



**VIVEKANANDA COLLEGE**

(GOVT. SPONSORED) (NAAC ACCREDITED GRADE 'A')

(033) 2497 6824  
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Ref. No.....

Date.....

**TO WHOM IT MAY CONCERN**

The details related to programme outcome and course outcome have been given below:

*H. K. Das*

Principal  
Vivekananda College  
Thakurpukur Kol-63

## **Programme Outcomes of different courses**

### **B.A. Honours and General**

Knowledge and understanding of the chosen field: Graduates will have a deep understanding of the theories, concepts, and historical context of their chosen field, whether it be literature, history, sociology, psychology, or any other discipline within the arts.

Critical thinking and analytical skills: Graduates will be able to analyze and evaluate complex information, ideas, and arguments within their chosen field, and apply critical thinking skills to develop their own perspectives and interpretations.

Effective communication skills: Graduates will be able to communicate their ideas and arguments effectively through various mediums, such as writing, speaking, and visual presentations.

Research skills: Graduates will possess the ability to conduct thorough research, locate and evaluate relevant sources, and synthesize information to support their arguments or creative works.

Creativity and innovation: Graduates will have developed creative thinking skills and the ability to generate original ideas, whether in the form of artistic expression, problem-solving, or conceptualization.

Cultural and global awareness: Graduates will have a broad understanding of diverse cultural perspectives, historical contexts, and social issues, enabling them to engage with and contribute to the global community.

Ethical and professional responsibility: Graduates will demonstrate ethical and professional behaviour and adhere to the values and standards of their chosen field, including respect for diversity, intellectual property rights, and ethical research practices.

Adaptability and lifelong learning: Graduates will be equipped with the skills and mindset necessary for continuous learning and adaptation to evolving professional environments, enabling them to pursue further education or successfully navigate career changes within or outside their field of study.

### **B.Sc Honours and General**

Subject Knowledge: Demonstrating a deep understanding of the subject matter and core concepts in the specific field of study.

Problem-Solving Skills: Applying scientific principles and methodologies to solve complex problems and analyze data.

Laboratory Skills: Conducting experiments, collecting data, and utilizing laboratory techniques in a safe and effective manner.

Critical Thinking: Evaluating and interpreting information, evaluating evidence, and making informed decisions based on scientific analysis.

Communication Skills: Effectively communicating scientific concepts, research findings, and ideas through written reports, presentations, and discussions.

**Teamwork and Collaboration:** Working effectively as part of a team, collaborating with others, and contributing to group projects and research.

**Ethical and Professional Responsibilities:** Demonstrating ethical behaviour and responsible conduct in scientific research and adhering to professional standards and regulations.

**Lifelong Learning:** Recognizing the importance of continuous learning and professional development to stay updated with advancements in the field.

**Research Skills:** Conducting independent research, literature reviews, and designing experiments or studies to address scientific questions or problems.

**Adaptability and Flexibility:** Being open to new ideas and approaches, adapting to changing circumstances, and embracing innovation and technological advancements in the field.

## **B.Com Honours and General**

**Industry-relevant knowledge:** Graduates will possess a comprehensive understanding of various areas of commerce, including accounting, finance, economics, marketing, and management.

**Business acumen:** Graduates will be able to apply their knowledge of business principles and practices to analyze and solve real-world business problems.

**Ethical conduct:** Graduates will be aware of and adhere to ethical standards and practices in business operations and decision-making.

**Analytical and critical thinking skills:** Graduates will develop the ability to analyze complex business scenarios, evaluate information, and make informed decisions.

**Communication skills:** Graduates will be able to effectively communicate in written, verbal, and digital forms to convey ideas and information in a clear and concise manner.

**Teamwork and collaboration:** Graduates will be able to work effectively in teams, demonstrating good interpersonal skills and the ability to contribute positively to team goals.

**Entrepreneurial mindset:** Graduates will have the skills and mindset required to identify and pursue entrepreneurial opportunities, including the ability to develop business plans and strategies.

**Technological proficiency:** Graduates will be proficient in using technology and software applications relevant to the field of commerce.

**Lifelong learning:** Graduates will have the ability to engage in continuous learning, stay updated with industry trends, and adapt to changing business environments.

**Global perspective:** Graduates will be aware of the global nature of business and possess cross-cultural competence to work effectively in diverse cultural and international business contexts.

Course outcomes for different subjects are given below:

## ENGLISH

### Course outcome

<p>CC-1 HISTORY OF ENGLISH LITERATURE AND PHILOLOGY</p>	<p>Traces the growth of English literature and language from a nascent state of civilization to the complexities of the modern world, recording in its course various literary movements and genres reflecting the turns that impacted the world and Britain in terms of social, economic, political and geographical changes.</p>
<p>CC-2 EUROPEAN CLASSICAL LITERATURE</p>	<p>A comprehensive insight into the social, economical and intellectual basis of the functioning of the ancient world, its value systems that founded the concept of a polis in Greece and Rome. The growth of the epic tragedy, comedy and rhetoric familiarizes students with classical mythology which enriches their ability to decipher allusions, allegories, structures in their study of English literature.</p>
<p>CC – 3 INDIAN WRITING IN ENGLISH</p>	<ul style="list-style-type: none"><li>• To give them preliminary ideas about postcolonial studies, looking into literature in post colonial times.</li><li>• To apprise students of the history of evolution of Indian writings in English from pre-colonial to present times.</li><li>• Introduces students to the works of 19<sup>th</sup> century Indian authors in English and in translations, helps them gauge the influence of Western thought process and also resistance to colonial oppression.</li></ul>
<p>CC -4 BRITISH POETRY AND DRAMA – 14<sup>TH</sup> CENTURY TO 17<sup>TH</sup> CENTURY</p>	<p>Acquaints students to the concepts of Romans and chivalry during the Middle Ages and the growth of humanism and poetry that still has a lasting influence on literature of the present times.</p> <p>Introduces them to stalwarts like Chaucer, Spencer, Shakespeare and so on.</p>

<p style="text-align: center;"><u>CC- 5</u> <u>AMERICAN</u> <u>LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• Students are introduced to the seminal texts of American literature through the teaching of works by prominent American writers.</li> <li>• To trace the history of American literature as it evolved over the ages and understand how that relates to socio –historical contexts of the times.</li> <li>• To familiarise students to various identity groups of America and their concerns as expressed through literature.</li> </ul>
<p style="text-align: center;"><u>CC-6</u> <u>POPULAR LITERATURE</u></p>	<p>Inspires students to probe the concepts and modes of writing that make some writings extremely popular and appealing to a large section of the reading public.</p> <p>Students are encouraged to search for the tropes that are embedded in the writings honning their imagination, investigative aptitude and play of language.</p>
<p style="text-align: center;"><u>CC -7</u> <u>BRITISH POETRY AND</u> <u>DRAMA</u></p>	<p>The students are introduced the turbulent times of the English civil war, with concepts of Commonwealth, republicanism which helps them understand the present world in an informed way.</p> <p>The conflict between religion and state is even today not unfamiliar and this period also records a shift towards economies rather than ethics founding the base of modern world.</p> <p>The age also records the literary emergence of women writers as Aphra Behn and familiarizes students with England’s imperialistic ambitions.</p>

<p style="text-align: center;"><u>CC8</u> <u>18TH CENTURY BRITISH LITERATURE</u></p>	<p>Introduction to metropolitan literature centering round London and the development of modern theatre with actresses, locale, light during the Restoration which continues till now.</p> <p>Drama and poetry are distinctly inclined towards the city and an elite class; uphold what is termed as pseudo-courtly ideal. The rise of the novel was the result of the shift from the aristocratic ideals to the value systems of the rising middle class.</p>
<p style="text-align: center;"><u>CC-9</u> <u>BRITISH ROMANTIC LITERATURE</u></p>	<p>By going through this course, students would learn about the major shift in English literature as the focus shifts from the city towards the primitive and heroic societies.</p> <p>It also focuses on main amidst nature removed from urban gentility and the importance of imagination and emotion against reason.</p> <p>The students therefore become informed about both the romantic and classical trends that mark the literature of the period.</p>
<p style="text-align: center;"><u>CC-10</u> <u>19TH CENTURY BRITISH LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• Students are enabled to critically analyse British literature through early 19<sup>th</sup> century works through different perspectives such as gender, sociological, aesthetic etc.</li> <li>• Helps students understand the Victorian age through social, philosophical, economical and religious movements.</li> </ul>
<p style="text-align: center;"><u>CC-11</u> <u>WOMEN'S WRITINGS</u></p>	<p>The whole focus is on Women's writings, bringing them to the forefront with writings by women from several continents as well as in India giving the students an idea about gender roles, oppression, and resistance in a largely male-dominated world.</p>
<p style="text-align: center;"><u>CC-12</u> <u>EARLY 20<sup>TH</sup> CENTURY BRITISH LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• The students witness a major shift in literary trends as a result of the disintegrating impact of the previous ages. The industrial</li> </ul>

	<p>revolution, Darwinism and then the first World war, the second World war and how the traditional coherent narratives became fractured and dislocated from any claim of unity.</p>
<p><u>CC -13</u> <u>MODERN EUROPEAN</u> <u>DRAMA</u></p>	<ul style="list-style-type: none"><li>• Modern drama signifies the struggle for self-realization and freedom; the turn from declamatory speech in classical drama to the intimacies of interpersonal exchange.</li><li>• It is ideal for students of social history, and the history of medieval</li></ul>

