+, Pb2+, Cd2+, Bi3+ , Sn2+/Sn4+ , As3+ /As5+ , Sb3+ / 5+, NH4+, Mg2+. Anion Radicals: F- , Cl- , Br- , BrO3- , I- , IO3- , SCN- , S2- , SO4 2- , NO3 - , NO2 - , PO4 3- , AsO4 3--, BO3 3- , CrO4 2- /Cr2O7 2- , Fe(CN)6 4- , Fe(CN)6 3- . Insoluble Materials: Al2O3(ig), Fe2O3(ig), Cr2O3(ig), SnO2, SrSO4, BaSO4, CaF2, PbSO4.
	CC-14	Physical Chemistry-IV (Theo)	04	➢ Learning of Molecular Spectroscopy: Rotation , Vibrational , Raman and NMR spectroscopy, Photochemistry, Surface phenomenon: Surface tension and energy, , Adsorption, Colloids:, Tyndall effect;
	DSE-3	Physical Chemistry-IV (Practical)	02	➢ Learning of Practical on :1. Determination of surface tension of a liquid using Stalagmometer. 2. Determination of CMC from surface tension measurements. 3. Verification of Beer and Lambert's Law for KMnO4 and K2Cr2O7 solution. 4. Determination of pH of unknown buffer, spectrophotometrically.
		Green Chemistry (Theo)	04	➢ Learning of Green Chemistry: Principles and applicationsExamples of Green Synthesis/ Reactions and some real world cases and Future Scope
		Green Chemistry (Pract)	02	➢ Learning of practical on Preparation of propene by two methods can be studied 2. Other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of

SEM	COURSE CODE	COURSE TITLE	CREDITS	COURSE OUTCOMES
				atom economy. 3. Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide. 4. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.
	DSE-4	Dissertation followed by power point presentation	04+02	➢ Learning of making powerpoint presentation and manner of delivering lecture using powerpoint presentation

DEPARTMENT OF PHYSICS
Saldiha College
Saldiha, Bankura

SEM	COURSE	COURSE OUTCOME
SEM-I H	CC- I: MATHEMATICAL PHYSICS- I	The students who complete the course mathematical physics-I successfully are expected tohave the knowledge of: • Revise the basic foundational knowledge of calculus, vectors, vector calculus,probability and probability distributions which areessential in solving problems in various branches of Physics. • Learn the Dirac delta function and its properties, which have applications in variousbranches of Physics, especially in quantum mechanics. • Learn the curvilinear coordinates which have applications in problems with sphericaland cylindrical symmetries. • Training in calculus will prepare the student to solve various mathematical problems. • Students can understand the use of the concept of partial differentiation in solving the situations which have more than one variable. • Students can also understand the need of complex numbers in solving mathematicalequations in different branches of Physics like Electricity and Magnetism, FluidDynamics and quantum mechanics. • In the laboratory course, students learn the fundamentals of the C and C++ programminglanguages and their applications in solving simple physical problems involvinginterpolations, differentiations, integrations, differential equations as well as findingthe roots of equations.
	CC II: MECHANICS	The students who complete the course mechanics successfully are expected to: • Builds basic concepts related to the motion of bodies which further teaches them to understand complexities of various motions and explain the same in simple mathematical forms. • The course builds a foundation of various applied field in science and technology as well. • The students will develop a deep understanding of Newton's laws. • They shall also gain knowledge of special theory of relativity.
SEM-1G	CC- 1A: MECHANICS	The students who complete the course mechanics successfully are expected to: • Understand the terminology used in Classical Mechanics and

		employ conceptual understanding to make predictions, and then approach the problem mathematically. • They will acquire basic knowledge of mechanics, gravitation and will understand howto apply the conservation of rotational motionin different parts of physics. • They shall alsogain knowledge of special theory of relativity. • In the practical classes they are able to understand the important connections between theory and experiment and connect concepts and mathematical rigor in order to enhance understanding.
SEM-II H	**CC-III: ELECTRICITY AND MAGNETISM**	• Demonstrate Gauss law, Coulomb's law for the electric field, and apply it to systems of point charges as well as line, surface, and volume distributions of charges. • Explain and differentiate the vector (electric fields, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics. • Apply Gauss's law of electrostatics to solve a variety of problems. • Articulate knowledge of electric current, resistance and capacitance in terms of electric field and electric potential. • Demonstrate a working understanding of capacitors. • Describe the magnetic field produced by magnetic dipoles and electric currents. • Explain Faraday-Lenz and Maxwell laws to articulate the relationship between electric and magnetic fields. • Understand the dielectric properties, magnetic properties of materials and the phenomena of electromagnetic induction. • Describe how magnetism is produced and list examples where its effects are observed. • Apply Kirchhoff's rules to analyse AC circuits consisting of parallel and/or series combinations of voltage sources and resistors and to describe the graphical relationship of resistance, capacitor and inductor. • Apply various network theorems such as Superposition, Thevenin, Norton, Reciprocity, Maximum Power Transfer, etc. and their applications in electronics, electrical circuit analysis, and electrical machines. • In the laboratory course the student will get an opportunity to verify various laws in electricity and magnetism such as Lenz's law, Faraday's law and learn about the construction, working of various measuring instruments. • Should be able to verify of various circuit laws, network theorems elaborated above, using simple electric circuits.
	CC-IV: WAVES AND OPTICS	The students who complete the course waves and optics successfully are expected to apply basic knowledge of:

		• The principles and theories about the behaviour of light and the physical environment to conduct experiments. • Understand the principle of superposition of waves, so thus describe the formation of standing waves. • Explain several phenomena we can observe in everyday life that can be explained as wave phenomena. • Use the principles of wave motion and superposition to explain the Physics of polarisation, interference and diffraction. • Understand the working of selected optical instruments like biprism, interferometer, diffraction grating, and holograms. • In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel biprism etc. Resolving power of optical equipment can be learnt firsthand. • The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course.
SEM-II G	**CC1B: ELECTRICITY AND MAGNETISM**	• It helps students to develop knowledge about one of the fundamental interactions of electricity and magnetism, both as separate phenomena as well as the unification as electromagnetic force and to understand the basic mathematical concepts related to electromagnetic vector fields. • The course also ensures that the students are able to apply the basic concepts of electrostatics and magneto statics in solving problems. • The course is very useful for the students in almost every branch of science and engineering. • The course also introduces the concepts of Faraday‘s law, induced electromotive force and Maxwell‘s equations. • The students gather the basic idea of electrical circuits and network theorems focusing on the working of the series and parallel LCR circuits.
SEM-IIIH	**CC- V: MATHEMATICAL PHYSICS-II**	After completing this course students • Learn the Fourier analysis of periodic functions and their applications in physicalproblems such as vibrating strings etc. • Learn about the special functions, such as the Hermite polynomial, the Legendrepolynomial, the Laguerre polynomial and Bessel functions and their differentialequations and their applications in various physical problems such as in quantummechanics which they will learn in future courses in detail. • Learn the beta, gamma and the error functions and their applications in doingintegrations. • Know about the basic theory of errors, their analysis, estimation with examples ofsimple experiments in Physics. • Acquire knowledge of methods to solve partial differential

		equations with theexamples of important partial differential equations in Physics. • In the laboratory course, students learn the basics of the Scilab software, their utility,advantages and disadvantages. • Apply the Scilab software in curve fittings, in solving system of linear equations,generating and plotting special functions such as Legendre polynomial and Besselfunctions, solving first and second order ordinary and partial differential equations. • Training in mathematical tools like calculus, integration, series solution approach,special function will prepare the student to solve ODE, PDE's which model physicalphenomena. • Developing an understanding of how to model a given physical phenomena such aspendulum motion, rocket motion, stretched string, etc., into set of ODE's, PDE's andsolve them.
	CC- VI: THERMAL PHYSICS	• By studying this course students will acquire the basic concepts of thermodynamics,the first and the second law of thermodynamics, the concept of entropy and theassociated theorems, the thermodynamic potentials and their physical interpretations.They are also expected to learn Maxwell's thermodynamic relations. • They will become proficient in the fundamentals of the kinetic theory of gases,Maxwell-Boltzmann distribution law, law of equipartition of energies, mean free path ofmolecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion. • They will have a knowledge of the real gas equations, Van der Waal equation of state,the Joule Thompson effect. • They will eventually master the concepts of the black body radiations, Stefan-Boltzmann's law, Rayleigh-Jean's law and Planck's law and their significances. • Learn the quantum statistical distributions, viz., the Bose-Einstein statistics and theFermi-Dirac statistics. • In the laboratory, the students are expected to perform the following experiments: • Measurement of Planck's constant using black body radiation • To determine Stefan's Constant • To determine the coefficient of thermal conductivity of a bad conductor by Lee's and Chrolton's disc method • To determine the temperature co-efficient of resistance by Platinum resistancethermometer • To study the variation of thermo emf across two junctions of a thermocouple withtemperature • To determine the pressure coefficient of air by constant volume method • To determine the coefficient of thermal conductivity of a bad conductor bySearle's method.
	CC- VII: DIGITAL SYSTEMS AND APPLICATIONS	This course lays the foundation for • Understanding the digital logic circuits and their use in combinational and sequential logic circuit design. • Information about the basic architecture, memory and input/output organization in a microprocessor system.

		• The students also learn the working of CRO. • Course learning begins with the basic understanding of active and passive components. It then builds the concept of Integrated Chips (IC): its classification and uses. • Differentiating the Analog and Digital circuits, the concepts of number systems like Binary,BCD, Octal and hexadecimal are developed to elaborate and focus on the digital systems. • Sequential Circuits: Basic memory elements Flips-Flops, shift registers and 4-bits counters leading to the concept of RAM, ROM and memory organization. • Timer circuits using IC 555 providing clock pulses to sequential circuits and develop multivibrators. • Introduces to basic architecture of processing in an Intel 8085 microprocessor and to Assembly Language. • Also impart understanding of working of CRO and its usage in measurements of voltage, current, frequency and phase measurement. • In the laboratory students will learn to construct both combinational and sequential circuits by employing NAND as building blocks and demonstrate Adders, Subtractors, Shift Registers, and multivibrators using 555 ICs. They are also expected to use µP 8085 to demonstrate the same simple programme using assembly language and execute the programme using a µP kit.
	SEC-1: RENEWABLE ENERGY AND ENERGY HARVESTING	At the end of this course, students will be able to achieve the following learning outcomes: • Knowledge of various sources of energy for harvesting. • Understand the need of energy conversion and the various methods of energy storage. • Knowledge of Stored Mechanical Energy, Gravitational Energy, Stored Mechanical Energy, Radiant Energy, Thermal Energy, Electrical Energy. • Qualitative ideas about Solar energy, Physical principle of conversion of solar energy into heat energy, solar energy harvesting devices like solar cells, solar cookers, solar greenhouses etc. • A good understanding of various renewable energy systems, and its components. • Knowledge about renewable energy technologies, different storage technologies, distribution grid, smart grid including sensors, regulation and their control. • Design the model for sending the wind energy or solar energy plant. • The students will gain hand on experience of: (i) different kinds of alternative energy sources, (ii) conversion of vibration into

		voltage using piezoelectric materials, (iii) conversion of thermal energy into voltage using thermoelectric modules.
SEM-III G	**CC-1C: THERMAL PHYSICS AND STATISTICAL MECHANICS**	At the end of the course, students will be able to: • Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics. • Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. • Know about reversible and Irreversible processes. • Learn about Maxwell's relations and use them for solving many problems in Thermodynamics • Understand the concept and behavior of ideal and real gases. • Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion. • Learn the quantum statistical distributions, viz., the Bose-Einstein statistics and the Fermi-Dirac statistics. • In the laboratory course, the students are expected to: Measure of Planck's constant using black body radiation, determine Stefan's Constant, coefficient of thermal conductivity of a bad conductor and a good conductor, determine the temperature coefficient of resistance, study variation of thermo emf across two junctions of a thermocouple with temperature etc • In the laboratory course, the students are expected to do some basic experiments in thermal Physics, viz., determination of Mechanical Equivalent of Heat (J), coefficient of thermal conductivity of good and bad conductor, temperature coefficient of resistance, variation of thermo-emf of a thermocouple with temperature difference at its two junctions and calibration of a thermocouple.
SEM-IV H	**CC-VIII: MATHEMATICAL PHYSICS-III**	After completing this course, student will be able to • Determine continuity, differentiability and analyticity of a complex function, find the derivative of a function and understand the properties of elementary complex functions. • Work with multi-valued functions (logarithmic, complex power, inverse trigonometric function) and determine branches of these functions. • Evaluate a contour integral using parametrization, fundamental theorem of calculus and Cauchy's integral formula. • Find the Taylor series of a function and determine its radius of convergence. • Determine the Laurent series expansion of a function in different regions, find the residues and use the residue theory to evaluate a contour integral and real integral. • Understand the properties of Fourier and Laplace transforms and use these to solve boundary value problems. • In the laboratory course, the students will learn the basics of the Scilab software/Python interpreter and apply appropriate numerical method to solve selected physics problems both using user defined and inbuilt functions from Scilab/Python.
	CC-IX:ELEMENTS	After getting exposure to this course, the following topics would be