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	<p>and early modern drama or literature.</p> <ul style="list-style-type: none"> <li>• It investigates the ranges of dramatic and performative techniques and strategies that playwrights across Europe used to adapt their works to the changing contexts in which they performed, and to the changing or expanding audiences that they faced.</li> <li>• This useful paper provides an innovative framework for approaching the relationship between spectatorship, performances and playwrights.</li> </ul>
<p style="text-align: center;"><u>CC- 14</u> <u>POSTCOLONIAL</u> <u>LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• This paper becomes relevant because it is capable of providing a representation of the suppressed as well as the suppresser, and hence offers a representation of conflicting views and ideologies.</li> <li>• Postcolonial literatures attempt to challenge the dominant literary and cultural discourses of the West and critique the discursive and material legacies of colonization.</li> <li>• This course provides students with valuable insights into how difference in race, ethnicity, tradition, language, gender, class, and power can be negotiated through the integration of postcolonial discourse and literature into English Literature classrooms.</li> </ul>
<p style="text-align: center;"><u>GE -1</u> <u>POETRY AND SHORT STORY</u></p>	<ul style="list-style-type: none"> <li>• Introducing students to the canonical British English texts. Understanding Romantic movements and implications in the works of second generation Romantic poets.</li> <li>• Analyzing the art of storytelling and various structural elements of short</li> </ul>



	story.
<u>GE-2</u> <u>ESSAY,DRAMA,NOVEL</u>	<ul style="list-style-type: none"> <li>• To introduce students to the literary genres of essay, drama and novel, through teaching of texts from of these genres, from various periods of English literature.</li> <li>• To give students a broader idea of the contexts of the texts with relation to history of English literature.</li> </ul>
<u>GE -3</u> <u>WOMEN'S WRITING AND</u> <u>WOMEN'S EMPOWERMENT</u>	<ul style="list-style-type: none"> <li>• Helps recognising the intersection between gender and other socio-cultural identities.</li> <li>• Develops critical thinking and analytical skills.</li> <li>• Helps understanding how societal institution and power structures impact the material realities of women's lives.</li> </ul>
<u>GE-4</u> <u>ACADEMIC WRITING</u>	<ul style="list-style-type: none"> <li>• Effective preparation for a career in school/language teaching in English as the course covers the writing process, introduces academic writing and processes of summarising and paraphrasing.</li> </ul>
<u>SEC- A2</u> <u>BUSINESS</u> <u>COMMUNICATION</u>	<ul style="list-style-type: none"> <li>• Getting clerical jobs in public and private sectors</li> <li>• Improving verbal and non-verbal communication.</li> <li>• Developing effective interpersonal skills and teamwork abilities.</li> </ul>
<u>SEC-B2</u> <u>CREATIVE WRITING</u>	<ul style="list-style-type: none"> <li>• Helps develop the concept of academic writing and technical skills such as citation.</li> </ul>

<p style="text-align: center;"><u>DSE – A1</u> <u>MODERN INDIAN</u> <u>WRITING IN ENGLISH</u> <u>TRANSLATION</u></p>	<ul style="list-style-type: none"> <li>• Helps expose the student to the multiculturalism of modern Indian writing in translation, fostering an understanding of the multifaceted nature of cultural identities in various selections of literature in the course.</li> </ul>
<p style="text-align: center;"><u>DSE- B1</u> <u>LITERARY TYPES,</u> <u>RHETORIC AND PROSODY</u></p>	<ul style="list-style-type: none"> <li>• By using literary types, students develop their knowledge of the genres and techniques of writing literature.</li> <li>• Rhetoric gives a framework to think critically about writing and reading choices.</li> <li>• Knowing how to use the tools of rhetoric can improve communication.</li> <li>• Prosody will help them to scan verses and enjoy the craft of poets.</li> </ul>
<p style="text-align: center;"><u>DSE –A3</u> <u>PARTITION LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• Brings out extensively the trauma, pain and dislocation brought about by the partition of India. Many of the students can relate them to their ancestors still nostalgic and not reconciled with the loss suffered.</li> <li>• It helps them to fathom out the meaningless separation caused by external agencies and be cautious of such forces.</li> <li>• It is a potential ground for them to pursue in terms of research projects and documentation.</li> </ul>
<p style="text-align: center;"><u>DSE- B3</u> <u>AUTOBIOGHRAPHY</u></p>	<ul style="list-style-type: none"> <li>• Autobiography in the classroom is both academically valid and a challenging way to encounter new worlds.</li> <li>• Autobiographies provide initial entry to the study of periods of time and of places with which there may be little familiarity.</li> <li>• For students, it is pleasurable, to learn history by reading the life stories of real people.</li> </ul>

<p style="text-align: center;"><u>AECC -1</u> <u>COMMUNICATIVE ENGLISH/</u> <u>MIL</u></p>	<ul style="list-style-type: none"> <li>• Help the students to learn the language of communication, such as personal communication, social interactions and communication in professional spheres. Focuses on improving grammatical skills.</li> </ul>
<p style="text-align: center;"><u>LCC (L1)-1</u> <u>LANGUAGE , VARIETY</u> <u>AND STYLISTICS</u></p>	<ul style="list-style-type: none"> <li>• Students are taught to learn the different forms of letter writing.</li> <li>• Students learn to write newspaper report and emails along with lesson of differentiating British English from American English.</li> </ul>
<p style="text-align: center;"><u>LCC (L1)-1</u> <u>LANGUAGE , VARIETY</u> <u>AND STYLISTICS</u></p>	<ul style="list-style-type: none"> <li>• Students are taught to learn the different forms of letter writing.</li> <li>• Students learn to write newspaper report and emails along with lesson of differentiating British English from American English.</li> </ul>
<p style="text-align: center;"><u>LCC (L1)- 2</u> <u>LANGUANGE,</u> <u>IMAGINATION AND</u> <u>CREATIVITY</u></p>	<ul style="list-style-type: none"> <li>• Students get to learn different poems by various writers and it helps them to understand the writing styles.</li> <li>• Travelogues, story writing and advertisement help to improve their writing skills.</li> </ul>
<p style="text-align: center;"><u>LCC (L2)-1</u> <u>LANGUAGE,SOCIETY AND</u> <u>PERSONALITY</u></p>	<ul style="list-style-type: none"> <li>• The students learn about the impact of society in the writings of the authors.</li> </ul>
<p style="text-align: center;"><u>LCC (L2) -2</u> <u>LANGUAGE ,CREATIVITY</u> <u>AND ANALYSIS</u></p>	<ul style="list-style-type: none"> <li>• The students get a firsthand experience of Indian writing in English.</li> </ul>
<p style="text-align: center;"><u>DSE A1 –Gen</u> <u>BRITISH</u> <u>LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• The students get to read plays, drama and novel written by British authors.</li> </ul>
<p style="text-align: center;"><u>DSE B1 –</u> <u>Gen</u> <u>PARTITION</u> <u>LITERATURE</u></p>	<ul style="list-style-type: none"> <li>• An introduction to partition literature can expose the students to interdisciplinary studies in the future.</li> <li>• These kinds of literature have a social and political relevance, and help the students to understand their nation’s history.</li> </ul>

## BENGALI

Course Outcome of B.A/ Bengali (Honours) /( CBCS) 2018-19

University of Calcutta

- CC1-History of Bengali Literature(up to 1800)
- CC2-Synchronic linguistic and Bengali Language
- CC3-History of Bengali Literature(19 century)
- CC4-Bengali literature : Introductory lesson
- CC5-History of Bengali Literature( 20th century)
- CC6-Historical Linguistic
- CC7- Fiction
- CC8-Pre-modern Literature
- CC9- Verse, Rhetoric and poetics
- CC10-Essays and other compositions
- CC11-Forms of Literature
- CC12-Drama and Theatre
- CC13-Modern Bengali Poetry
- Cc14-Sanskrit, English and Neighboring( Hindi) Literature

Discipline Specific Elective (DSE) and

Skill Enhancement Course(SEC) and

Ability Enhancement Compulsory Course(AECC)

- DSE-A1-Socio-cultural history of Bengal
- DSE-A2- Literature of Bangladesh
- DSE-A3- Detective and Supernatural stories and Science fiction in Bengali
- DSE-A4- Comparative Literature
- DSE-B1- Children and Adolescent Literature in Bengali

- DSE-B2- Bengali Partition Literature
- DSE-B3- Biography, Auto-biography and Travel Literature
- DSE-B4-Folk culture and folk literature

Skill Enhancement Course(SEC)

- SEC-A1- Printing and Publishing
- SEC-A2- Applied Bengali-1
- SEC-B1-applied Bengali and Research Methodology in literature
- SEC-B2- Applied Bengali -2

Ability Enhancement Compulsory Course

- AECC-1-personal essays,short stories,poeams and technical terminology.

## SANSKRIT

### Course Outcome for UG Sanskrit Studies

The course outcome for a Sanskrit course typically includes several key aspects:

CC1: Studying Classical Sanskrit Literature with a focus on poetic masterpieces like *Raghuvamśam* by Kālidāsa, *Kirātārjunīyam* by Bhāravi, and "*Kumārasambhavam* by Kālidāsa, is a journey into the heart of the Sanskrit literary tradition. By the conclusion of this course, students should possess a deep understanding of these remarkable works, appreciating their intricate metrical and stylistic brilliance. They will be equipped to engage in the detailed analysis of these epic poems, discerning the cultural, mythological, and philosophical nuances embedded within. Moreover, students will gain insights into the broader narrative traditions of classical Sanskrit poetry, recognize the historical and religious contexts in which these works were composed, and develop a profound appreciation for the timeless themes of love, valor, and divine intervention that are woven into the fabric of these poetic masterpieces. Through this course, students will emerge with a comprehensive understanding of classical Sanskrit poetry, equipping them to engage with the beauty, cultural richness, and literary sophistication of these texts that continue to captivate and inspire readers across the ages.

CC2: General ideas on the *Rāmāyaṇam*, the *Mahābhārata* and the *Purāṇas* are scheduled in the course. These are the reliable sources of Indian Knowledge. These classics narrate a basic policy which shows life in the right direction. There are many short stories with moral values which can uplift anyone's life.

Student will learn that Rāma and Sitā were on the pinnacle of family values and it is accepted that both of them is a timeless inspiration till now. Students will always stand together as a family in the society and will show love and respect towards humanity, guard themselves, keep distance from negativity.

CC3: Studying Classical Sanskrit Literature (Prose) is a scholarly expedition into the world of ancient Indian thought, ethics, and knowledge as preserved in prose writings. However, a course on the Origin and Development of Prose, focusing on important prose romances and fables, encompasses various outcomes to provide students with a comprehensive understanding of the evolution of prose literature. By the end of the course, students are expected to acquire a historical perspective on the origins and development of prose in literature, tracing its evolution from ancient to modern periods. They should be able to analyze key milestones, stylistic changes, and thematic shifts in prose writing over different literary epochs. Furthermore, students are likely to gain proficiency in the critical analysis of significant prose romances and fables, with an emphasis

on understanding the cultural, social, and literary contexts in which these works were created. They should be able to identify and interpret the unique characteristics of prose romances, such as narrative techniques, character development, and plot structures. The course may also foster skills in literary criticism, encouraging students to engage in thoughtful discussions and written analyses of prose works. Students should emerge with an appreciation for the artistic nuances and cultural significance embedded in prose romances and fables.

Overall, the course aims to equip students with a well-rounded knowledge of the historical trajectory of prose literature and the ability to critically engage with and appreciate the richness of prose romances and fables within their respective cultural and literary contexts.

CC4: Studying self-management in the context of the Gītā is a journey of personal and philosophical growth. By the end of this course, students should have gained a deep understanding of the Gītā's teachings on self-discipline, self-awareness, and the management of one's thoughts, actions, and emotions. They will have learned to apply the timeless wisdom of the Gītā to real-life situations, cultivating skills for effective decision-making, stress management, and goal setting. Moreover, students will have explored the ethical and spiritual dimensions of self-management, understanding the importance of balancing personal goals with a sense of duty and service to others. This course equips students not only with practical life skills but also with a profound appreciation for the Gītā's role as a guide to achieving inner harmony and realizing one's full potential. It encourages students to navigate life's challenges with resilience, ethical clarity, and a holistic understanding of self-management.

CC5: Studying Classical Sanskrit Literature (Drama) provides students with a unique opportunity to immerse themselves in the world of ancient Indian theatrical artistry. By the end of this course, students should have a comprehensive understanding of the dramatic conventions, structural intricacies, and thematic diversity inherent in Sanskrit drama. They will be capable of interpreting and analyzing classical Sanskrit plays, such as Kālidāsa's *Abhijñānaśakuntalam* or Bhāsa's *Svapnavāsavadattam*, in their cultural and historical context. Students will also develop an appreciation for the fusion of entertainment and moral instruction in Sanskrit drama, as well as the rich use of language, gesture, and character portrayal. Furthermore, they will gain the ability to recognize the enduring influence of Sanskrit drama on World Theater and literature. This course not only equips students with the skills to appreciate the artistic and philosophical dimensions of classical Sanskrit drama but also offers insights into the broader cultural and social aspects of ancient India that these plays reflect.

CC6: The Sanskrit Poetics and Literary Criticism course endeavors to equip students with an advanced understanding of the intricate principles governing Sanskrit literature. By the course's conclusion, students are expected to possess a mastery of poetic terminology, metrics, and figures of speech. They should adeptly analyze and interpret diverse Sanskrit literary genres, discerning historical and cultural contexts while applying seminal literary theories from works like Natya Shastra and Dhvanyaloka. The course fosters critical thinking, enabling students to evaluate and articulate their perspectives on Sanskrit literary works. Additionally, students are encouraged to engage in comparative literary analysis, appreciate aesthetic elements, and develop effective writing skills for crafting nuanced literary criticism. Ultimately, the course aims to cultivate research skills, empowering graduates to contribute meaningfully to the scholarly discourse surrounding Sanskrit literature, poetics, and literary criticism.

CC7: The Dharmaśāstra offers commentaries on duties, responsibilities and ethics for an individual's behaviour toward oneself one's family and one's community. Students learn the code of conduct and moral principles and laws. They learn ethical and moral way of living. This topic is very important and useful because students get knowledge on ancient Indian political thought.

CC8: Inscriptions provide information about the particular events, dynasties, law and order of ancient India. Students know actual dates and other achievements of the rulers. Inscriptions represent the earliest written forms of Indian languages and are evidence that these written forms were already well developed by the time the inscriptions were made. Students get accurate information about the society and the culture of ancient Indian history.

SEC A1: A course in Sanskrit writing skills is designed to cultivate a comprehensive proficiency in the language, enabling students to express themselves articulately through the written word. By the end of the course, students are expected to master the intricacies of Sanskrit grammar and syntax, constructing grammatically sound and syntactically sophisticated sentences. The curriculum emphasizes vocabulary enrichment, empowering students to use a diverse lexicon that spans various semantic fields. With a focus on composition skills, students are guided to write original pieces, ranging from essays to short stories, showcasing their ability to convey ideas with clarity and coherence. Translation competence is honed through exercises that require the transformation of passages from other languages into Sanskrit, contributing to a nuanced understanding of linguistic structures. Editing and proofreading skills are emphasized, fostering the capacity to refine and improve one's own writing. Throughout the course, students gain cultural awareness, understanding how language is embedded within historical and literary contexts. The incorporation of literary appreciation and stylistic elements, such as metaphors and poetic devices, encourages students to infuse their writing with aesthetic qualities. Ultimately,



the course equips students with the tools to navigate the nuanced art of Sanskrit writing, fostering a deep appreciation for the language's literary heritage and cultural significance.

CC9: *Śivarājāvijayam (Niśvāsa-I)* By Ambika Datta Vyasa, *Atha Kim* by Siddheswar Chattopadhyaya, *Daridradurdaivam* of Shrijiva Nyayatirtha and *Rukmiṇīharaṇam (Canto I)* Haridasa Siddhantavagisha - these books are a boon for scholars interested in learning modern writings. These scriptures emphasize the ancient and modern both customs and cultures of India. The basic fundamentals of Indian thoughts in above mentioned books are explained with systematic approach in a nice manner in this context. Further these also give the relevant information like origin, utility and gradual development of traditional knowledge of India. These are also useful publications for personalities who have contributed a lot in modern Sanskrit literature.

CC 10: A course in World Sanskrit Literature aspires to cultivate a profound understanding of Sanskrit literary traditions on a global scale. By the conclusion of the course, students are expected to exhibit a versatile comprehension of Sanskrit texts from diverse regions beyond the Indian subcontinent, acknowledging linguistic nuances and cultural adaptations. Graduates should adeptly engage in comparative literary analysis, drawing connections and distinctions between Sanskrit literature and other world literary traditions. The course aims to instill translation proficiency, enabling students to convey the richness of Sanskrit literary works to a broader audience. Cultural sensitivity is emphasized through the exploration of Sanskrit literature's integration into various global societies. Students are encouraged to recognize the profound influence of Sanskrit literature on world literary traditions and intellectual thought. Furthermore, the course fosters research skills, empowering graduates to contribute to the scholarly discourse surrounding the global impact and enduring relevance of Sanskrit literature. Overall, the course endeavors to produce culturally aware and globally competent individuals with a deep appreciation for the universal dimensions of Sanskrit literary heritage. *Galpasāhitya* is a fantastic tool for comprehending the moral ideals of human existence. Through these tales students can learn about psychology and moral values. Students learn about human action and reaction in different situations through narratives having animals. Such stories prove beneficial in the brain development of students and aid them in handling real life situation. *Mahākāvya* and *Purānas* still teaches students a lot of life saving lessons, stand by what's right, even fight for it.

SEC B2: A course in Spoken and Computational Sanskrit aims to achieve a dual proficiency, fostering both oral and technical competencies in the language. By the end of the course, students are expected to develop conversational fluency, enabling them to express ideas, engage in

discussions, and comprehend spoken Sanskrit. The curriculum emphasizes practical language skills, including pronunciation, vocabulary usage, and common conversational patterns. Concurrently, students delve into the computational aspects of Sanskrit, gaining proficiency in utilizing tools and techniques for processing the language computationally. This includes exposure to computational linguistic models, natural language processing tools, and machine translation systems tailored for Sanskrit. The course equips students with a unique blend of traditional spoken language skills and modern computational approaches, preparing them to navigate the diverse applications of Sanskrit in both academic and technological contexts. Through this interdisciplinary approach, students gain a holistic understanding of Sanskrit as a living language with relevance in contemporary computational realms.

CC11 Studying Vedic Literature, Vedic Grammar, and Upanishads is a comprehensive exploration of the foundational texts of ancient Indian knowledge and spirituality. By the end of this course, students should have a deep understanding of the Vedas, the oldest sacred scriptures of Hinduism, and their profound significance in the development of Indian philosophy and religious thought. They will also be well-versed in Vedic grammar, enabling them to interpret and analyze these ancient texts with linguistic precision. In addition, students will have delved into the Upanishads, the philosophical and mystical treatises that form the basis of Indian spiritual wisdom, and gained insights into the nature of reality, the self (*ātman*), and the ultimate reality (Brahman). Overall, this course equips students with a holistic understanding of the spiritual and intellectual heritage of India, cultivating a profound appreciation for the deep philosophical inquiries and spiritual teachings that continue to influence religious and philosophical traditions worldwide.

DSE1: Studying *Tarkabhāṣā*, *Saptapadārthī* and *Vivekacūḍāmaṇi* is a comprehensive exploration into the realms of Indian philosophy and logic. By the end of this course, students should have developed a profound understanding of *Tarkabhāṣā*, a foundational text in Indian logic written by Kesava Mishra. They will be equipped with the analytical tools to engage with various aspects of logic and argumentation, laying the groundwork for precise reasoning and critical thinking. Additionally, students will delve into *Saptapadārthī*, a treatise attributed to the philosopher Padmapada, where they will explore the seven categories of thought, deepening their comprehension of classical Indian philosophy. Furthermore, the study of *Vivekacūḍāmaṇi* by Adi Shankaracharya will provide students with insights into the nature of self-realization and discrimination between the real and the unreal. This course aims to cultivate skills in logical reasoning, philosophical inquiry, and self-reflection, fostering a holistic understanding of

classical Indian philosophical thought and its practical implications in navigating the complexities of existence.