	OF MODERN PHYSICS	learnt: • Main aspects of the inadequacies of classical mechanics as well as understanding of the historical development of quantum mechanics. • Formulation of Schrodinger equation and the idea of probability interpretation associated with wave-functions. • The spontaneous and stimulated emission of radiation, optical pumping and population inversion. Three level and four level lasers. Ruby laser and He-Ne laser in details. Basic lasing • The properties of nuclei like density, size, binding energy, nuclear forces and structure of atomic nucleus, liquid drop model and nuclear shell model and mass formula. • Decay rates and lifetime of radioactive decays like alpha, beta, gamma decay. Neutrino, its properties and its role in theory of beta decay. • Fission and fusion: Nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars. • In the laboratory course, the students will get opportunity to measure Planck's constant, verify photoelectric effect, determine e/m of electron, Ionization potential of atoms, study emission and absorption line spectra. They will also find wavelength of Laser sources by single and Double slit experiment, wavelength and angular spread of He-Ne Laser using plane diffraction grating.
	CC-X ANALOG SYSTEMS AND APPLICATIONS	The course will help students gather knowledge about the working principle of different electronic circuit and their application in real life. At the end of this course, the following concepts will be learnt • Characteristics and working of p-n junction. • Two terminal devices: Rectifier diodes, Zener diode, photodiode etc. • NPN and PNP transistors: Characteristics of different configurations, biasing, stabilization and their applications. • CE and two stage RC coupled transistor amplifier using h-parameter model of the transistor. • Designing of different types of oscillators and their stabilities. • Ideal and practical op-amps: Characteristics and applications. • In the laboratory course, the students will be able to study characteristics of various diodes and BJT. They will be able to design amplifiers, oscillators and DACs. Also different applications using Op-Amp will be designed.
	SEC-2: ELECTRICAL CIRCUITS AND NETWORK SKILLS	• By studying this course the student will acquire necessary skills on multimeters,voltmeters, ammeters, electric circuit elements, dc power sources, ac/dc generators,inductors, capacitors, transformers, single phase and three phase motors, interfacingdc/ac motors to control and measure, relays and

		basics of electrical wiring. • Develop skills to understand various types of DC and AC circuits and makingelectrical drawings with symbols for various systems. • Students will acquire the ability to understand and operate generators, transformersand electric motors. • They will develop knowledge of solid state devices and their uses. • Students will gain competence to do electrical wiring with assured electricalprotection devices.
SEM-IVG	CC-ID:WAVES AND OPTICS	On successfully completing the requirements of this course, the students will have the skill and knowledge to: • Understand Simple harmonic oscillation and superposition principle. • Understand different types of waves and their velocities: Plane, Spherical, Transverse, and Longitudinal. • Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations. • Understand Interference as superposition of waves from coherent sources derived from same parent source. • Demonstrate basic concepts of Diffraction: Superposition of wavelets diffracted from aperture, understand Fraunhoffer and Fresnel Diffraction. • In the laboratory course, student will gain hands-on experience of using various optical instruments and making finer measurements of wavelength of light using Newton Rings experiment, Fresnel Biprism etc. Resolving power of optical equipment can be learnt first hand.The motion of coupled oscillators, study of Lissajous figures and behaviour of transverse, longitudinal waves can be learnt in this laboratory course
SEM-V-H	**CC – XI: QUANTUM MECHANICS AND APPLICATIONS**	The Students will be able to learn the following from this course: • New mathematical tools and methods and their use in quantum mechanics problems. This will include complex functions and Hilbert spaces, and operator algebra. • Solutions of ordinary and partial differential equations and some special differential equation (hypergeometric differential equation) that arise in quantum mechanics will also be understand. • Ability of conceptual understanding regardingclassical mechanics and quantum mechanics and their difference as well as realizations of the fundamental mathematical structure of a physical theory that uses the notations of observables, states, measurement etc.

		• Methods to solve time-dependent and time-independent Schrodinger equation. • Quantum mechanics of simple harmonic oscillator. • Non-relativistic hydrogen atom: spectrum and eigenfunctions. • Angular momentum: Orbital angular momentum and spin angular momentum. • Bosons and fermions - symmetric and anti-symmetric wave functions. • Application to atomic systems • In the laboratory course, with the exposure in computational programming in the computer lab, the student will be in a position to solve Schrodinger equation for ground state energy and wave functions of various simple quantum mechanical onedimensional and three dimensional potentials.
	CC - XII: SOLID STATE PHYSICS	On successful completion of the module students should be able to • Elucidate the concept of lattice, crystals and symmetry operations. • Understand the elementary lattice dynamics and its influence on the properties of materials. • Describe the main features of the physics of electrons in solids: origin of energy bands, and their influence electronic behavior. • Explain the origin of dia-, para-, and ferro-magnetic properties of solids. • Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability. • Understand the basics of phase transitions and the preliminary concept and experiments related to superconductivity in solid. • In the laboratory students will carry out experiments based on the theory that they have learned to measure the magnetic susceptibility, dielectric constant, trace hysteresis loop. They will also employ to four probe methods to measure electrical conductivity and the hall set up to determine the hall coefficient of a semiconductor.
	DSE-1 ADVANCED MATHEMATICAL PHYSICS	After completing the course the students have: • The understanding of the basic properties of the linear vector space such as linear dependence and independence of vectors, change of basis, isomorphism and homomorphism, linear transformations and their representation by matrices. • Critically apprehend the basic properties of matrices, different types of matrices viz., Hermitian, skew Hermitian, orthogonal and unitary matrices and their correspondence to physical quantities, e.g, operators in quantum mechanics. They should also learn how to find the eigenvalues and eigenvectors of matrices. • Acquiring the knowledge of some basic properties of tensors,

		their symmetric and antisymmetric nature, the Cartesian tensors, the general tensors, contravariant, covariant and mixed tensors and their transformation properties under coordinate transformations, physical examples of tensors such as moment of inertia tensor, energy momentum tensor, stress tensor, strain tensor etc. • In the laboratory course, the students are expected to solve the following problems using the Scilab: o Diagonalization of a matrix o Inverse of a matrix o Solutions of differential equations satisfied by different orthogonal polynomialsand special function, o Determination of wave functions for stationary states as eigenfunctions ofHermitian differential operators and also the energy eigenvalues.
	DSE-2 CLASSICAL DYNAMICS	At the end of this course, students will be able to: • Understand the physical principle behind the derivation of Lagrange and Hamilton equations, and the advantages of these formulations. • Understand the classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton - Jacobi equations. • Understand the concept of generalized co-ordinates. • Understand small amplitude oscillations. • Understand the intricacies of motion of particle in central force field. Critical thinking and problem-solving skills. • Recapitulate and learn the special theory of relativity extending to Four – vectors. • Learn the basics of fluid dynamics, streamline and turbulent flow, Reynolds's number, coefficient of viscosity and Poiseuille's equation.
SEM-V G	**DSE-1A: ELEMENTS OF MODERN PHYSICS**	• Know main aspects of the inadequacies of classical mechanics and understand historical development of quantum mechanics and ability to discuss and interpret experiments that reveal the dual nature of matter. • Understand the theory of quantum measurements, wave packets and uncertainty principle. • Understand the central concepts of quantum mechanics: wave functions, momentum and energy operator, the Schrodinger equation, time dependent and time independent cases, probability density and the normalization techniques, skill development on problem solving e.g. one dimensional rigid box, tunneling through potential barrier, step potential, rectangular barrier. • Understanding the properties of nuclei like density, size,

		binding energy, nuclear forces and structure of atomic nucleus, liquid drop model and nuclear shell model and mass formula. • Ability to calculate the decay rates and lifetime of radioactive decays like alpha, beta, gamma decay. Neutrinos and its properties and role in theory of beta decay. • Understand fission and fusion well as nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars. • Understand various interactions of electromagnetic radiation with matter. Electron positron pair creation. • In the laboratory course, the students will get opportunity to perform the following experiments. • Measurement of Planck's constant by more than one method. • Verification of the photoelectric effect and determination of the work Function of a metal. • Determination of the charge of electron and e/m of electron. • Determination of the ionization potential of atoms. • Determine the wavelength of the emission lines in the spectrum of Hydrogen atom. • Determine the absorption lines in the rotational spectrum of molecules. • Verification of the law of the Radioactive decay and determine the mean life time of a Radioactive Source, Study the absorption of the electrons from Beta decay. Study of the electron spectrum in Radioactive Beta decays of nuclei.
SEM-VI H	**CC-XIII: ELECTROMAGNETIC THEORY**	• With the completion of the course, the students should be able to differentiate different types of coordinate systems and use them for solving the problems ofelectromagnetic field theory. • The students will also learn to describe static electric and magnetic fields, their behaviour in different media, associatedlaws, boundary conditions and electromagnetic potentials. • They will develop their knowledge on application of Maxwell`s equations for solving the problems of Electromagnetic field theory. • Understand electromagnetic wave propagation in unbounded media: Vacuum, dielectric medium, conducting medium, plasma. • Understand electromagnetic wave propagation in bounded media: reflection and transmission coefficients at plane interface in bounded media. • Understand polarization of Electromagnetic Waves: Linear, Circular and Elliptical Polarization. • They will also learn about time varying fields, propagation of electromagnetic waves in different media, Poynting theorem,

		their sources & effects and to apply the theory of electromagnetic waves in practical problems. • To introduce various co-ordinate system and review of Maxwell's equations. • To familiarize the students about the electric field in material space and learn to solve boundary valueproblems. • To identify, formulate and solve fields and electromagnetic waves propagation problems. • Apply Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density. • In the laboratory course, the student get an opportunity to perform experiments with Polarimeter, Babinet Compensator, Ultrasonic grating, simple dipole antenna. Also, to study phenomena of interference, refraction, diffraction and polarization.
	CC-XIV: STATISTICAL MECHANICS	The students who complete the course statistical mechanics successfully are expected to understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world. By the end of the course, students will be able to: • Understand the concepts of microstate, macrostate, phase space, thermodynamic probability and partition function. • Understand the use of Thermodynamic probability and Partition function forcalculation of thermodynamic variables for physical system (Ideal gas, finite level system). • Difference between the classical and quantum statistics • Understand the properties and Laws associated with thermal radiation. • Apply the Fermi- Dirac distribution to model problems such as electrons in solids and white dwarf stars • Apply the Bose-Einstein distribution to model problems such as blackbody radiation and Helium gas. • In the laboratory course, with the exposure in computer programming and computational techniques like C, C++, Scilab, the student will be in a position to perform numerical simulations for solving the problems based on Statistical Mechanics.
	DSE-3: NUCLEAR AND PARTICLE PHYSICS	• Learn the ground state properties of a nucleus – the constituents and their properties, mass number and atomic number, relation between the mass number and the radius and the mass number, average density, range of force, saturation property, stability curve, the concepts of packing fraction and binding energy, binding energy per nucleon vs. mass number graph, explanation of fusion and fission from the nature of the binding energy