CC 12: The study of Sanskrit Grammar encompasses a range of objectives aimed at equipping students with a comprehensive understanding of the linguistic structure and rules governing Sanskrit. By the end of the course, students should have acquired a solid foundation in the intricacies of Panini's *Aṣṭādhyāyī*, the seminal work on Sanskrit grammar. They should be proficient in analyzing and interpreting Sanskrit texts with a keen awareness of the grammatical elements such as declensions, conjugations, sandhi (sound changes), and syntactical structures. Additionally, students will develop translation skills, enabling them to convey the meaning of Sanskrit passages accurately. The course aims to instill a deep appreciation for the systematic nature of Sanskrit grammar, enhancing linguistic precision and analytical thinking. Students are expected to apply their knowledge practically, whether in the study of classical Sanskrit literature, religious texts, or historical documents, showcasing a mastery of the grammatical principles that underpin the Sanskrit language.

DSE 2: Benefits of learning *Sāhityadarpaṇa*, *Kāvya tattva* (काव्य तत्त्व) is being taught to make people यशस्वी, to build career, to learn ethics and values of life, to gather pure knowledge, to attain मोक्ष which is ultimate goal of life. If you want to bring success in life, you have to strive. Man can build his own fate by कर्म. Your rights are in action, not in consequence.

CC 13: Studying Indian Ontology and Epistemology is a scholarly exploration into the profound philosophical traditions that have shaped the intellectual landscape of India. By the end of this course, students should possess a comprehensive understanding of the diverse ontological and epistemological systems that characterize Indian philosophy, such as *Nyāya*, *Vaiśeṣika*, *Vedānta*, and Buddhist thought. They will be equipped to analyze the nature of existence, reality, and knowledge within these frameworks, delving into questions about the ultimate nature of the self (*ātman*), the cosmos, and the relationship between the knower and the known. Students should also develop critical thinking skills to assess the different perspectives on epistemology, including the various *pramānas* (means of knowledge) proposed in Indian philosophy. Furthermore, the course aims to foster an appreciation for the nuanced debates and intricate metaphysical inquiries that define Indian ontological and epistemological discourse. Students will be prepared to engage with the profound insights and contemplative wisdom that characterize these traditions, contributing to a deeper understanding of the philosophical heritage of India.

DSE 3: *Siddhāntakaumudī* extensively covers the rules and principles associated with *Strīpratyaya*, which involves the formation and usage of feminine suffixes in Sanskrit words. Understanding the application of feminine suffixes is crucial for grammatical analysis and

composition. *Siddhāntakaumudī* includes discussions on different verb classes, and the *Tiñanta-prakarāṇa* refers to the class of verbs that take three suffixes in their conjugation. Mastery over such *Tiñanta-prakarāṇa* is essential for constructing grammatically accurate and contextually appropriate verb forms. While *Ajanta-puṃliṅga* is not a standard term, the concept of masculine nouns declined like "Ajanta" is covered in *Siddhāntakaumudī*. The declension of nouns, especially those following specific patterns like Ajanta, is a significant aspect of Sanskrit grammar. The course outcomes, in this case, would involve students gaining a detailed understanding of the grammatical rules associated with feminine suffixes, the conjugation of verbs belonging to the three-suffix class, and the declension patterns of masculine nouns resembling "Ajanta." Students should be able to apply these rules in practical grammatical analysis and construct grammatically correct sentences.

CC14: A course on Sanskrit Composition and Communication typically aims to achieve several key outcomes to ensure students develop a practical and comprehensive understanding of the language. The specific outcomes may vary depending on the course's level and goals, but here are some general expectations: Students should have a solid grasp of Sanskrit grammar, syntax, and morphology. This includes understanding the various verb forms, declensions, and sentence structures outlined in classical Sanskrit grammar texts. The course aims to enrich students' vocabulary, allowing them to express a wide range of ideas and concepts in Sanskrit. This involves learning and applying words from different semantic fields and contexts. Students are expected to develop the ability to compose original sentences, paragraphs, and short essays in Sanskrit. This includes creating grammatically correct and contextually appropriate expressions. The course often includes translation exercises, enabling students to translate sentences or passages from English or another language into Sanskrit. This enhances their understanding of both languages and reinforces grammatical concepts. Emphasis is placed on effective communication skills, enabling students to convey their thoughts clearly and coherently in Sanskrit. This may involve both written and oral communication exercises. The course may incorporate elements of cultural and contextual understanding, encouraging students to use Sanskrit in scenarios relevant to real-life situations, classical literature, or specific domains of knowledge. Students should develop the ability to review and revise their compositions, ensuring accuracy in grammar, syntax, and overall expression. This fosters a keen eye for detail and language refinement. Alongside practical communication skills, the course may include an element of literary appreciation, exposing students to various genres of Sanskrit literature and encouraging them to incorporate literary devices into their compositions. Students are encouraged to experiment with different stylistic elements of Sanskrit language and literature, enhancing their writing with appropriate figures of speech, poetic devices, and rhetorical flourishes. The course

may aim to develop cultural competence, enabling students to use Sanskrit within the broader cultural and historical contexts of India.

Ultimately, the course outcomes in Sanskrit Composition and Communication are designed to empower students to express themselves fluently and accurately in Sanskrit, fostering a deeper appreciation for the language's rich linguistic and cultural heritage.

DSE 4: Studying the Eastern and Western interpretations of the Veda, *Muṇḍakopaniṣad*, and *Taittiriyopaniṣad* is a scholarly journey into the multifaceted world of Vedic and Upanishadic literature. By the end of this course, students should have gained a comprehensive understanding of how these ancient texts are interpreted and contextualized in both Eastern and Western philosophical and religious traditions. They will be able to appreciate the intricate layers of meaning within the Vedas, and specifically the profound insights offered by the *Muṇḍakopaniṣad* and *Taittiriyopaniṣad*. Students will also have the analytical tools to compare and contrast the interpretations of these texts in Eastern contexts, such as within Hinduism and other Dhārmika traditions, and in Western philosophical and academic settings. Furthermore, they will explore the impact of these interpretations on broader religious and philosophical discourse, recognizing the significant role these texts play in shaping our understanding of spirituality, metaphysics, and the human condition across different cultural and intellectual landscapes. This course equips students with a profound appreciation for the interplay of ideas and perspectives that continue to shape the global discourse on these ancient and revered texts.

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## HISTORY

### Course Outcome

#### CBCS SYLLABUS IN HISTORY HONOURS 2018

#### CC1: HISTORY OF INDIA: FROM THE EARLIEST TIMES TO C 300BCE Course outcome

On completion of the course students are expected to

1. Gain knowledge about the sources of early Indian history and historiography.
2. Have acquired knowledge on the pre-history of the Indian subcontinent.
3. Have acquired knowledge on the beginning of civilization in India.
4. Get an idea about jati, varna, purusharthas, chaturashrama and the position of women in early India.
5. Gain knowledge on the strength of diversity of our country.

#### CC2: SOCIAL FORMATIONS AND CULTURE PATTERNS OF THE ANCIENT WORLD OTHER THAN INDIA

### Course outcome

On completion of the course students are expected to

1. Compare the process of development from primitive ages in India as well as other parts of the world, during the same era.
2. Boost the knowledge about the history of ancient Egypt.
3. Get an idea about the history of ancient Greece.
4. Gain knowledge about the history of the Roman Empire.
5. Explore the relationship between the past and the present.

#### CC3: HISTORY OF INDIA C300BCE TO C 750E Course outcome

On completion of the course students are expected to

1. Have a knowledge about the socio-political aspect of ancient India.
2. Analyse the economic aspect of the ancient age.
3. Gain knowledge about the protestant religions of ancient India.
4. Get an idea about the growth of monarchical, republican and other forms of government in ancient India.
5. Analyse the interconnection between past and present.

#### CC4: SOCIAL FORMATION AND CULTURE PATTERNS OF THE MEDIEVAL WORLD OTHER THAN INDIA

### Course outcome

On completion of the course students are expected to

1. Get an outline of the historiography of the decline of the Roman Empire.
2. Get knowledge of the society, religion, polity and economy in medieval times.

3. Gain knowledge about the rise of feudalism in medieval Europe.
4. Have an idea about the rise of universities, towns, witchcraft and magic in medieval Europe.
5. Have knowledge about Judaism, Christianity, Islam and the Crusades.

#### CC5: HISTORY OF INDIA CE750-1206

##### Course outcome

On completion of the course students are expected to

1. Get an idea on the early medieval period in its totality.
2. Get an idea on the socio-economic structure of the early medieval India.
3. Get an idea on the cultural aspects of the early medieval Indian history.
4. Have knowledge about the political developments in early medieval India.
5. Gain knowledge about the Arab invasion of Sind and its impact.

#### CC6: RISE OF MODERN WEST-1

##### Course outcome

On completion of the course students are expected to

1. Get an idea on the transition phase from feudalism to capitalism.
2. Get knowledge of the exploration of the new world by Portugal and Spain.
3. Know the concepts like renaissance, reformation, economic developments associated with this period.
4. Have knowledge about the price revolution, agricultural revolution and the enclosure movement.
5. Gain knowledge about the rise of national monarchies and the emergence of the European state system.

#### CC7: HISTORY OF INDIA 1206-1526

##### Course outcome

On completion of the course students are expected to

1. Get an idea on the sultanate period of India.
2. Get an idea on the society and economy of this period
3. Get an idea on the cultural and religious aspect of this period.
4. Gain knowledge about the political developments of the sultanate period.
5. Have knowledge about the emergence of regional dynasties and identities in Vijaynagar, Bahamani, Gujarat, Malwa, Jaunpur and Bengal.

#### CC8: RISE OF THE MODERN WEST II

##### Course outcome

On completion of the course students are expected to

1. Get an idea of the crisis in the 17th C Europe.
2. Have an idea about the printing revolution, military revolution and scientific revolution in Europe.
3. Gain knowledge about the English revolution and the origins of enlightenment in Europe.
4. Clear concepts like Mercantilism and Industrial Capitalism.
5. Get an idea of Absolutism in Europe in the 17th C and 18thC.

#### CC9: HISTORY OF INDIA 1526-1605

##### Course outcome

On completion of the course students are expected to

1. Get an idea on the historiography of the Mughal age.
2. Get an idea of the political history of the Mughal age.
3. Get an idea of the socio-economic aspects of the Mughal age.
4. Have knowledge about the concepts like jabti, mansab, jagir etc.
5. Gain knowledge about the growth and development of religious toleration, Sulh-i-kul, Bhakti and Sufi movements during the era.

#### CC10: HISTORY OF INDIA 1605-1750 Course outcome

On completion of the course students are expected to

1. Have knowledge about the political and social developments of the Mughal period.
2. Get an idea of Mughal art and architecture.
3. Get an idea of the economic aspect of the Mughal period.
4. Gain knowledge about the various patterns of regional politics during the era.
5. Have an idea about the 18th Century crisis and its related historiography.

#### CC11: HISTORY OF MODERN EUROPE (c.1780-1939) Course outcome

On completion of the course students are expected to

1. Get an idea of the political history of the French revolution, the Napoleonic era and European repercussion.
2. Have knowledge about the revolutionary and radical movements of 1830 and 1848.
3. Form an idea on capitalist industrialization of late 18th C.
4. Gain knowledge about the various forces of nationalism and the reorganisation of the states in the 19th and 20th Centuries in Europe.
5. Get an idea of the World Wars and diplomacy post the World Wars.

#### CC12: HISTORY OF INDIA (c.1750-1857) Course outcome



On completion of the course students are expected to

1. Form an idea on colonialism and its impact on polity.
2. Form an idea on the economic impact of colonialism.
3. Have an idea of the social impact of colonialism and the Indian response to it.
4. Get an idea about the colonial state and its ideology.
5. Form an idea of 1857 mutiny as well as other mutinies of the same era.

CC13: HISTORY OF INDIA (c.1857-1964) Course outcome

On completion of the course students are expected to

1. Get an idea about the cultural changes and the socio-religious reform movements of the 19th century.
2. Form an idea on the Indian national movement and the impact of Gandhism.
3. Analyse the role of communalism and rise of Hindu Maha Sabha, Muslim League in Indian politics.
4. Have a knowledge of the transfer of power, partition, integration of the princely states and the adoption of the constitution of India.
5. Gain knowledge about the development of parliamentary democracy, economic planning and foreign policy of independent India.

CC14: HISTORY OF WORLD POLITICS 1945-1994 Course outcome

On completion of the course students are expected to

1. Form an idea on Cold War and its consequences in world politics.
2. Have knowledge about the disintegration of the Soviet Union and its impact in world politics.
3. Form an idea on the rise of P.R.C and Sino-Soviet rift.
4. Gain knowledge about the West – Asian crisis.
5. Form an idea on decolonization.

DSE-A1: HISTORY OF BENGAL (c.1757-1905) Course outcome

On completion of the course students are expected to

1. Form an idea on Bengal's political history from Plassey to Buxar.
2. Form an idea on colonial economy and the drain of wealth in Bengal.
3. Have an idea about the role of the Christian missionaries and the socio-religious reform movements in Bengal.
4. Gain knowledge about the protest movements against the Raj.
5. Form an idea on the partition of Bengal and its effects on society, polity and economy of Bengal.

DSE-B1: HISTORY OF MODERN EAST ASIA-I CHINA (c.1840- 1949) Course outcome

On completion of the course students are expected to

1. Have an idea about the society, economy and polity of pre modern China.
2. Get an idea on the rise of imperialism in China between 19th C and early 20th C.
3. Form an idea about the anti-imperial movements in China.
4. Get an idea on the history of reform movements in China between 1919-1949.
5. Get an idea on the formation of communism in China 1921-1937.

DSE A3 : HISTORY OF BENGAL (c.1905-1947) Course outcome

On completion of the course students are expected to

1. Have an idea about the partition of Bengal and the Swadeshi movement.
2. Form an idea on Gandhian politics like Civil Disobedience, Quit India movement and other trends in nationalism.
3. Form an idea on communal politics between 1906-1930.
4. Get an idea about the rise of Subhash Chandra Bose and left-wing politics in Bengal.
5. Form an idea on partition of India, Independence, formation of Pakistan.

DSE B3 : HISTORY OF MODERN EAST- II JAPAN (c.1868-1945) Course outcome

On completion of the course students are expected to

1. Get an idea on the transition from feudalism to capitalism in Japan.
2. Have knowledge about the restoration movement in Japan.
3. Gain knowledge about the Meiji constitution and all round reforms in Japan.
4. Get an idea on the Japanese imperialism.
5. Get an idea on the concepts like democracy, militarism, fascism in Japan.

SEC A (1) : ARCHIVES AND MUSEUMS Course outcome

On completion of the course students are expected to

1. Gain first-hand knowledge about archives and museums through visit to the museums and archives.
2. Form an idea on the history of archives and museums, with special reference to India.
3. Form an idea on types of archives and museums.
4. Get an idea on museum presentation and exhibition.
5. Have an idea about the role of archives and museums in society.

SEC B (2) : ART APPRECIATION :AN INTRODUCTION TO INDIAN ART Course outcome

On completion of the course students are expected to

1. Gain first-hand knowledge about Indian art and architecture through visit to a monument of national importance.

2. Get an idea of pre historic and proto historic art.
3. Get an idea on the Indian art between (C600BCE-600CE) and (C600CE-1200CE)
4. Have knowledge about Indian art and architecture from C. 1200 CE-1800 CE.
5. Get an idea on contemporary art and architecture of India.

#### COURSE OUTCOME CBCS IN HISTORY GENERAL 2018

##### HISG,GE-1 HISTORY OF INDIA FROM EARLIEST TIMES UPTO 300CE

###### Course outcome

On completion of the course students are expected to

1. Gain knowledge on prehistory.
2. Gain knowledge on the protestant religions of ancient India.
3. Gain knowledge on the political history of ancient India up to 300CE.

##### HISG,GE-2 HISTORY OF INDIA FROM 300C TO 1206 Course outcome

On completion of the course students are expected to

1. Gain knowledge on the political history of ancient India from 300C to 1206C.
2. Gain knowledge on Arab invasion in Sind.
3. Gain knowledge on establishment of the Sultanate rule in India.

##### HISG,GE-3 HISTORY OF INDIA FROM 1206 to 1707 Course outcome

On completion of the course students are expected to

1. Get knowledge regarding the rise of the Mughals in India.
2. Gain knowledge regarding the rise of the bhakti and Sufi movement.
3. Get knowledge regarding the socio-economic and cultural aspects of the Mughal rule.

##### HISG,GE-4 HISTORY OF INDIA 1707-1950

###### Course outcome

On completion of the course students are expected to

1. Know about the pre 1857 phase and post 1857 phase in Indian politics.
2. Know about the nationalist movement in India.
3. Know about the formation of independent India and the adoption of the constitution.

##### DSE-A2: SOME ASPECTS OF EUROPEAN HISTORY: C. 1780 – 1945 Course outcome

On completion of the course students are expected to

1. Form an idea on capitalist industrialization of late 18th C.
2. Get an idea of the political history of the French revolution, Napoleonic era and European repercussion.
3. Get an idea of the World Wars and diplomacy post the World Wars.

#### DSE-B2: SOME ASPECTS OF SOCIETY & ECONOMY OF MODERN EUROPE: 15th – 18th CENTURY

##### Course outcome

On completion of the course students are expected to

1. Get an idea of the Feudal crisis in Europe.
2. Get an idea of Renaissance and Reformation in Europe.
3. Get an idea of the transition from Feudalism to Capitalism and the rise of Industrial capital.

#### SEC A1 HISTORICAL TOURISM –THEORY AND PRACTICE Course outcome

On completion of the course students are expected to

1. Know about ancient art and architecture.
2. Know about Indo-Persian architecture.
3. Know about colonial architecture.

#### SEC B1 MUSEUMS AND ARCHIVES IN INDIA Course outcome

On completion of the course students are expected to

1. Get knowledge about the definitions of museums and archives in India.
2. Learn about the history of museums and archives in India.
3. Get knowledge regarding the functions of the museums and archives in India.

## POLITICAL SCIENCE

### COURSE OUTCOME

#### CBCS

#### POLITICAL SCIENCE

#### HONORS COURSE

#### **PLSA CC1: UNDERSTANDING POLITICAL THEORY CONCEPTS(SEMESTER I)**

This paper introduces students to political theory. It focusses on conceptualising the “political” and understanding the subject matter and meaning of political science. Module 1 with concepts like state, power, authority, sovereignty, liberty, equality and law. Module 2 deals with democracy, citizenship, justice and authoritarianism. These theoretical concepts provide students with a tool to understand the contemporary political events.

#### **PLSA CC2: UNDERSTANDING POLITICAL THEORY: APPROACHES AND DEBATES (SEMESTER I)**

This paper introduces students to the approaches of Political science. The first module familiarises students with feminism, structural functionalism, system theory, post colonialism and behavioralism. The second module deals with Marxism. It deals with Marxian approach of dialectical materialism and historical materialism. It focusses on key ideas of Marxism namely surplus value alienation, class, party, revolution. It also introduces students to the ideas of Mao, Lenin, Luxemburg and Gramsci.