		graph. • Know about the nuclear models and their roles in explaining the ground stateproperties of the nucleus – (i) the liquid drop model, its justification so far asthe nuclear properties are concerned, the semi-empirical mass formula, (ii)the shell model, evidence of shell structure, magic numbers, predictions ofground state spin and parity, theoretical deduction of the shell structure,consistency of the shell structure with the Pauli exclusion principles. • Learn about the process of radioactivity, the radioactive decay law, theemission of alpha, beta and gamma rays, the properties of the constituents ofthese rays and the mechanisms of the emissions of these rays, outlines ofGamow's theory of alpha decay and Pauli's theory of beta decay with theneutrino hypothesis, the electron capture, the fine structure of alpha particlespectrum, the Geiger-Nuttall law, the radioactive series. • Learn the basic aspects of nuclear reactions, the Q-value of such reaction andits derivation from conservation laws, The reaction cross-sections, the typesof nuclear reactions, direct and compound nuclear reactions, Rutherfordscattering by Coulomb potential. • Learn some basic aspects of interaction of nuclear radiation with matter-interaction of gamma ray by photoelectric effect, Compton scattering and pairproduction, energy loss due to ionization, Cerenkov radiation. • Learn about the detectors of nuclear radiations- the Geiger-Mueller counter,the scintillation counter, the photo-multiplier tube, the solid state andsemiconductor detectors. • Gain knowledge on the basic aspects of particle Physics – the fundamentalinteractions, elementary and composite particles, the classifications ofparticles: leptons, hadrons (baryons and mesons), quarks, gauge bosons. Thestudents should know about the quantum numbers of particles: energy, linearmomentum, angular momentum, isospin, electric charge, colour charge,strangeness, lepton numbers, baryon number and the conservation lawsassociated with them.
	DSE-4: ASTRONOMY AND ASTROPHYSICS	• Develop the potential of the students to comprehend astronomical scales and understand basic concepts of positional astronomy like astronomical coordinate system and measurement of distances, time and temperature and radius of star. • Students will eventually grasp the idea of basic parameters of stars like brightness, radiant flux, luminosity, magnitude, orbits, spectral classification. H-R diagram. • Understand astronomical techniques, various types of optical

		telescopes and telescope mountings. Various types of detectors and their use with telescopes. • The students will get acquainted with the physics of sun and solar system: photosphere, chromosphere, corona, solar activity. Solar MHD, helioseismology, solar system and its origin, Nebular model, Tidal forces and planetary rings. • Conceptualizing the physics of stars and sun. Role of gravitation in astrophysics, Newton vs Einstein, viral theorem and thermodynamic equilibrium. Atomic spectra, stellar spectra, Spectral classification, luminosity classification, temperature dependence. • Acquire basic knowledge of galaxies and Milky Way. Morphology and classification of galaxies, intrinsic stages of galaxies, galactic halo, milky way, gas and dust in galaxy, spiral arm, rotation of galaxy and dark matter. Star clusters in Milky Way, galactic nucleus and its properties. • Learn about the large-scale structure and expanding universe cosmic distance ladder, distance measurements, cluster of galaxies, Hubble's law.
SEM-VIG	**DSE-IB:DIGITAL AND ANALOG CIRCUITS AND INSTRUMENTATION**	• Differentiating the Analog and Digital circuits, the concepts of number systems like Binary,BCD, Octal and hexadecimal are developed to elaborate and focus on the digital systems. • Characteristics and working of p-n junction. • Two terminal devices: Rectifier diodes, Zener diode, photodiode etc. • NPN and PNP transistors: Characteristics of different configurations, biasing, stabilization and their applications. • CE and two-stage RC coupled transistor amplifier using h-parameter model of the transistor. • Designing of different types of oscillators and their stabilities. • Ideal and practical op-amps: Characteristics and applications. • Timer circuits using IC 555 providing clock pulses to sequential circuits and develop multivibrators.. • Also impart understanding of working of CRO and its usage in measurements of voltage, current, frequency and phase measurement. • In the laboratory students will learn to construct both combinational and sequential circuits by employing NAND as building blocks. They will be able to study characteristics of various diodes and BJT. They will also be able to design amplifiers (using BJT and Op-Amp), oscillators and multivibrators. • They will also learn the working of CRO.

DEPARTMENT OF MATHEMATICS

Saldiha College
Saldiha, Bankura

B. Sc. Honours

Program Specific Outcomes

After the successful completion of the specific program (B. Sc. in Mathematics (Hons.)):

- **PSO1:** Students will demonstrate in-depth knowledge of Mathematics, both in theory and application.
- **PSO2:** Students will attain the ability to identify, formulate and solve challenging problems in Mathematics.
- **PSO3:** Students will be able to analyze complex problems in Mathematics and propose solutions using their knowledge.
- **PSO4:** Students will be aware of their professional and ethical responsibilities.
- **PSO5:** Students will be able to work individually or as a team member or leader in uniform and multidisciplinary settings.
- **PSO6:** Students will develop confidence for self-education and ability for lifelong learning.

Course Outcomes

1st Year 1st Semester

Course Title: Calculus, Geometry & Differential Equations

Course Outcomes:

After the completion of the course the student will be able to

- **CO1:** Understand the concept of Hyperbolic functions, asymptotes, concavity and convexity.
- **CO2:** Compute the n-the derivative using the Leibnitz's rule.
- **CO3:** Become familiar with the reduction formulae for integration of *sin nx, cos nx, tan nx, sec nx* etc.
- **CO4:** Calculate of arc length, area of surface of revolution of a curve.

- **CO5:** Understand the basic knowledge of conics and quadrics.
- **CO6:** Solve different types of differential equations.
- **CO7:** Graphically demonstrate different types of curves and surfaces.

Course Title: Algebra

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Get an initial idea about the about algebraic and various properties of complex numbers, Argand plane etc.
- **CO2:** Solve different types of cubic and biquadratic equations.
- **CO3:** Get a flavour of abstract algebra by knowing set, relation, partition, equivalence relation.
- **CO4:** Know different properties of integers and aspects of the theory of numbers.
- **CO5:** Solve system of linear equations by matrix method.
- **CO6:** Understand the concepts of a linear transformation, matrix of a linear transformation, the inverse of a matrix, characterizations of invertible matrices.
- **CO7:** Gain knowledge of the theory of vector spaces.

1st Year 2nd Semester

Course Title: Real analysis

Course Outcomes:

This course will enable the students to:

- **CO1:** Understand various properties of the real line $\mathbb{R}$.
- **CO2:** Learn the various concepts of sets in $\mathbb{R}$ in depth.
- **CO3:** Recognize bounded, convergent, divergent, Cauchy and monotonic sequences and to calculate their limit superior, limit inferior, the limit of a bounded sequence and subsequences.
- **CO4:** Apply the ratio test, root test, integral test, alternating series, Leibniz test and limit comparison tests for convergence and absolute convergence of an infinite series of real numbers.
- **CO5:** Develop an intense foundation in fundamental concepts of real analysis so that they (the student) should be able to work basic problems (proofs, construction of examples, counter-examples, or argue that a claim is false) in basic Real analysis.

Course Title: Differential Equation and Vector Calculus

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain clearer concepts of Lipschitz condition and Picard's Theorem, and, to understand applications of Lipschitz condition in different problems.
- **CO2:** Understand about General solution of homogeneous equation of second order, principle of super position for homogeneous equation, and also Wronskian: its properties and applications. Also know how to solve linear homogeneous and non-homogeneous equations of higher order with constant coefficients. Gain clear idea on Euler's equation, method of undetermined coefficients, and method of variation of parameters and know how to solve different problems.
- **CO3:** Be able to understand Systems of linear differential equations, types of linear systems, differential operators, an operator method for linear systems with constant coefficients, and learn its' application in business, economics and life sciences.
- **CO4:** Understand Basic Theory of linear systems in normal form, homogeneous linear systems with constant coefficients: Two Equations in two unknown functions and methods of solutions of variety of problems with an emphasis on, homogeneous linear systems with constant coefficients.
- **CO5:** Gain clear concepts on Equilibrium points, Interpretation of the phase plane and know how to find Equilibrium points on different problems.
- **CO6:** Become able to solve Power series solution of a differential equation about an ordinary point, solution about a regular singular point with a clear idea about how to solve different physical problems.
- **CO7:** Apply differential equations to solve real world problems from both the physical and life sciences.
- **CO8:** Gain clearer concepts on vector Triple product, introduction to vector functions, operations with vector-valued functions and recapitulate on vector product of two vectors (dot & cross).
- **CO9:**Understand the concept of limits and continuity of vector functions, differentiation and integration of vector functions.
- **CO10:** Understand the Graphical Demonstration of Plotting of family of curves which are solutions of second order differential equation &plotting of family of curves which are solutions of third order differential equation.

2nd Year 3rd Semester

Course Title: Theory of Real Functions & Introduction to Metric Space

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Understand the concepts of limit, continuity and differentiability in ε – δ approach.
- **CO2:** Gain signifaicant knowledge about the sequence and series of real numbers.
- **CO3:** Become familiar with the various properties of continous and differentiable functions.
- **CO4:** Learn about the applications of Mean Value Theorems.
- **CO5:** Gain significant knowledge about Taylor series and its applications.
- **CO6:** Get preliminary ideas about metric spaces.

Course Title: Group Theory–I

Course Outcomes:

Upon the completion of the course the student will be able to

- **CO1:** Understand the concepts of group, commutative group, non-commutative group, subgroup, cyclic group, cosets, normal subgroup, factor group.
- **CO2:** Become familiar with the definition and properties of centralizer, normalizer and centre of a group.
- **CO3:** Understand Lagrange's theorem, Fermat's little theorem and its application.
- **CO4:** Become familiar with the properties of external direct product.
- **CO5:** Familiarize with Cauchy's theorem.
- **CO6:** Gain clear idea about homomorphism, isomorphism of group.
- **CO7:** Understand the symmetries of square, different properties of permutation groups, quaternion group, Dihedral groups.

Course Title: Numerical Methods & Numerical Methods Lab

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Learn Approximation of numbers, Algebraic manipulation for avoiding loss of significance, various types of errors, Algorithms and Convergence.
- **CO2:** Learn the importance of Polynomial Interpolations, Numerical differentiation to compute the values for a tabulated function at points not in the table.
- **CO3:** Understand the error bounds and concepts of Finite difference operators.
- **CO4:** Become proficient in finding solution of algebraic and transcendental equations of a single variable numerically up to a certain given level of precision by (i) Bisection method, (ii) Newton's method, (iii) Secant method, (iv) Regula-Falsi method, (v) Fixed point iteration, (vi) Newton-Raphson method and understand the rate of convergence of these methods.
- **CO5:** Able to get solution of a system of linear algebraic equation by Gauss−Jacobi, Gauss−Seidel, Gauss Jordan and LU decomposition methods.

- **CO6:** Become proficient in various Numerical Integration methods such as Newton Cotes formula, Trapezoidal, Simpson's 1/3rd, Simpsons 3/8th, Weddle's, Boole's. Midpoint, and able to apply them to solve integrals.
- **CO7:** Able to solve of the algebraic eigenvalue problem by Power Method.
- **CO8:** Able to solve ordinary differential equations numerically by Euler's, the modified Euler and Runge-Kutta method.
- **CO9:** Develop basic knowledge and experience with the use of the standard C programming language.
- **CO10:** Able to write C programme on Interpolation, finding a real root of nonlinear equations, solving system of linear equations, numerical integration, solving ordinary differential equations.
- **CO11:** Able to apply Numerical Methods in diverse real-life situations in physics, engineering, and in other mathematical contexts.

Course Title: Logic and Sets

Course Outcomes:

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

- **CO1:** Understand the concepts of truth table, negation, conjunction and disjunction.
- **CO2:** Become familiar with predicates and quantifiers.
- **CO3:** Demonstrate the knowledge of set theory and set operations.
- **CO4:** Become familiar with the concept of counting principle.
- **CO5:** Understand the concept of relation and partition.

2nd Year 4th Semester

Course Title: Riemann Integration and Series of Functions

Course Outcomes:

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

- **CO1:** Become familiar with the notion of Riemann integration and its properties.
- **CO2:** Check the Riemann integrability of monotone and continuous functions.
- **CO3:** Understand the intermediate value theorem for integrals.
- **CO4:** Become familiar with the concepts of improper integrals, Beta, and Gamma functions.
- **CO5:** Demonstrate the knowledge of piecewise and uniform convergence of sequence of functions.
- **CO6:** Become familiar with the various properties of series of functions.
- **CO7:** Demonstrate the knowledge of Fourier series.
- **CO8:** Become familiar with the different properties of power series.