#### **PLSA CC3: CONSTITUTIONAL GOVERNMENT IN INDIA(SEMESTER II)**

It familiarises students with constitution assembly debates, its working and evolution. It deals with the preamble, citizenship, fundamental rights and duties, directive principles of state policy as well as nature of Indian federalism. It is also concerned with the theory and practice of the working of the three organs of the government-legislature, executive and judiciary.

#### **PLSA CC4: POLITICS IN INDIA: STRUCTURES AND PROCESSES (SEMESTER II)**

It introduces students to party system, coalition government and political parties in west Bengal. It also deals with social movements in India, regionalism and social cleavages like caste, gender, language and tribe.

#### **PLSA CC5: INDIAN POLITICAL THOUGHT (SEMESTER III)**

Module I introduce students to ancient and medieval political thought particularly the thoughts of Kautilya, Abul Fazal and Barani. Module II deals with modern political thought particular the thought of Tagore, Ram Mohan Roy, Gandhi, Bankim Chandra Chattopadhyay and Vivekananda.

#### **PLSA CC6: COMPARATIVE GOVERNMENT AND POLITICS (SEMESTER III)**

Module I deal with scope, concept, purpose and methods of comparative government and politics. It introduces students to classification of political system. Module II deals with working of government in UK, USA, France, Russia, PRC.

#### **PLSA CC7: PERSPECTIVES ON INTERNATIONAL RELATIONS (SEMESTER III)**

Module I introduce students to major theories of International Relations as well as emergent issues like development, environment and terrorism. Module II deals with making and evolution of Indian Foreign Policy as well as bilateral relations like Sino-India and Indo-US Relations.

### **PLSA CC8: INDIAN POLITICAL THOUGHT (SEMESTER IV)**

It introduces students to socialist thought of Narendra Dev, Jay Prakash Narayanan and Ram Manohar Lohia, Jawaharlal Nehru and Subhas Chandra Bose. It deals with radical humanism of M.N Roy; contested ideas of nation as upheld by Savarkar and Jinnah; Pandit Ramabai and Syed Ahmed Khan's views on caste and untouchability as well as Syed Ahmed Khan and Iqbal's views on colonialism and nationalism.

### **PLSA CC9: GLOBAL POLITICS IN INDIA SINCE 1945(SEMESTER IV)**

It deals with evolution of cold war, globalisation, European Union, Brexit as well working of major international organisations and institutions of global governance. India's relations with her South Asian neighbours and working of UNO and its organs has been focussed on.

### **PLSA CC10: WESTERN POLITICAL THOUGHT AND THEORY I(SEMESTER IV)**

Module I deal with Greek, Roman and Medieval political thought including the thoughts of Machiavelli. Module II introduces the thought of Bodin, Hobbes, Locke and Rousseau.

### **PLSA CC11: WESTERN POLITICAL THOUGHT AND THEORY II(SEMESTER V)**

It deals with political thought of Hegel, T.H Green and Bentham. It also introduces students to anarchism, On Marxist Socialism and Cultural Marxism

### **PLSA CC12: POLITICAL SOCIOLOGY (SEMESTER V)**

It introduces students to Political Sociology focussing on concepts of political culture, political socialisation, political development, political participation and political communication. It deals with caste, class, religion, tribe and their interaction with politics.

### **PLSA CC13: PUBLIC ADMINISTRATION: CONCEPTS AND PERSPECTIVES (SEMESTER VI)**

It deals with nature, scope, evolution of Public Administration and the effect of globalisation on governance and evolution Concepts like hierarchy, span of control, decentralisation, etc has been dealt with. It deals with bureaucracy, Riggsian model, models of decision making and communication as well as public policy making.

### **PLSA CC 14: ADMINISTRATION AND PUBLIC POLICY IN INDIA (SEMESTER VI)**

Module I deal with continuity and change in Public Administration in India focussing on Bureaucracy and organisation of Union Government and State Government as well as District Administration. Module II deals with local self-government, financial administration, planning, social welfare policies and institutions of citizen centric administration.

### **PLSA DSE A1: GENDER AND POLITICS (SEMESTER V)**

Module I deal with concepts central to gender like patriarchy, sex, power, public-private divide and locates gender within family, state and community. Module II deals with women movement and issues concerning women like visible and invisible work, reproductive and care work, violence against women.

### **PLSA DSE B (2) DEVELOPMENT PROCESS AND SOCIAL MOVEMENTS IN CONTEMPORARY INDIA (SEMESTER V)**

IT deals with aspects of planning, liberalisation and industrial development policy, mixed economy, privatisation and its impact on organised and unorganised labour is discussed, It introduces students to social movements, land reforms, agrarian crisis and emergence of new middle class

#### **PLSA DSE A(4):UNDERSTANDING GLOBAL POLITICS(SEMESTER VI)**

It deals with sovereign state system and its evolution.as well as institutions of global economy including Bretton Woods Institutions, WTO and transnational actors. Conflict, War, Terrorism as well as Global Environment and Global Civil Society is discussed.

#### **PLSA DSE B: CITIZENSHIP IN A GLOBALISING WORLD (SEMESTER VI)**

Module 1 deals with classical conceptions of citizenship and its evolution. Module 2 deals with multicultural citizenship, and impact of globalisation and social justice on citizenship including concept of cosmopolitan citizenship.

#### **PLSA SEC A(1) DEMOCRATIC AWARENESS THROUGH LEGAL LITERACY (SEMESTER III)**

Module 1 deals with laws relating to criminal jurisdiction particularly FIR, Arrest, Bail. It is concerned with offences under IPC like laws relating to dowry, sexual harassment, right to information, cybercrimes and anti-terrorist laws.

#### **PLSA SECB(1):LEGISLATIVE PRACTICES AND PROCEDURES(SEMESTER III)**

Module 1 deals with powers and privileges of MPs, MLAs, and functionaries of urban and local self- government. Module 2 deals with committees, powers and functions of people's representatives and role of standing committee

### **GENERAL COURSE**

#### **PLSG CC1: INTRODUCTION TO POLITICAL THEORY (SEMESTER I)**

It introduces students to scope and nature of Political Science and different approaches of studying the discipline.It familiarizes students with key concepts like state ,democracy, sovereignty, rights, liberty and equality as well as ideologies like Marxism and fascism

#### **PLSG CC2: COMPARATIVE GOVERNMENT AND POLITICS (SEMESTER II)**

It introduces students to different forms of political systems as well as governments, constitutions and political parties of USA, UK, PRC, France and Switzerland

#### **PLSG CC3: GOVERNMENT AND POLITICS IN INDIA (SEMESTER III)**

It familiarises students with constitution assembly debates, its working and evolution. It deals with the preamble, citizenship, fundamental rights and duties, directive principles of state policy, political parties as well as nature of Indian federalism. It is also concerned with the theory and practice of the working of the three organs of the government-legislature, executive and judiciary. It also deals with social movements in India, regionalism and social cleavages like caste, gender, language and tribe.

#### **PLSG CC4: INTERNATIONAL RELATIONS (SEMESTER IV)**

It deals with theories an approach of studying International Relations as well as cold war, post-cold war period and emerging centres of power. It familiarises students with basic determinants of Indian Foreign Policy as well as present trajectory of India as an emerging power.

### **PLSG DSE A 1B:INDIAN FOREIGN POLICY(SEMESTER V)**

It introduces students to concepts like national interest, foreign policy, diplomacy, military, propaganda etc. It deals with evolution and basic principles of foreign policy as well as bilateral relations between India and her neighbours.

### **PLSG DSE B 2B:HUMAN RIGHTS:THEORY AND INDIAN CONTEXT(SEMESTER VI)**

It deals with evolution of human rights, the UDHR and Human Rights Commission. It introduces students to national and state human rights commissions as well as human rights in context of India

### **PLSG SEC 3A(1) LEGAL LITERACY(SEMESTER III/IV)**

It familiarises students with Indian Penal Code, Personal Laws, Consumer Rights, Human Rights and Anti-Terrorist Rights.

### **PLSG SEC 6 B(2)BASIC RESEARCH METHODS(SEMESTER IV/VI)**

This paper introduces students to research methods. It deals with case study, survey approach, experimental research, participant observation and content analysis



## Syllabus for Three Year B.A. (Hons./Gen.) Course

## Philosophy under CBCS System

**HONOURS**

Name of the Programme	Year of Introduction	Course Code	Course Name	Course Outcome
<b>SEM-1</b>	2018	<b>CC1</b>	<b>Indian Philosophy-1</b>	<p>Indian Philosophy is a way of thinking about life and important questions. It has many different paths, but they can be divided into two main groups: Astika and Nastika.</p> <p>Astika schools believe in the Pramanya of Vedas.</p> <p>Nāstika schools do not believe in the Pramanya of Vedas.</p> <p>This paper introduces three special Astika schools: Carvaka, Jaina, and Bauddha. It also talks about two more familiar Astika schools: Nyaya and Vaisesika.</p> <p>Carvaka is a materialistic school which believes that only the physical world exists.</p> <p>Jaina is a non-theistic school that believes in the soul and karma.</p> <p>Bauddha is a non-theistic school that believes in the Four Noble Truths and the Eightfold Path.</p> <p>Nayaya is an Astika school of logic and pistemology.</p> <p>Vaisesika is a school of atomism and seven types of Padarthas.</p> <p>By reading this paper, students learn about different ways of thinking about the world. They</p>

				learn about the physical world, the deeper world of ideas, and how to reach liberation.
	2018	<b>CC-2</b>	<b>History of Western Philosophy -1</b>	<p>Western Philosophy is the study of the ideas and concepts that have shaped Western culture.</p> <p>It begins with the ancient Greek philosophers, such as Thales and Aristotle.</p> <p>Western philosophers have explored a wide range of topics, including the nature of reality, the meaning of life, and the relationship between mind and body.</p> <p>Some of the most important Western philosophers include Plato, Socrates, and Descartes.</p> <p>Western Philosophy has had a profound impact on the development of Western thought and culture.</p> <p>Here is a more detailed explanation of some of the key terms in the paragraph:</p> <p>Philosophy is the study of fundamental questions about knowledge, reality, and ethics.</p> <p>Western culture is the culture of the countries of Europe and the Americas.</p> <p>The Pre-Socratics were a group of ancient Greek philosophers who lived before Socrates.</p> <p>Epistemology is the branch of Philosophy that studies knowledge.</p>
<b>SEM-2</b>	2018	<b>CC-3</b>	<b>Indian Philosophy-2</b>	<p>The study of Indian Philosophy can help to maximize one's power of analytic thought. This is because Indian Philosophy deals with many complex and challenging questions, such as the nature of reality, the meaning of life, and the problem of suffering. In order to understand these</p>