Course Title: Multivariate Calculus

Course Outcomes:

Upon completion of this course successfully, students are expected to:

- **CO1:**Understand the fundamental concepts of functions of several variables & the concepts of derivatives for this type of functions.
- **CO2:** Apply the concepts of derivatives to find the maxima and minima for functions of several variables.
- **CO3:**Compute double and triple integrals efficiently & also learn about change of variables in double and triple integrals.
- **CO4:**Apply double and triple integral to find area and volume.
- **CO5:** Gain knowledge on the concept of Vector operators, directional derivatives, conservative vector fields, gradient, divergence, curl and integration of vector point functions.
- **CO6:** Solve problems related to line, surface and volume integrals using Gauss's Divergence theorem, Stoke's theorem and Green's theorem.

Course Title:Ring Theory and Linear Algebra I

Course Outcomes :

The students who complete this course successfully are expected to :

- **CO1:** Gain clearer concept of rings, subrings, integral domains and fields and, to understand characteristic of a ring, Ideal, factor rings, prime and maximal ideals.
- **CO2:** Be able to understand ring homomorphisms and learn bout Isomorphism theorems.
- **CO3:** Able to understand Vector spaces, subspaces, quotient spaces, linear span.
- **CO4:** Understand the concepts of linear combination of vectors, linear independence, basis and dimension, dimension of subspaces.
- **CO5:** Become able to solve problems using extension, deletion and replacement theorems.
- **CO6:** Gain clearer concept of Linear transformations, algebra of linear transformations, Isomorphisms .
- **CO7:** Be able to understand range, rank and nullity of a linear transformation and matrix representationof a linear transformation.
- **CO8:** Understand the concept of changeofcoordinate matrix.

Course Title: Graph Theory

Course Outcomes:

The students who complete this course successfully are expected:

- **CO1:**To understand the definition of a graph and its basic properties.
- **CO2:** To develop the under-standing of pseudo graphs, complete graphs, bi-partite graphs, isomorphism of graphs and weighted graph.
- **CO3:** To understand the concept of Eulerian circuits, Eulerian graph, semi-Eulerian graph, Hamiltonian cycles, Trees, spanning tree and related theorems and learn their applications.
- **CO4:** To able to represent a graph by a matrix like Incidence matrix, Adjacency matrix etc.
- **CO5:** To solve problems on Travelling salesman's problem, Dijkstra's algorithm and Warshall algorithm.
- **CO6:** To comprehend and apply the essential notions of graph theory and relate the graph theory to the real-world problems.
- **CO7:** To handle graph theory-based tools in solving practical problems

3rd Year 5th Semester

Course Title: Partial Differential Equations and Applications

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:**Understand Basic concepts and Definitions various Partial Differential Equations (PDE).
- **CO2:**Able to classify the first and second order Partial Differential Equations and understand their Geometrical Interpretations.
- **CO3:** Able to reduce the first and second order PDE to their Canonical Forms and solve the first and second order PDE by the Method of Separation of Variables.
- **CO4:** Able to derive Heat equation, Wave equation and Laplace equation.
- **CO5:** Solve the Cauchy problem of 2nd order partial differential equations.
- **CO6:** Become proficient in finding solution of Cauchy problem of an infinite string, Semi-Infinite String with a fixed/Free end, Non-Homogeneous Wave Equation, Vibrating String Problem and the Heat Conduction problem.
- **CO7:** Demonstrate the capacity to model a physical phenomenon using PDE (in particular using the heat and wave equations).
- **CO8:** Become proficient in problem-solving in diverse situations in physics, engineering, and in other mathematical contexts by using the concepts and techniques from PDE's and Fourier analysis.

Course Title: Mechanics I

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain ability about the basic concepts of co-planar forces, astatic equilibrium, friction and equilibrium of a particle on a rough curve and understand how to solve different problems involving them.
- **CO2:** Understand the basic idea of concurrent forces, couple, and parallel forces, forces in three dimensions, Pointsot central axis, and principle of virtual work.
- **CO3:** Know how to solve the problems related to principle of virtual work, coplanar forces.
- **CO4:** Gain clear idea of centre of gravity for different bodies. also know how to find the conditions of stable and unstable equilibrium of different bodies.
- **CO5:** Be able to understand the equilibrium of flexible string (common catenary) under coplanar forces, catenary of uniform strength and solve many problems involving them.
- **CO6:** Gain clearer concepts of rectilinear motion, simple harmonic motion, damped and forced vibrations.
- **CO7:** Able to understand angular velocity and angular acceleration, tangential and normal components of velocity and acceleration, motion of a projectile under gravity.
- **CO8:** Gain clear idea about motion in a plane under central forces, central orbit in polar and pedal forms, law of force when the centre of force and the central orbit are known, stability of circular orbits, conditions for stability of circular orbits under central force, planetary motion, modification of Kepler's third law, escape velocity, motion of a heavy particle on a smooth curve in a vertical plane, motion of a projectile in a resisting medium terminal velocity, motion of a particle in a plane under different laws of resistance, motion on a smooth cycloid in a vertical plane, motion of a particle along a rough curve.
- **CO9:** Solve more advanced mathematical application related to the motion of uniform sphere, cone, heavy circular cylinder along perfectly rough plane etc.
- **CO10:** Able to understand the basic idea of degrees of freedom, moments and product of inertia, radius of gyrations, D'Alembert Principle.
- **CO11:** Become able to solve various problems related two-dimensional motion of a rigid body, translation and rotational motion.
- **CO12:** Gain clear idea about Motion about a fixed axis, compound pendulum, motion of a system of particles and conservation of momentum and energy.

Course Title : Linear Programming

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain clearer concepts of linearprogramming, theory of simplex method, convex sets and, to understand how to introduce artificialvariables.
- **CO2:** Be able to understand two-phase method, Big-M Method and their comparison.
- **CO3:** Able to understand duality, formulation of the dual problem, primal-dual relationships, economic interpretation of the dual, also dual simplex method.
- **CO4:** Understand the concept of transportation problemmanditsma the matical formulation, North-West Corner method, least cost method and Vogel approximation method for determination of starting basic solution.
- **CO5:** Become able to solve problems using Hungarian method, northwest-corner method , Vogel approximation method, UV method.
- **CO6:** Gain clearer concept for solving assignment problem, travelling salesman problem.
- **CO7:** Be able to understand Game theory and able to solve two-person zero sum games, games with mixed strategies, graphical solution procedure of games.
- **CO8:** Understand the concept of linear programming solution of games.

Course Title: Probability and Statistics

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain significant knowledge about probability and probability distribuiton functions.
- **CO2:** Understand the concepts of continuous and discreate distributions.
- **CO3:** Familiarize with the concepts and properties of joint distribution functions.
- **CO4:** Expected to understand with the concepts of mathematical expectation and correlation coefficients.
- **CO5:** Familiarize with the concepts of Chebysev's inequality, Central Limit theorem and Markov chains.
- **CO6:** Know about random sampling and testing of hypothesis.

3rd Year 6th Semester

Course Title: Metric Spaces and Complex Analysis

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Get ideas about the sequences in metric space.
- **CO2:** Understand the notion of continuity, connectedness, compactness in metric space.
- **CO3:** Learn about various properties homeomorphisms and its applications.
- **CO4:** Become familiar with the concepts of limit and continuity of complex functions.
- **CO5:** Be able to understand various properties of analytic functions in complex plane.
- **CO6:** Demonstrate the knowledge about Laurent series and its applications.

Course Title: RingTheory and Linear Algebra II

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:**Gain clearer concepts of polynomial rings over commutative rings, division algorithm and, to understand principal ideal domains, Eisenstein criterion, and unique factorization in Z[x].
- **CO2:** Be able to understand uniquefactorizationdomains,Euclideandomains and divisibilityinintegraldomains.
- **CO3:** Become able to solve problems using reducibility and irreducibility tests.
- **CO4:** Understand the concept of dual spaces, dual basis, double dual and transpose of a linear transformation and its matrix in the dual basis.
- **CO5:** Become able to solve problems using the concept of Cayley-Hamilton theorem, theminimalpolynomialfora linearoperator and canonicalforms.
- **CO6:** Gain clearer concept of eigen spaces of a linear operator, annihilators and diagonalisation of matrix.
- **CO7:** Be able to understand Inner product spaces and norms, Gram-Schmidt orthogonalization process, orthogonal complements, Bessel's inequality, the adjoint of a linear operator.
- **CO8:** Understand the concept of normal andself-adjoint operators,orthogonal projectionsandSpectraltheorem.
- **CO9:** Solve problems using Least Squares Approximation method, Gram-Schmidt orthogonalisation process.

Course Title: Group Theory II

Course Outcomes:

After completing this course the student will be able to

- **CO1:** Become familiar with the concept and properties of automorphism, automorphism groups, inner automorphism.
- **CO2:** Understand the concept of commutator subgroup, characteristic subgroup.
- **CO3:** Demonstrate the knowledge of internal and external direct product of groups.
- **CO4:** Become familiar with the concept of group action, kernel of group action, stabilizer, Cayley's theorem.
- **CO5:** Gain knowledge about class equation, Cauchy's theorem, Sylow's theorems and their applications,
- **CO6:** Understand the simplicity of A_n for $n \geq 5$
- **CO7:** Test the simplicity of groups of different orders.

Course Title: Mechanics II

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain clearer concepts of interpretation of Newton's laws of motion and limitations of Newton's laws in solving problems in mechanics.
- **CO2:** Understand the concepts of inertial and non-inertial frames of references, Galilean transformation, concept of absolute length and time.
- **CO3:**Understand the basic idea about fluid pressure and its elementary properties, density, homogeneous and non-homogeneous fluid, equation of pressure, condition of equilibrium.
- **CO4:** Become familiar with pressure derivative in terms of force, equilibrium of fluids in a given field of force and equi-pressure surfaces. Also handle the problems involving equilibrium of fluids under different conditions.
- **CO5:** Gain clear concepts about the relation among pressure volume and temperature, Boyle's and Charles's law, ideal gas, internal energy of a Gas, equilibrium of an isothermal atmosphere & convective equilibrium etc.
- **CO6:** Become able to understand about continuum, strain, and stress, stress quadric and related topics.
- **CO7:** Know about the basic concept of constraints and their classifications, also familiar with different examples involving them.
- **CO8:** Gain clear concepts of generalized coordinates, holonomic, rheonomic, conservative, non-conservative constraints of a dynamical system. Also know the derivation technique of Lagrange's equation of motion for holonomic system.
- **CO9:** Understand the basic idea about Gibbs-Appell's principle of least constraint, Work energy relation for constraint forces.

Course Title: Project Work

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Learn new knowledge about modern mathematics and its application.
- **CO2:** Get exposure to research topics.
- **CO3:** Formulate new mathematical problems.
- **CO4:** Understand how mathematics can be used to solve complex real world problems.

B. Sc. General

Program Specific Outcomes:

After the successful completion of the specific program (B. Sc. (General) in Mathematics) :

- **PSO1:** Students will demonstrate in-depth knowledge of Mathematics, both in theory and applications.
- **PSO2:** Students will attain the ability to identify, formulate, analyze, and solve challenging problems in Mathematics.
- **PSO3:** Ability to apply knowledge of mathematics to solve the problems related to the associated fields of the students.
- **PSO4:** Students will be aware of their professional and ethical responsibilities.
- **PSO5:** Students will be able to work individually or as a team member or leader in uniform and multidisciplinary settings.
- **PSO6:** Students will develop confidence for self-education and ability for lifelong learning.

Course Outcomes

1st Year 1st Semester

Course Title: Differential Calculus

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Gain clear idea about limit, continuity and types of discontinuity. Also gain proficiency in solving problems involving them.
- **CO2:**Understand about higher order derivatives and, to know Leibnitz theorem and its applications.
- **CO3:** Get a strong foundation in partial differentiation, Euler's theorem on homogeneous function and chain rule with application.
- **CO4:** Able to understand and evaluate the tangent and normal, envelopes, asymptotes, test for concavity, convexity, inflection points and curve tracing (for standard curves, Cartesian, parametric and polar).
- **CO5:** Gain clear concepts about Rolle's theorem, mean value theorem, and Taylor are Theorem with Lagrange's and Cauchy's form of remainders, and apply these for different functions.
- **CO6:** Able to understand and evaluate Taylor's series, Maclaurin's series for some standard functions.

1st Year 2nd Semester

Course Title: Differential Equations

Course Outcomes:

After completing this course, the student will be able to:

- **CO1:** Solve exact differential equations.
- **CO2:** Calculate integrating factors of first order differential equation.
- **CO3:** Solve linear homogeneous differential equations with constant coefficients and non-homogeneous differential equations.
- **CO4:** Find solutions of Cauchy-Euler differential equation and Simultaneous differential equations.
- **CO5:** Understand the concept of linear and non-linear partial differential equations.
- **CO6:** Solve partial differential equations using Lagrange's and Charpit's method.
- **CO7:** Classify the second order partial differential equations.

2nd Year 3rd Semester

Course Title: Real Analysis

Course Outcomes:

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

- **CO1:** Become familiar with the concept of countability of sets.
- **CO2:** Understand the properties of sequence of real numbers.
- **CO3:** Demonstrate the knowledge of infinite series.
- **CO4:** Test the convergence of different infinite series.
- **CO5:** Become familiar with the notion of uniform and pointwise convergence of sequence of functions.
- **CO6:** Understand the properties of series of functions.
- **CO7:** Become familiar with the properties of power series.

Course Title: Logic and Sets

Course Outcomes:

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

- **CO1:** Familiarize with the concepts proposition, truth table, negation, conjunction, disjunction,
- **CO2:** Understand logical equivalence, predicates and quantifiers.
- **CO3:** Demonstrate the knowledge of set theory.
- **CO4:** Gain knowledge about set operations.
- **CO5:** Understand the concepts of power sets and product set.
- **CO6:** Familiarize with the concepts of relations and partitions**.**

2nd Year 4th Semester

Course Title: Algebra

Course Outcomes:

After successful completion of this course the student will be able to:

- **CO1:** Understand the concept of group theory.
- **CO2:** Become familiar with the notion Abelian and nonabelian groups and its properties.
- **CO3:** Demonstrate the knowledge of subgroups, cyclic groups, cosets, normal subgroups.
- **CO4:** Become familiar with the concept of Lagrange's theorem and its applications.
- **CO5:** Understand the concept of permutation group.
- **CO6:** Gain knowledge about ring theory.
- **CO7:** Familiarize with the notion of subrings and ideals.

Course Title: Vector Calculus

Course Outcomes:

After completing this course successfully, the student will be able to:

- **CO1:** Differentiate and partially differentiate a vector function.
- **CO2:** Differentiate the dot product and cross-product of two vectors.
- **CO3:** Find the gradient, divergence and curl and understand its properties.

3rd Year 5th Semester

Course Title: Matrices

Course Outcomes:

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

- **CO1:** Understand the concept of vector space and subspace and their various properties.
- **CO2:** Demonstrate the knowledge of linear dependence, linear combinations.
- **CO3:** Become familiar with the concept of translation, dilation, reflection, rotation and their matrix representations.
- **CO4:** Calculate the rank of matrix.
- **CO5:** Find solutions of linear and non-linear homogeneous equations using matrix.
- **CO6:** Compute inverse of matrix using elementary row operations.
- **CO7:** Apply the concept of matrix to solve various problems in Physics, Chemistry, Statistics, Geometry and Combinatorics.

Course Title: Probability and Statistics

Course Outcomes:

The students who complete this course successfully are expected to:

- **CO1:** Understand the basic concept of probability, like classical and axiomatic definitions of probability, sample space, Bayes/ theorem etc. and properties.
- **CO2:** Know about random variables, various discrete and continuous distribution functions.
- **CO3:** Gain clearer concepts of transformation of random variables; discrete and continuous distribution in two dimension and related area of study.
- **CO4:**Understand and solve independently the problems on mathematical expectation in one and two variables,
- **CO5:** Know how to find the mean, variance and standard deviation of some standard distributions.
- **CO6:** Understand the clear concepts about moments, measures of skewness and kurtosis, moment generating function, characteristic function, conditional expectation, covariance, co-relation coefficient, regression curves.
- **CO7:** Know the technique of finding mean, variance and standard deviation from characteristic function of different standard distributions.

3rd Year 6th Semester

Course Title: Linear Programming

Course Outcomes:

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

- **CO1:** Formulate Linear Programming Problems.
- **CO2:** Solve Linear Programming Problems graphically.
- **CO3:** Become familiar with the notion of convex sets and hyperplane.
- **CO4:** Find solutions of Linear Programming Problems by Simplex. Two Phase and Big-M methods.
- **CO5:** Become familiar with the notion of duality in Linear Programming.
- **CO6:** Formulate Dual problems.
- **CO7:** Become familiar with the applications of duality.

Course Title: Transportation and Game Theory

Course Outcomes:

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

- **CO1:** Formulate transportation problems.
- **CO2:** Solve transportation problems.
- **CO3:** Become familiar with the formulation assignment problems.
- **CO4:** Understand the procedure of solving assignment problems.
- **CO5:** Formulate two-person zero sum games.
- **CO6:** Become familiar with the strategies of solutions of two person-zero sum games.

DEPARTMENT OF ZOOLOGY
Saldiha College
Saldiha, Bankura

Programme Specific Outcome:

- Zoology makes a huge impact on our world through the scientific study of the evolution, anatomy, physiology, behavior, habitats, and health of animals and humans.
- It includes diverse approaches such as electron microscopy, molecular genetics, and field ecology.
- By studying animals we develop a better understanding of how we, ourselves, function and interact with the world around us.
- If you don't know anything about animals or biology, nature seems to be just about chaos. Everything seems to happen at random. But once you study the life cycles and food chain, you'll have a better understanding of nature's handiworks. The reason why zoology is important is that it gives you the opportunity to see nature for what it really is.
- To Understand the Importance of Preservation
- An independent research project on a zoological topic
- An education and training suitable for a wide variety of careers and to prepare you for higher degrees and careers in biological sciences research;
- The capability of life-long learning, study and enquiry.

Knowledge and Understanding

1. Students will be able to gather knowledge Taxonomy and Systematics, which helps the learner to understand history of classification and development of taxonomy through decades. Additionally, students will be able to understand the evolutionary relationships among different phylum (From single cellular to multi-cellular organism) by studying systematic.

2. Students will be able to identify different organism belongs to different phylum and also able to classify them by understanding the characters variation of different phylum.
3. Students will be able to gather knowledge about the different organ system of various organisms belong to different phylum and understand how more advanced and complex structures have evolved.
4. Students will be able to compare different phylum to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth.
5. Students will be able to understand comparative biology, like development heart and aortic arch.
6. Students will be able to know about the evolution, which is a theory in biology postulating that the various types of plants, animals, and other living things on Earth have their origin in other preexisting types and that the distinguishable differences are due to modifications in successive generations. The theory of evolution is one of the fundamental keystones of modern biological theory.
7. Students will be able to demonstrate ecology, which is the study of organisms and how they interact with the environment around them. Students are able to learn the relationship between living things and their habitats. In addition, it includes understanding of food chain, energy flow, food pyramid and food web.
8. Students will be able to explain the biology of organism at genetic level and gene interaction. In addition, genetics is the scientific study of genes and heredity of how certain qualities or traits are passed from parents to offspring as a result of changes in DNA sequence and a gene is a segment of DNA that contains instructions for building one or more molecules that help the body work.
9. Students will be able to demonstrate cell biology, which is the study of cell structure and function, and it revolves around the concept that the cell is the fundamental unit of life. Focusing on the cell permits a detailed understanding of the tissues and organisms that cells compose.

10. Students will be able to understand behavioral ecology, which is a sub-discipline of animal biology. It focuses on the behavioral adaptations and interactions of animals within a population in relation to the selective pressures in a particular ecological environment.
11. Students will be able to explain biostatistics (also known as biometry), which is the development and application of statistical methods to a wide range of topics in biology. It encompasses the design of biological experiments, the collection and analysis of data from those experiments and the interpretation of the results.
12. Students will be able to design experiments for their area of specialization within biology as they are familiar to experimental technique and method like preparation of chemicals, use of different instruments.

Having successfully completed this programme you will be able to demonstrate following knowledge and understanding:

K1.The concept of Zoology

K3. Knowledge of history of taxonomy and systematics

K4. Fundamental knowledge of classification, identification and characterization of different species

K5. Idea about type study and comparative biology

K6. Knowledge of evolution and its application

K7. Basic idea to set an experiment

K8. Knowledge of gene, genome and its expression in biological system

K9. Understanding of biological macromolecules and its metabolism

K10. Describe mechanisms for the life processes and appreciate how the physiology of an organism makes it fit for its environment

K11. An understanding of the cellular and genetic mechanisms of animal development

K12. The principles of nutrient and energy flow through individuals, populations and communities

K13. The theory of animal behavior and interaction with their environment

K14. Knowledge of animal physiology

Learning Outcome

SEM I (Hons)	
Paper	**COs**
CC-1 (Non-chordates)	**COs for the course of Non-chordates** **Unit 1: Basic Animal Classification** • Describe the function of classification • Distinguish between taxonomy and systematics and be able to identify a classification as systematic or taxonomic • Describe the reasons for preferring natural classifications over artificial classifications • Describe the reason that classical taxonomy is an hierarchical scheme of classification• • Describe the role that key characteristics play in taxonomy • Describe why consistency is both valuable for taxonomy and hard to achieve. • rules of zoological nomenclature **Unit 2: Protista and Metazoa** • Student possesses the general knowledge of life functions of representatives of the kingdomsProtista and Animalia and of relations between the different groups of heterotrophs; knows the phylogenetic relationships between the major taxa of Animalia • Locomotion in Euglena, Paramoecium • Process of conjugation in Paramoecium and its significance • Life cycle and pathogenicity of Plasmodium vivax and Entamoeba histolytica • Evolution of symmetry and segmentation of Metazoa **Unit 3: Porifera** • Describe common and distinctive features of Porifeans and classification upto class • Description of the canal system in sponges and spicules and its significance **Unit 4: Cnidaria** • Describe distinguishing characteristics of the phylum Cnidaria and Classification up to classes • Metagenesis in Obelia • Polymorphosis in Cnidaria

	• Coral and Coral reef diversity, finction and conservation **Unit 5: Ctenophora** • General characteristics of the phylum **Unit 6:Platyheliminthes** • describe the general characteristic features of the group of animals and Classification up to classes • Life cycle and pathogenicity and control measures *Fasciola hepatica* and *Taenia solium* **Unit 7: Nematoda** • describe the salient features of the phylum and Classification up to classes • Life cycle and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*
CC 2 **(Ecology)**	**COs for the course of Ecology** **Unit 1: Introduction to Ecology** • Describe the history of Ecology • Decribe autecology and synecology • Describe the level of organization • Describe law of limiting factor • Study of physical factor • Describe the biosphere **Unit 2: Population** • Define demography and describe a life table. • Give the name of and define the following symbols used in demographic studies: x, nx, lx,• dx, qx, ex, bx, mx, R0, Tc. • Draw Type I, II, and III mortality curves and determine where, on the graph, the death rate is maximal and minimal. • Describe changes in age-specific death rates that lead to Type I, II, and III mortality curves. • Define life expectancy and name the elements of the life table necessary to calculate and estimation of life expectancy. • Calculate the net replacement rate from age-specific survivorship and birth rates and define net replacement rate. • Write the equation for exponential population growth and define each variable and term. • Correctly apply either exponential or geometric population growth models to given scenarios. • Define logistic population growth and correctly argue that it represents density-dependent population growth. • Write the equation for logistic population growth rates and define each of the variables and terms in the equation. • Draw a logistic (sigmoid) population growth curve and estimate the population growth rate at specified points on the curve using the concept of tangents to a curve. • Define asymptote, K, and r.