				<p>questions, one must be able to think clearly and critically.</p> <p>The study of Indian Philosophy can also help to overcome negative mental states, such as anxiety, depression, and anger. This is because Indian Philosophy teaches us about the importance of non-attachment, mindfulness, and compassion. By practicing these qualities, we can learn to let go of negative thoughts and emotions, and to live a more peaceful and fulfilling life.</p> <p>The paper you are referring to discusses the remaining orthodox schools of Indian Philosophy: Samkhya, Yoga, Mimamsa, and Vedanta.</p> <p>Samkhya is a dualistic school of Philosophy that posits two fundamental realities: Purusha (consciousness) and Prakriti (matter).</p> <p>Yoga is a school of Philosophy and practice that emphasizes the importance of uniting the individual consciousness with the universal consciousness.</p> <p>Mimamsa is a school of Philosophy that focuses on the interpretation of the Vedas.</p> <p>Vedanta is a school of Philosophy that explores the nature of Brahman, the ultimate reality.</p> <p>By studying these schools of Philosophy, students can gain a deeper understanding of the world and their place in it. They can also learn how to live a more meaningful and fulfilling life.</p>
	2018	<b>CC-4</b>	<b>History of Western Philosophy -2</b>	<p>Epistemology is the branch of Philosophy that studies knowledge. It asks questions about the nature of knowledge, how we acquire knowledge, and the limits of knowledge.</p>

			<p>The paper you are referring to discusses the Western empiricist and critical approaches to epistemology.</p> <p>Empiricism is the view that knowledge is derived from experience. Empiricists believe that we are born with a blank slate and that all of our knowledge comes from our senses.</p> <p>Criticism is the view that knowledge is not simply derived from experience, but also from reason and understanding. Critics believe that we need to use our reason to interpret our experiences and to form knowledge.</p> <p>The paper discusses the key ideas of the empirical theories of Locke, Berkeley, and Hume.</p> <p>John Locke (1632-1704) was an English philosopher who argued that the mind is a blank slate at birth. He believed that all of our knowledge comes from experience, through our senses.</p> <p>George Berkeley (1685-1753) was an Irish philosopher who argued that only minds and ideas exist. He believed that material objects are not real, but are simply collections of ideas in the mind.</p> <p>David Hume (1711-1776) was a Scottish philosopher who argued that we cannot know anything with certainty. He believed that all of our knowledge is based on our experiences, which are always changing.</p> <p>The paper also discusses the critical idea of Immanuel Kant (1724-1804).</p> <p>Immanuel Kant was a German philosopher who argued that knowledge is not simply derived from experience, but also from reason and understanding. He believed that we have certain innate ideas, such as the idea of space and time, that allow us to make sense of our experiences.</p>
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				<p>Kant's contributions to epistemology and moral Philosophy were significant. His ideas have been debated and discussed for centuries, and they continue to influence philosophers today.</p>
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<b>SEM-3</b>	2018	<b>CC-5</b>	<b>Philosophy of Mind</b>	<p>Philosophy of mind is the branch of Philosophy that studies the mind. It asks questions about the nature of the mind, how the mind works, and how the mind relates to the body.</p> <p>The mind-body problem is one of the central problems in Philosophy of mind. It asks how the mind, which is immaterial, can interact with the body, which is material.</p> <p>There are many different ways to think about the mind-body problem. Some philosophers believe that the mind is simply a product of the brain, while others believe that the mind is something more than that. There is no one answer to the mind-body problem that everyone agrees on.</p>
	2018	<b>CC-6</b>	<b>Social and Political Philosophy</b>	<p>Social and Political Philosophy is a branch of Philosophy that studies the nature of society and government. It asks questions about how societies should be organized, what rights and responsibilities individuals have, and what role government should play in our lives.</p> <p>Social and Political Philosophy is related to Ethics, which is the study of right and wrong. It focuses on the moral value of social institutions and practices.</p>

			<p>The theories of Social and political philosophers provide the students with insights into following important questions:</p> <ol style="list-style-type: none"> <li>1. What is the relationship between the individual and the state?</li> <li>2. What are the rights and responsibilities of citizens?</li> <li>3. What is the best form of government?</li> <li>4. What is the role of justice in society?</li> <li>5. What is the relationship between law and morality?</li> </ol>
2018	<b>CC-7</b>	<b>Philosophy of Religion</b>	<p>Studying Philosophy of Religion can help the students to understand why people believe what they believe. It can also help the students to think about our own beliefs and values. Philosophy of religion is a branch of Philosophy that studies the nature of religion and religious beliefs. Philosophy of religion can help us evaluate our own beliefs and values and understand the world around us better.</p>
	<b>SE C-A (b)</b>	<b>Men and Environment</b>	<p>Men and Environment is a valuable resource for students who want to learn more about the relationship between humans and the environment. The book can help them to understand the challenges that we face, develop solutions, and become more engaged in environmental protection.</p>

**SEM-4**

2018

**CC-8**

**Western  
Logic-I**

The student will learn how to use critical thinking and logic to answer questions about truth, validity, deduction, syllogisms, informal fallacies, philosophic inquiry, scientific investigation, mathematical proofs, empirical evidence, and the limits of Logic and Language.

To do this, the student will complete assigned exercises and writing assignments. They will also learn to identify premises and conclusions in formal and informal proofs, and to be aware of the limits of deductive forms and linguistic ambiguities. This can be done by critically reading and analyzing short essays, editorials, or articles.

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**Western  
Logic-II**

The student will learn to identify the different parts of an argument, and to evaluate different types of arguments. For example, they will learn how and when arguments by analogy are effective, and what their limits are. They will also learn about the different kinds of causal analyses and how they are used in different contexts.

To do this, the student will complete assigned exercises, such as constructing arguments of their own, evaluating the claims of others, drawing and analyzing Venn diagrams, and finding examples of fallacious forms of reasoning. They will also write a term paper on a controversial topic, in which they will need to research



			both sides of the debate and defend their own position.
2018	<b>C C- 10</b>	<b>Epistemology and Metaphysics</b>	<p>Epistemology is the branch of Philosophy that studies knowledge. It asks questions about what knowledge is, how we acquire knowledge, and whether knowledge is possible.</p> <p>Metaphysics is the branch of Philosophy that studies the fundamental nature of reality. It asks questions about the existence of God, the nature of time and space, and the relationship between mind and body.</p> <p>Epistemology is concerned with the limits of knowledge. It asks questions like, "How do we know what we know?" and "Are there things that we can't know?" Metaphysics, on the other hand, is concerned with the nature of reality. It asks questions like, "What is the nature of existence?" and "What is the relationship between mind and body?"</p> <p>Epistemology and metaphysics are closely related. Epistemology provides the foundation for metaphysics, because it tells us what we can know about reality. Metaphysics, in turn, helps us to understand the nature of knowledge, by providing a framework for thinking about the limits of knowledge.</p>
2018-2021	<b>SEC-B</b>	<b>Philosophy of Human Rights</b>	The Philosophy of Human Rights is a powerful tool that can be used to make the world a better place. By studying this subject, students can learn how to use our voices to protect the rights of all people.

	2022-.....		<p style="text-align: center;"><b>Business Ethics &amp; Environmental Philosophy</b></p>	<p style="text-align: center;"><b><u>Business Ethics:</u></b></p> <p>Business Ethics is an important subject for all students to study, regardless of their career goals. By learning about business ethics, students can become more ethical and responsible business leaders, and they can help to create a more ethical business world.</p> <p style="text-align: center;"><b><u>Environmental Philosophy:</u></b></p> <p>Students read environmental Philosophy to learn about the ethical relationship between humans and nature.</p> <p>They can also develop critical thinking skills about environmental issues and become more engaged citizens in environmental protection.</p> <p>Environmental Philosophy can also help students develop a deeper appreciation for nature.</p>
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**SEM-5**

2018	<b>CC-11</b>	<b>Nyaya Logic and Epistemology-I</b>	<p>Epistemology is the branch of Philosophy that studies knowledge. It asks questions about what knowledge is, how we acquire knowledge, and whether knowledge is possible.</p> <p>Metaphysics is the branch of Philosophy that studies the fundamental nature of reality. It asks questions about the existence of God, the nature of time and space, and the relationship between mind and body.</p> <p>Epistemology is concerned with the limits of knowledge. It asks questions like, "How do we know what we know?" and "Are there things that we can't know?" Metaphysics, on the other hand, is concerned with the nature of reality. It asks questions like, "What is the nature of existence?" and "What is the relationship between mind and body?"</p> <p>Epistemology and Metaphysics are closely related. Epistemology provides the foundation for metaphysics, because it tells us what we can know about reality. Metaphysics, in turn, helps us to understand the nature of knowledge, by providing a framework for thinking about the limits of knowledge.</p>
2018	<b>C C- 12</b>	<b>Ethics (Indian)</b>	<p>Ethics is the study of moral principles and values. It is concerned with what is right and wrong, good and bad, and how we should behave.</p> <p>Indian Ethics is a branch of Philosophy that deals with ethical issues from an Indian perspective. It is one of the oldest</p>

and most influential traditions of moral thought in the world.

The range of issues that Indian Ethics covers is vast and includes:

**Life-values and virtues:** What are the most important values in life? What are the virtues that we should strive to cultivate?