	• Name the assumptions of the logistic population growth model and predict the effect of a violation of each assumption on logistic population growth. • Define lag time and, using graphs, predict its effect on the outcome of logistic growth models. • Distinguish between density-dependence and density independence. • Distinguish between scramble and interference competition. • Explain how dispersal, social behavior, and territoriality can act as density-dependent population regulatory mechanisms **Unit 3: Community Ecology** • Distinguish between biotic assemblages and communities. Describe emergent properties of communities • Define species richness, diversity, and evenness • Distinguish between dominance and information-based diversity indices.• calculate the simpson, shannon-weiner diversity indices • relate changes in environmental quality to changes in biodiversity using the concept of size symmetry • Contrast direct with indirect effects and give examples involving competition, mutualism and parasitism • Define keystone species and their impact on biodiversity • Define ecological succession • Distinguish between primary and secondary succession • Describe pioneer, intermediate, and climax seres **Unit 4: Ecosystem** • Define ecosystems and emergent properties associated with ecosystems list, define and relate ecosystem measurements (biomass, energy flow, and nutrient flow) to ecosystem emergent properties. • Define a food web • Define and diagram flows of material or energy between trophic levels. • Define and give a hypothetical example of a trophic cascade • Define standing crop and distinguish it from productivity • Explain how the laws of thermodynamics constrain energy and material flows in• ecosystems • Distinguish gross and net primary production • Relate net primary production to net biomass change • Define production efficiency and state general levels of efficiency (both for gpp and npp) • Define eutrophication and list the anthropogenic reasons for it • Distinguish between herbivores and detritivores • Distinguish between gross and net secondary productivity • Relate primary and secondary producer efficiency to lindeman efficiency • Define nutrient cycling and associated terms (nutrient pool, flux rate, source, sink). • Diagram the global nitrogen cycle

	Unit 5: Applied Zoology • Definition of conservation of wild animals • Types of conservation :- in situ and ex situ conservation methods • management strategies for conservation of wild animals • Idea about national park, wildlife sanctuary and biosphere reserve • Wildlife protection act of india

SEM I (Gen)

Paper	COs
Core Course I (Animal Diversity)	**COs for the course of Animal Diversity** **Unit 1: Kingdom Protista** • Describe the general characters and classification of subkingdom protista upto phylum • Describe the locomotary organelles and locomotion in Protozoa **Unit 2: Phylum porifera** • Describe the general characters and classification upto class • Describe the canal system in *Sycon* **Unit 3: Phylum Cnidaria** • Describe the general characters and classification upto class • Describe the polymorphism in cnidaria **Unit 4: Phylum Platyhelminthes** • Describe the general characters and classification upto class • Describe the life cycle of *Taenia solium* **Unit 5: Phylum Nematoda** • Describe the general characters and classification upto class • Describe the life history of *Ascaris lumbricoides* and its parasitic adaptation **Unit 6: Annelida** • Describe the general characters and classification upto class • Describe the nephridia in annelid **Unit 7: Phylum Arthropoda** • Describe the general characters and classification upto class • Describe the structure of ommatidium and vision formation • Describes the metamorphosis in insects **Unit 8: Phylum Mollusca** • Describe the general characters and classification upto class • Describe respiratory and fuction in *Pila* **Unit 9: Phylum Echinodermata** • Describe the general characters and classification upto class • Describe the water vascular system in *Asterias*

	Unit 10: Protochordates • Describe the general characters and classification of Protochordates • Describe the feeding mechanism in *Branchiostoma* **Unit 11: Agnatha** • Describe the general characters and classification upto class **Unit 12: Pices** • Describe the general characters and classification upto sub-class • Describe the osmoregulation fish **Unit 13: Amphibia** • Describe the general characters and classification upto living order • Describes the metamorphosis in toad **Unit 14: Reptiles** • Describe the general characters and classification upto living subclasses • Describes the types of poisonous and non-poisinous snakes • Describes the biting mechanism **Unit 15: Aves** • Describe the general characters and classification upto order • Describes the adaptation for flight **Unit 16: Mammals** • Describe the general characters and classification upto class • Describe the origin and distribution of cranial nerves in *Cavia*

SEM II (Hons)	
Paper	**COs**
CC 3 **(Non-chordates)**	**COs for course of Non-chordtaes** **Unit 1: Introduction** • Describe the evolution of coelom and metamerism **Unit 2: Annelida** • Describe the general characteristics and classification up to order • Describe the excretion in annelida through nephridia • Describe the metamerism in annelida **Unit 3: Arthropoda** • Describe the general characteristic sand classification up to subclass • Describe the vision in insecta • Describe the respiration in arthropoda (gills in prawn and trachea in cockroach) • describe the metamorphosis in lepidopteran insects • Describe the social life in termite **Unit 4: Onychophora**

	• General characteristics and evolutionary significance **Unit 5: Mollusca** • Describe the general characteristics and classification up to classes • Describe the nervous system and torsion in gastropoda • Describe the feeding and respiration in *Pila* sp **Unit 6: Echinodermata** • Describe the general characteristics and classification up to orders • Describe the water-vascular system in asteroidea • Describe the larval forms in echinodermata • Describe the affinities with chordates **Unit 7:** Hemichordata • Describe the general characteristics of phylum hemichordata. Relationship with non-chordates and chordates
CC 4 (Cell Biology)	**COs for course of cell biology** 1. Explain the basic structure of prokaryotic and eukaryotic cells, viruses, viroid, prion and mycoplasma 2. Describe the Ultra structure and composition of Plasma membrane and transport across the membrane 3. Illustrates cell junctions 4. Explain the structure and function of different cytoplasmic organelles 5. Explain the type, structure and functions of cytoskeleton and accessory proteins of microfilament & microtubule 6. Describe the structure of nucleus and types of chromatin euchromatin and heterochromatin and its packaging (nucleosome) 7. Describes the Cell cycle and its regulation, and different types of cell division 8. Explain cancer and role of different tumor suppressor gene 9. Explain cell signal transduction pathways and apoptosis
SEM II (Gen)	
Core Course II (comparative anatomy and developmental biology of vertebrates)	**COs for course of comparative anatomy and developmental biology of vertebrates** 1. Describe the derivatives of integument with reference to glands and digital tips 2. Explain the evolution of visceral arches 3. Illustrates the brief account of alimentary canal and digestive glands 4. Give brief account of gills, lungs, air sacs and swim bladder 5. Describe the evolution of heart and aortic arches 6. Describe the evolution of kidney and urinogenital ducts 7. Describe the comparative account of brain 8. Describe the early Embryonic Development 9. Describe the late embryonic development

	10. Describe the control of development

SEM III (Hons)	
Paper	**COs**
CC 5 (Chordates)	**COs for the course of chordates** 1. Describe the general characteristics and outline classification of phylum chordate 2. Describe the general characteristics and classification of sub-phylum urochordata and cephalochordate up to classes and retrogressive metamorphosis in *ascidia*. With chordate features and feeding in branchiostoma 3. Explain origin of chordate 4. Describe the general characteristics and classification of cyclostomes up to order 5. Illustrate the general characteristics and classification of chondrichthyes and osteichthyes up to subclasses and accessory respiratory organ, migration and parental caring fishes with details of swim bladder in fishes 6. Describe the general characteristics and classification unto living orders and metamorphosis and parental care in amphibia 7. Describes the general characteristics and classification up to living orders and poison apparatus and biting mechanism in snake 8. Explain the general characteristics and classification up to sub-classes and exoskeleton and migration in birds with principles and aerodynamics off flight 9. Illustrate the general characters and classification up to living orders and affinities of prototheria 10. Describe the exoskeleton derivatives of mammals and adaptive radiation in mammals with reference to locomotory appendages and also echolocation in micro-chiropterans and cetaceans 11. Describe the zoogeographical realms, plate tectonic and continental drift theory, distribution of birds and mammals in different realms
CC 6 (Animal Physiology: Controlling &Coordinating Systems)	**COs for the course of Animal Physiology: Controlling &Coordinating System** 1. Detailed description of the structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue 2. Explain the structure and types of bones and cartilages, ossification 3. Describes the structure of neuron, resting membrane potential, origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers including types of synapse, synaptic transmission and neuro-muscular junction with reflex action and its types 4. Describe the histology of different types of muscle and ultrastructure of skeletal muscle and molecular and chemical basis of muscle contraction with characteristics of muscle fibre 5. Describe the histology of testis and ovary and physiology of reproduction (estrus and menstrual cycle)

	6. Explain the histology of different endocrine glands and classification of hormones with mechanism of hormone action: signal transduction pathways for steroidal and non-steroidal hormones
CC 7 (Fundamentals of Biochemistry)	**COs for the course of Fundamentals of Biochemistry** 1. Describe the structure, types and metabolism of carbohydrates 2. Explain the structure, types and metabolism of lipid 3. Describe the structure, types and metabolism of protein 4. Describe the structure, types and basic concepts of metabolism of nucleic acid 5. Describe the nomenclature and classification of enzyme and mechanism of enzyme action 6. Detailed description of oxidative phosphorylation in mitochondria
SEC (Sericulture or Apiculture)	**COs for the course of Apiculture** 1. Describe the history, classification and biology of honey bees and social organization of bee colony 2. Explain the artificial beer earing(apiary),beehives–newton and langstroth and bee pasturage 3. Illustrate the selection of bee species for apiculture and bee keeping equipment 5. Methods of extraction of honey (indigenous and modern) 4. Describe the bee diseases and enemies, control and preventive measures 5. Explains the products of apiculture industry and its uses(honey, bees wax, propolis), pollenetc 6. Detailed description of bee keeping industry–recent efforts, modern methods in employing artificial beehives for cross pollination in horticultural gardens **COs for the course of Sericulture** 1. Describes the Definition, history and present status; Silk route and Types of silkworms, Distribution and Races , Exotic and indigenous races Mulberry and nonmulberry Sericulture 2. Explain Life cycle of *Bombyx mori* and Structure of silk gland and secretion of silk 3. Describe the Selection of mulberry variety and establishment of mulberry garden and Rearing house and rearing appliances 4. Explain the Silkworm rearing technology: Early age and Late age rearing and Types of mount ages with Spinning, harvesting and storage of cocoons 5. Describe the Pests of silkworm and Pathogenesis of silkworm diseases with Control and prevention of pests and diseases 6. Explain the Prospectus of Sericulture in India and Visit to various sericulture centers
SEM III (GEN)	

Paper	COs
Core Course III (Physiology and Biochemistry)	**COs for the course of Physiology and Biochemistry** 1. Describe the structure of neuron and nerve impulse transmission 2. Describe the structure of muscle and mechanism of muscle contraction 3. Describe the physiology of digestion and absoption of charbohydrates, proteins and lipids 4. Explain the respiratory mechanism 5. Detailed description of cardiovascular system **6.** Explain the physiology of reproduction and histology of different endocrine glands and classification of hormones 7. Describe the structure, types and metabolism of carbohydrates 8. Describe the structure, types and metabolism of lipid 9. Describe the structure, types and metabolism of protein 10. Describe the nomenclature and classification of enzyme and mechanism of enzyme action

SEM IV (Hons)	
Paper	**COs**
CC8 (Comparative Anatomy of Vertebrates)	**COs for the course of Comparative Anatomy of Vertebrates** 1. Describe the Structure, function and derivatives of integument in amphibian, birds and mammals 2. Explain the Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches 3. Describe the Comparative anatomy of stomach and Dentition in mammals 4. Describe the Respiratory organs in fish, amphibian, birds and mammals 5. Describes the General plan of circulation, Comparative account of heart and aortic arches 6. Explain the Succession of kidney and Evolution of urinogenital ducts and Types of mammalian uteri 7. Describes the Comparative account of brain and Cranial nerves in mammals 8. Describes the Classification of receptors and give Brief account of auditory receptors invertebrate
CC9 (Animal Physiology: Life Sustaining Systems)	**COs for the course of Animal Physiology: Life Sustaining Systems** 1. Describe the Structural organization and functions of Gastrointestinal tract and Associated glands 2. Describe the Mechanical and chemical digestion of food and Absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids with Digestive enzymes 3. Explain the Mechanism of Respiration and Respiratory volumes and capacities 4. Describe Transport of Oxygen and Carbon dioxide in blood ,Dissociation curves and the factors influencing it and Respiratory pigments 5. Illustrate the Carbon monoxide poisonin

	6. Describe the Components of Blood and their functions; Structure and functions of haemoglobin 7. Describe the Homeostasis; Blood clotting system, Fibrinolytic system and Haemopoiesis; Basic steps and its regulation 8. Explain the Blood groups; ABO and Rh factor 9. Structure of mammalian heart and Origin and conduction of cardiac impulses; Cardiac Cycle and cardiac output 10. Describe the Physiological classification based on thermal biology and Thermal biology of endotherms 11. Describe the Osmoregulation in aquatic vertebrates and External osmoregulatory organs invertebrates 12. Decribes the Structure of Kidney and its functional unit and Mechanism of urine formation with Regulation of acid-base balance
CC10 (Immunology)	**COs for the course of Immunology** 1. Describe the Basic concepts of health and diseases and Historical perspective of Immunology with Cells and organs of the Immune system 2. Explain the Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral) 3. Describe the Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens and Factors influencing immunogenicity 4. Describe the Structure and functions of different classes of immunoglobulins and Antigen- antibody interactions 5. Describe the Immunoassays (ELISA and RIA) and Hybridoma technology, Monoclonal antibody production 6. Explain the Structure and functions of MHC molecules and Structure of T-cell Receptor and its signaling with T-cell development &selection 7. Describe the Types, properties and functions of cytokines 8. Describe the Components and pathways of complement activation 9. Explain the Gell and Coombs' classification and brief description of various types of hypersensitivities 10. Describe the Malaria, Filariasis, Dengue and Tuberculosis 11. Illustrate Various types of vaccines. Active & passive immunization (Artificial and natural)
SEC II (Medical Diagnostics or Aquarium Fish Keeping)	**COs for the course of Aquarium Fish Keeping** 1. Describe the The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishe 2. Describe the Common characters and sexual dimorphism of Freshwater and Marine Aquarium fishes such as Guppy, Molly, Swordtail, Goldfish, Angel fish ,Bluemorph, Anemone fish and Butterfly fish 3. Describe the Use of live fish feed organisms with Preparation and composition of formulated fish feeds with Aquarium fish as larval predator 4. Describe the Live fish transport- Fish handling, packing and forwarding techniques 5. Describe the General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

	COs for the course of Medical Diagnostics 1. Describe the Introductionto Medical Diagnostics and its Importance 2. Describe the Diagnostics Methods Used for Analysis of Blood 3. Describe the Diagnostic Methods Used for Urine Analysis 4. Describe the Causes, types, symptoms, complications ,diagnosis and prevention of Diabetes,Hypertension(Primaryandsecondary),TestingofbloodglucoseusingGlucometer/Kit 5. Explain the Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis, Malarial parasite and Microscope based and ELISA based) 6. Describe the Clinical Biochemistry LFT and Lipid profiling 7. Describe the Antibiotic Sensitivity Test 8. Describe the Types (Benign/Malignant), Detection and metastasis, X-Ray of Bone fracture, PET, MRI and CT scan (using photographs). 9. Visit to Pathological Laboratory and Submission of Project
SEM IV (GEN)	
Paper	**COs**
Core Course IV (Genetics and Evolutionary Biology)	**COs for the course of Genetics and Evolutionary Biology** 1. Describe the mendel's work on transmission of traits, genetic variation, molecular basis of genetic information 2. Describe the principles of inheritance, chromosome theory of inheritance, incomplete dominance and co-dominance, multiple alleles, lethal alleles, epistasis, pleiotropy, sex-linked inheritance, extrachromosomal inheritance 3. Describe the linkage and crossing over, recombination frequency as a measure of linkage intensity, two factor and three factor crosses, interference and coincidence, 4. Describe the chromosomal mutations: deletion, duplication, inversion, translocation, aneuploidy and polyploidy; gene mutations: induced versus spontaneous mutations 5. Describe the chromosomal mechanisms of sex determination; dosage compensation (human) 6. Briefly explain the origin of life 7. Explain introduction to evolutionary theories; lamarckism, darwinism, neo-darwinism 8. Explain the types of fossils, incompleteness of fossil record, dating of fossils, phylogeny of horse 9. Explain the organic variations; isolating mechanisms; natural selection (example: industrial melanism); types of natural selection (directional, stabilizing, disruptive), artificial selection 10. Describe the biological species concept (advantages and limitations); modes of speciation (allopatric, sympatric) 11. Describe the macro-evolutionary principles (example: darwin's finches) 12. Describe the mass extinction (causes, names of five major extinctions, k-t extinction in detail), role of extinction in evolution

SEM V (Hons)	
Paper	COs
CC 11 (Molecular Biology)	**COs for the course of Molecular Biology** 1. Describe the watson and crick model of dna 2. Explain the mechanism of dna replication in prokaryotes. Add note on replication of telomeres 3. Describe the mechanism of transcription in prokaryotes and eukaryotes, 4. Describe the mechanism of protein synthesis in prokaryote. Add note on genetic code, degeneracy of the genetic code and wobble hypothesis 5. Describe the different post transcriptional modifications and processing of eukaryotic rna 6. Describe the lac operon and trp operon add short note on regulation of transcription in eukaryotes 7. Describe the types of DNA repair mechanisms 8. Describe the principles of molecular techniques like pcr and western blotting
CC12 (Genetics)	**COs for the course of Genetics** 1. Describe principles of inheritance, incomplete dominance and co-dominance, epistasis multiple alleles, lethal alleles, pleiotropy. Add note on sex-linked, sex-influenced and sex-limited inheritance 2. Determine the recombination frequency and linkage intensity using three factor crosses, interference and coincidence 3. Describe gene mutations and chromosomal aberrations. Add note on non-disjunction and variation in chromosome number 4. Describe the mechanisms of sex determination in *Drosophila* and in mammals 5. Describe the kappa particle in *Paramoecium* and shell spiralling in snail 6. Brief explanation of conjugation, transformation, transduction. Add note on complementation test in bacteriophage 7. Describe the ac-ds elements in maize and p elements in drosophila. Add note on line, sine, alu elements in humans
DSE 1 (Animal Biotechnology or Microbiology)	**COs for the course of Animal Biotechnology** 1. Describe the Organization of prokaryotic and eukaryotic genome. Add note on genomics 2. Describe different Cloning vectors (Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors) 3. Describe Type II Restriction enzyme 4. Describe the Construction of genomic and cDNA libraries and screening by colony and plaque hybridization 5. Describe the Nuclear Transplantation, Retroviral Method, DNA microinjection for cloning 6. Details of Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knockout mice 7. Describe Animal cell culture. Add note on Molecular diagnosis of genetic diseases(Cystic fibrosis, Sickle cell anaemia)

	COs for the course of Microbiology 1. Describe the prokaryotic pathogens, eukaryotic pathogens 2. Principles and modern approaches of bacterial taxonomy. Basic idea about Hackel and Whittaker's kingdom concept and domain concept of carl woose 3. Describe the differences between gram- positive and gram-negative species. Add note on structural organization of viruses, prions and viroids 4. Describe the distribution of normal flora in the body (skin, eye, mouth, intestinal tract) 5. Describe the exotoxins, endotoxins, antigenic switching. 6. Describe the principles and applications: simple staining, gram-staining, acid-fast staining, collection of specimens 7. Describe the transformation, conjugation-f+, f-, hfr & f' strain 8. Describe the name of pathogen, symptoms, pathogenesis, mode of action &preventive measures of following diseases: bacterial (polio, typhoid, staphylococcal food poisoning), viral(dengue, aids)
DSE 2 (Parasitology or Biology of Insects)	**COs for the course of Parasitology** 1. Brief introduction of parasitism, parasite, parasitoid and vectors. Add note on host parasite relationship 2. Describe the morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of *Giardia intestinalis* 3. Describe the morphology, life cycle, prevalence, epidemiology, pathogenicity, diagnosis, prophylaxis and treatment of *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria bancrofti*. Add note on nematode plant interaction and gall formation 4. Describe the biology, importance and control of ticks **COs for the course of Biology of Insects** 1. Describe the Basis of insect classification 2. Describe the External Features; Head–Eyes, Types of antennae, Mouth parts. Add note on Types of Legs adapted to diverse habitat 3. Describe the Structure and physiology of Insect body systems like Integumentary, digestive, excretory, circulatory, system 4. Describe the Social insects with special reference to termites 5. Add note on Insects as mechanical and biological vectors 6. Brief discussion on houseflies and mosquitoes as important vectors

SEM VI (Hons)	
Paper	**COs**
CC 13 (Developmental Biology)	**COs for the course of Developmental Biology** 1. Describe the phases of development. Add note on cell cell interaction and differentiation 2. Describe spermatogenesis and oogenesis

	3. Explain the early development of frog and chick up to gastrulation. Add note on embryonic induction and organizers 4. Describe the implantation of embryo in humans. Add note on types and stucture of placenta 5. Describe the development of brain and eye in vertebrate 6. Add note on teratogenesis and in vitro fertilization
CC 14 (Evolutionary Biology)	**COs for the course of Evolutionary Biology** 1. Describe the historical review of evolutionary concepts, lamarckism, darwinism and neo darwinism 2. Describe the evolution of horse. Add note on neutral theory of molecular evolution 3. Dercribe the hardy-weinberg law (statement and derivation of equation, application of law to biallelic population. Add note on genetic drift mechanism (founder's effect, bottleneck phenomenon) 4. Describe the mechanisms, modes of speciation 5. Explain the back ground and mass extinctions (causes and effects), detailed example of k–t extinction 6. Describe the unique hominin characteristics contrasted with primate characteristic molecular analysis of human origin. Add note on convergent& divergent evolution.
DSE 3 (Animal Behavior or Wild life Conservation)	**COs for the course of Animal Behaviour** 1. Brief profiles of karl von frish, ivan pavlov, konrad lorenz, nikotinbergen 2. Describe the stereotyped behaviours (orientation, reflexes 3. Add note on altruism 4. Describe the foraging in honeybee and advantages of the waggle dance. 5. Describe the biological oscillation, the concept of average, amplitude, phase and period 6. Add note on circadian rhythms; tidal rhythms and lunar rhythms **COs for the course of Wild life Conservation** 1. Describes the Importance of conservation and Causes of depletion 2. Describe Population density, Natality, Birth-rate, Mortality, fertility schedules and sex ratio computation. 3. Describe the Wild life conservation in India–through ages. Add note on in- situ conservation and ex-situ conservation 4. Describe the Estimation of carrying capacity 5. Explain the Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview. Add note on Management of excess population 6. Describe National parks &sanctuaries, Community reserve; Important features of protected areas in India. Add a note on Tiger conservation in India
DSE 4 (Endocrinology	**COs for the course of Endocrinology**

or Reproductive Biology)	1. Describe classification, characteristics and transport of hormones. Add note on neurosecretions and neurohormones 2. Describe the structure of pineal gland, secretions and their functions in biological rhythms and reproduction 3. Describe the structure and functions of hypothalamus and hypothalamic nuclei, 4. Describe the structure of pituitary gland, hormones and their functions, add note on hypothalamo- hypophysial portal system 5. Describe the structure, hormones, functions and regulation of thyroid gland, parathyroid, adrenal, pancreas, ovary and testis 6. Describe the mechanism of action of steroidal, non-steroidal hormones with receptors. Add note on bioassays of hormones using RIA & ELISA **COs for the course of Reproductive Biology** 1. Describe the mechanism of action of steroids and glycoprotein hormones 2. Describe the development and differentiation of gonads, genital ducts and external genitalia 3. Describe the histo-architechture of testis in human and spermatogenesis 4. Describe the histo-architechture of ovary in human and oogenesis and secretion of ovarian hormones. Add note on hormonal control of implantation 5. Describe the lactation and its regulation 6. Describe the causes, diagnosis and management of infertility in male and female

DEPARTMENT OF BOTANY
Saldiha College
Saldiha, Bankura

Programme Specific Outcomes (PSO)

- Students can acquire core knowledge of the Morphology, Phycology, Mycology, Anatomy, Microbiology, Genetics, Plant Breeding, Systematic, Physiology etc of Marine and terrestrial plants
- Understanding plant diversity and their ecological role.
- Students will be able to explain how plants function at tissue, cellular, genome and gene level.
- Think logically and organize tasks into a structured form as well as apply the knowledge of basic science, life science for upliftment of society via addressing health, environmental issues, food scarcity etc.
- Student will be able to relate the physical features of the environment to the structure of populations, communities and ecosystem.
- Develop research skills and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.
- Students can develop transferable skills like use of IT (word-processing, use of internet, statistical packages and databases), communication of scientific ideas in writing as well as orally, ability to use library resources, time management, and career planning.
- Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Course Outcomes (CO) of B.Sc. Botany

CC1: Microbiology and Phycology

I. To understand the diversity, systematic, morphology and structure, of Algae
II. To know the life cycle pattern of Algae.
III. To study the useful and harmful activities of Algae.
IV. To study the evolutionary importance of algae as progenitors of land plants.
V. To understand the world of microbes
VI. To know discovery, physiochemical as well as biological characteristics and classification of viruses and bacteria.
VII. To study economic and pathogenic importance of bacteria and viruses.

CC2: Archegoniatae

I. Understand the unifying features and classification of archegoniates (Bryophytes, Pteridophytes and Gymnosperms).
II. To know adaptations strategy of bryophytes to land habit.

III. To impart an insight into the external morphology, internal structure and reproduction of different types of bryophytes, pteridophytes and gymnosperms.
IV. Realize the ecological and economical importance of archegoniates.

CC3: Mycology and Phytopathology

I. To understand the general characteristics, life cycle pattern, biodiversity and economic Importance of fungi and lichen.
II. To study affinities of fungi with plants and animals.
III. To know pathological importance of microorganisms.
IV. Understand host-pathogen relationships,disease cycle and environmental relation.
V. To gain knowledge about host defence mechanism, prevention and control of plant diseases (biological & chemical).

CC4: Morphology & Anatomy of Angiosperms

I. To study internal organization and development of plant body.
II. To understand different tissue system and their involvement in adaptive and protective system.
III. To gain knowledge about scope and applications of plant anatomy in systematics, forensics and pharmacognosy.
IV. To study different plant organs like leaves, inflorescence, flower, fruit and seeds with reference to their types and evolution.

CC5: Plant Ecology & Phytogeography

I. To gain basic concepts of ecology and their different components.
II. To understand relationship between the living world and the environment.
III. To know functional aspects of ecosystem like principles and models of energy flow, different ecological biogeochemical cycles etc.
IV. To study characteristics features of major terrestrial biomes and phytogeographical division of India.

CC6: Plant Systematics

I. Acquaint with the aims, objective and significance of plant taxonomy and systematics.
II. To learn plant identification and classification by the evidences from palynology, cytology, phytochemistry and molecular data.
III. To understand various rules, principles and recommendations of plant nomenclature produces in plant identification.
IV. To familiarize with the characters of biologically important families of angiosperms.
V. To gain knowledge about origin and evolution of angiosperms as well as methods of illustrating evolutionary relationship (phylogenetic tree, cladogram).
VI. Acquaint with the basic technique in the preparation of herbarium.

CC7: Economic Botany

I. To familiarize with the plants having immense economic important.
II. To gain knowledge about importance of plants & plant products and understand the chemical contents of the plant products.

III. To know about the utility of plant resources.

CC8: Palaeobotany & Palynology

I. To know the scope and significance of palaeobotany, types of fossils, its role in global economy and geological time scale.
II. For understand the various fossil genera representing different fossil groups.
III. To learn the basic idea of correlation and stratigraphy like stratigraphic deductions based on plant fossils.
IV. To understand the microsporogenesis, megasporogenesis and different types of pollination.
V. Familiarize with the spore/pollen morphology with reference to polarity, size, shape, symmetry, aperture and sculpture.

CC9: Biomolecules and Cell Biology

I. To know the chemical nature of biomolecules and understand the different types of interaction in Biomolecules.
II. To study properties, significance and types of carbohydrate and lipids.
III. To gain knowledge about structure, classification and biological role of protein and nucleic acids (DNA and RNA).
IV. To familiarize with the structure and general features of enzymes and concept of enzyme activity and inhibition.
V. To learn the ultra-structure and functioning of cell in the microscopic and molecular level.
VI. To understand structure and organization of cell wall plasma membrane, cell organelles and eukaryotic cell cycle and mitotic & meiotic cell division.

CC10: Molecular Biology

I. To understand the biochemical nature of nucleic acids, their role in living systems and experimental evidences to prove DNA as a genetic material.
II. To gain knowledge about the mechanism and essential component required for prokaryotic as well as eukaryotic DNA replication.
III. To study the synthesis, processing and modification of prokaryotic and eukaryotic RNA
IV. To learn the process of proteins synthesis and role of genetic code in polypeptide formation.

CC11: Plant Physiology

I. To acquire basic knowledge needed for proper understanding of plants functioning.
II. To understand the plants and plant cells in relation to water and movement of sap.
III. Learn and understand about minerals and nutrition for plant growth and development.
IV. Understanding the process of translocation of solutes in plants.
V. To know discovery, chemical nature and physiological role of different plant growth regulators.
VI. Familiarize with the physiology of flowering.

CC12: Plant Metabolism

I. To learn basic concepts of metabolism and understand the carbohydrate, lipid, and nitrogen metabolism in plants.
II. To know about the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3, C4 and CAM pathways.
III. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
IV. To gain knowledge about ATP synthesis mechanisms.
V. Understand the Beta Oxidation, Gluconeogenesis and its role in mobilization of fatty acids during germination.
VI. To familiarize with the different types of signal transduction mechanisms.

CC13: Genetics & Plant Breeding

I. Acquaint with mendelian and neo-mendelian genetics.
II. To study the phenomenon of dominance, laws of segregation, independent assortment of genes.
III. To learn about different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, and multiple alleles.
IV. To understand the inheritance pattern of nuclear and extra nuclear genes.
V. Acquire knowledge about variation in chromosome number & structure and concept about gene mutation.
VI. To learn the methods of crop improvement.
VII. To get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e., Mass selection, Pure line Selection and Clonal selection.
VIII. To know about the taking advantage of Heterosis, hybrid and variety development and their release through artificial hybridization.

CC14: Plant Biotechnology

I. To understand the principle and basic protocols for Plant Tissue Culture.
II. Acquire knowledge about tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation).
III. To know about the fundamentals of Recombinant DNA Technology and Genetic Engineering.
IV. To understand different types of gene cloning and methods of gene transfer with special focus to Agrobacterium-mediated & Direct gene transfer (Microinjection, Microprojectile and bombardment).
V. To learn diverse application of biotechnology techniques to produce herbicide, pest, and disease resistance genetically modified (GMO) plants.

DEPARTMENT OF COMMERCE
Saldiha College
Saldiha, Bankura

Programme Specific Outcomes

Towards the end of the programme, students will be able to:

- Develop an ability to effective communicate both orally and verbally.
- Appreciate importance of working independently and in a team.
- Process information by effective use of IT tools.
- Understand required mathematical, analytical and statistical tools for financial and accounting analysis.
- Develop self-confidence and awareness of general issue prevailing in the society.
- Gets skill regarding various aspects like Marketing Manager, Human Resource Manager, over all administration abilities of the company.
- Capable to make decisions at personal and professional level.
- Start up their own Business.
- Get knowledge of different specializations in Accounting, Costing, Banking and Finance.
- Get knowledge about basic computer knowledge for office work management.
- Get knowledge about Computer Accounting Software like Tally.
- Learn the practical skills of work as accountant, audit assistant, tax consultant, and computer operator as well as financial supporting services.
- Appear and success in different professional exams like, CA, ICWA, Audits and Accounts, PSC, UPSC, Baking as well as other related coerces.
- Learn the concept and process of developing Electronic Commerce.
- Do their higher education and can make research in the field of finance, commerce and management.

Course Outcomes

Environmental Studies

It will make experienced and qualified skill person to any student for successfully perform better business in this competitive era.

Financial Accounting

- To enable the students to learn principles and concepts of Accountancy.
- Students are enabled with the Knowledge in the practical applications of accounting.
- To enable the students to learn the basic concepts of Partnership Accounting, and allied aspects of accounting.
- The student will get thorough knowledge on the accounting practice prevailing in partnership firms and other allied aspects.
- To find out the technical expertise in maintaining the books of accounts.

- To encourage the students about maintaining the books of accounts for further reference.

Cost Accounting

- To keep the students conversant with the ever – enlarging frontiers of Cost Accounting knowledge.
- Students can get knowledge of different methods and techniques of cost accounting.
- To impart Knowledge about the concepts and principles application of Overheads.

Management Accounting

- Identify differences between various forms of accounting—Financial, Managerial and Cost and the role of a Management Accountant.
- Identify cost according to their associated activities and apply costing techniques for computing cost of products or services.
- Prepare income statements using variable costing and absorption costing.
- Make various managerial decisions on the basis of learning about concepts and issues involved therein.
- Prepare different forms of budgetary statements, identify and control cost at a responsibility centre assigned to a manager, analyze and report performance of the assigned responsibility centre.
- Communicate effectively with appropriate skill for advocating Management Accounting.

Business Economics (Micro)

- To provide students knowledge of Micro Economic concepts and inculcate an analytical approach to the subject matter.
- To arouse the students interest by showing the relevance and use of various economic theories.
- To apply economic reasoning to solve business problems.

Business Economics (Macro)

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

Business Management

The students will be able:

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

Human Resource Management

The students will be able:

- To understand how organisation manages their human resources.
- To understand the role and function of HRM.
- To understand how the HR planning, recruitment and selection process is done.
- To understand various training and development programs organised by the organisation.
- To understand various techniques of performance appraisal and job valuation.

Marketing Management

Students will be able:

- To understand the functioning of marketing, marketing mix and marketing environment.
- To understand new product development process, factors affecting price of a product, pricing policies and strategies.
- To understand various types of distribution channels and their functions.
- To understand various types of promotions and factors affecting promotion mix decisions.
- To know the recent developments in marketing.

Taxation

Students will be able to:

- Differentiate between direct and indirect tax assessment.
- Define the procedure of direct tax assessment.
- In order to familiarize the different know-how and heads of income with its components.
- Able to compute total income and define tax complicacies and structure in manual and online format.
- Able to file IT return for various assesses.
- Able to understand amendments made from time to time in Finance Act.

Advertising

- Student will demonstrate strong and conceptual knowledge in the functional area of advertising product and brand Management.
- Students will demon -started analytical skill in identification &resolution of problems pertaining to the subject.

Auditing

Students will be able to understand the various laws and working knowledge for doing audits of different types of firms and organizations.

E-Commerce

Students will be able to:

- Understand the basic concepts and technologies used in the field of electronic Commerce.
- Should be able to understand concepts of E-Commerce and E- business.

- Analyze real business cases regarding their e-business strategies and transformation processes and choices.
- Integrate theoretical frameworks with business strategies.

International Business

- Explain the concepts in international business with respect to foreign trade/international business.
- Apply the current business phenomenon and to evaluate the global business environment in terms of economic, social and legal aspects.
- Analyze the principle of international business and strategies adopted by firms to expand globally.
- Integrate concept in international business concepts with functioning of global trade.

Business Law

Students will be able:

- To understand basic aspects of contracts for making the agreements, contracts and subsequently enter valid business propositions.
- To be able to recognize and differentiate the special contracts and identify their appropriate usage at varied business scenarios.
- To equip the students about the legitimate rights and obligations under The Sale of Goods Act.
- To enable with skills to initiate entrepreneurial ventures as Partnership Firm and LLP.
- To understand the fundamentals of Negotiable instruments and their different uses under Negotiable Instruments Act.

Corporate Laws

In the light of this, learner will be able to: Covered various provisions and case studies related to Incorporation of various types of companies, Charters of company. doctrine of constructive notice, doctrine of indoor management, various rules regarding managerial personnel, Management & control of companies, majority powers and minority rights, Corporate accountability, amalgamation, Winding up proceeding, winding up of unregistered company, dissolution of company. NCLT & NCLAT, XBRL/E-FILLING.

Fundamentals of Banking & Insurance

In the light of this, students will be able to provide an understanding of the Indian Banking & Insurance Sector. To make the students comprehend, the latest offerings and the day to day operations in Banking & Insurance.

Business Mathematics and Statistics

After studying this, the students will be able:

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

- To understand the techniques and concept of different types of index number

Computer Application in Business

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

Project Work

This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data.

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