**Karma and dharma:** What is the relationship between our actions and our future? What is our duty in life?

**Evil and suffering:** Why do bad things happen to good people? How can we overcome suffering?

**Renunciation and enlightenment:** What is the meaning of life? How can we achieve liberation from suffering?

**Human rights and justice:** What are our basic rights as human beings? How can we create a just and equitable society?

**Ecology and animal ethics:** How should we treat the natural world and its inhabitants?

**Non-violence and democracy:** What are the role of violence in society? How can we create a nonviolent and democratic society?

Indian ethics is a rich and complex tradition that has much to offer us. It can help us to think more deeply about the moral issues that we face in our own lives and in the world around us.

2018	<b>DSE-A (1)c</b>	<b>Philosophy of Language (Tarkasamgraha)</b>	<p>Tarkasamgraha is a text on Indian logic written by Annambhatta. It is one of the most important texts in the Nyaya school of Indian Philosophy.</p> <p>The paper will provide students with a textual reading of Tarkasamgraha. This means that the paper will focus on the text itself, and will not be concerned with other interpretations of the text.</p> <p>The paper will also introduce students to the area of Indian logic. This includes topics such as pada (word), shakti (power), and laksana (characteristic).</p> <p>By studying Tarkasamgraha and Indian logic, students will gain a deeper understanding of the Nyaya school of Indian Philosophy. They will also be able to apply the principles of Indian logic to their own thinking and reasoning.</p>
2018	<b>DSE-B (1)a</b>	<b>An Enquiry Concerning Human Understanding (D.Hume)</b>	<p>Students can learn a lot about the thoughts, beliefs, opinions, and views of Sir David Hume, one of the most important Western empiricists, by reading his book "An Enquiry Concerning Human Understanding."</p> <p>"An Enquiry Concerning Human Understanding" is a challenging but rewarding read, and it can help students to develop a deeper understanding of one of the most important philosophers of the Western tradition.</p>

**SEM-6**

2018	<b>CC-13</b>	<b>Nyaya Logic and Epistemology-II</b>	<p>In classical Indian Philosophy, logic is discussed as a part of epistemology, which is the study of knowledge. This means that logic is seen as a tool for gaining knowledge, rather than as an end in itself.</p> <p>The goal of inference is to generate true knowledge, whether for oneself or for others. This is different from the Western notion of logic, which is often seen as a way of proving the validity or invalidity of an argument.</p> <p>Indian logicians have invested a great deal of energy in establishing the validity of universal propositions, which are statements that apply to all members of a class. This is because they believe that universal propositions are necessary for sound inference.</p>
2018	<b>CC-14</b>	<b>Ethics (Western)</b>	<p>Ethics is the study of what is right and wrong, good and bad. It is concerned with how we should behave and make decisions.</p> <p>The study of ethics can help us to look at our own lives more critically and to evaluate our actions, choices, and decisions. It can help us to understand what is important to us and what we value.</p> <p>It can also help us to think better about morality. This is because it exposes us to different ethical theories and perspectives, which can help us to develop our own moral compass.</p> <p>Ethical discussions can help us to understand and better prepare us to handle external pressures in our own careers. This is because they can help us to develop the skills we need</p>

			to think critically and to make sound ethical decisions.
2018	<b>DSE-A (2)b</b>	<b>Applied Ethics</b>	<p>The course teaches students about the rules and principles that make society a better place. These rules include doing good, not harming others, letting people make their own choices, being fair, being good people, and working together for the good of everyone.</p> <p>The course also teaches students about the ethical implications of complex issues like euthanasia, ecology, war, and violence. Euthanasia is when someone ends another person's life to stop them from suffering. Ecology is the study of how plants and animals live together. War is when two or more groups fight with guns and other weapons. Violence is when someone hurts another person physically.</p> <p>The course will teach students about the different sides of these issues and how to make ethical decisions. It will also help students to think critically about the ethical implications of their actions.</p>
2018	<b>DSE-B (2)d</b>	<b>M.K.Gandhi</b>	<p>Under this elective course students will study the philosophical thinking of great Indian philosophers like Mahatma Gandhi. There are many reasons why students might read the Philosophy of Gandhi.</p> <p>To learn about his nonviolent methods of social change. Students can learn from his example how to fight for what they believe in without resorting to violence.</p>

				<p>To understand his views on social justice and equality. Students can learn from his example how to work for a more just and equitable world.</p> <p>To develop their own moral compass. Gandhi was a deeply moral person who lived his life according to his principles. Students can learn from his example how to develop their own moral compass and make ethical decisions.</p>
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## GENERAL

Name of the Programme	Year of Introduction	Course Code	Course Name	Course Outcome
<b>SEM-1</b>	2018	<b>CC-1</b>	<b>Indian Epistemology and Metaphysics</b>	<p>Philosophy is the study of fundamental questions about the nature of reality, knowledge, morality, and beauty. It is a way of thinking about the world that is based on reason and logic.</p> <p>Epistemology is a branch of Philosophy that studies knowledge. It asks questions like, "What is knowledge?", "How do we acquire knowledge?", and "What is the nature of truth?".</p> <p>Metaphysics is a branch of Philosophy that studies the fundamental nature of reality. It asks questions like, "What is the nature of existence?", "What is the relationship between mind and body?", and "What is the purpose of life?".</p> <p>The syllabus of Calcutta University for semester 1 includes only Metaphysics and Epistemology. This is because these two branches of Philosophy are considered to be the</p>

				<p>foundation for other branches of Philosophy.</p> <p>Epistemology is the foundation for metaphysics because it tells us what knowledge is and how we can acquire it. Metaphysics is the foundation for other branches of Philosophy because it provides a framework for thinking about the fundamental nature of reality.</p>
<p><b>SEM- 2</b></p>	2018	<p><b>C C - 2</b></p>	<p><b>Western Epistemology and Metaphysics</b></p>	<p>Epistemology is the branch of Philosophy that studies knowledge. It asks questions like, "What is knowledge?", "How do we acquire knowledge?", and "What are the limits of knowledge?".</p> <p>Metaphysics is the branch of Philosophy that studies the fundamental nature of reality. It asks questions like, "What is the nature of existence?", "What is the relationship between mind and body?", and "What is the purpose of life?".</p> <p>Western epistemology has a long history, beginning with the ancient Greeks and continuing to the present. Western epistemologists have commonly defined knowledge in terms of justified true belief. This means that knowledge is a belief that is true and</p>

				<p>that we have good reasons to believe it is true.</p> <p>Metaphysics in Western Philosophy has become the study of the fundamental nature of all reality. This means that it asks questions about the basic building blocks of reality, the relationship between different parts of reality, and the ultimate purpose of reality.</p>
<b>SEM-3</b>	2018	<b>CC-3</b>	<b>Western logic</b>	<p>Logic is the study of how to reason correctly. It helps us to make sure that our arguments are sound and that our conclusions are justified. Logic is important because it influences every decision we make in our lives.</p> <p>For example, when we are trying to decide whether or not to believe something, we use logic to evaluate the evidence. We ask ourselves questions like, "Is the evidence reliable?", "Is it relevant?", and "Does it support the conclusion?".</p> <p>Logic is also important for students. It helps them to learn and make decisions that will affect their lives. For example, when students are learning a new concept, they use logic to understand the relationships between different ideas. When they are making</p>

				<p>decision about their future, they use logic to weigh the pros and cons of different options.</p>
<p><b>SE</b> <b>M-4</b></p>	<p>2018</p>	<p><b>CC-4</b></p>	<p><b>Philosophy of Mind</b></p>	<p>Philosophy of mind is the branch of Philosophy that studies the mind and mental states. It asks questions like, "What is the mind?", "What are mental states?", and "How do the mind and body interact?".</p> <p>The main aim of philosophers working in the area is to determine the nature of the mind and mental process. This involves exploring different theories about the mind, such as dualism, materialism, and functionalism.</p> <p>Studying Philosophy of mind can help students to understand their own behavior, emotions, and ideas. This is because it can help them to understand the different ways in which the mind works.</p> <p>In this paper, students will learn about sensation and perception, three levels of mind, different theories of learning, and the definition and measuring of intelligence. By doing so, students will be able to gain a basic understanding of the mind.</p>

<b>SEM-5</b>	2018	<b>DSE-A(a)</b>	<p><b>Ethics: Indian &amp; Western</b></p> <p>Ethics is a system of moral principles that tells us what is right and wrong. Ethics can help us to make good decisions in our daily live.</p> <p>This paper discusses both Indian and Western Ethics. Indian ethics is based on the teachings of the Vedas, the Upanishads, and the Bhagavad Gita. It emphasizes the importance of dharma. On the other hand, Western ethics is based on the teachings of philosophers such as Aristotle, Kant, and Mill. It emphasizes the importance of reason and justice in making moral decisions.</p> <p>This paper can help students to get practical guidance for their daily lives. It can help them to understand the different ethical theories and how to apply them to their own lives. It can also help them to develop their own moral compass.</p>
	2018	<b>SEC-A(b)</b>	<p><b>Business Ethics</b></p> <p>Business Ethics is an important subject for all students to study, regardless of their career goals. By learning about business ethics, students can become more ethical and responsible business leaders, and they can help to create a more ethical business world</p>

<b>SEM-6</b>	2018	<b>DSE-B (a)</b>	<b>Applied Ethics &amp; Philosophy of Religion</b>	<p>Applied Ethics is the study of moral problems that arise in specific areas of life, such as business, medicine, law, and politics. It seeks to apply ethical principles to real-world problems and to develop solutions that are both morally sound and practical.</p> <p>Philosophy of religion is the study of the nature of religion, religious beliefs, and religious experiences. It asks questions about the existence of God, the nature of religious language, and the relationship between religion and ethics.</p> <p>In short, Applied Ethics is concerned with the practical application of moral principles, while Philosophy of religion is concerned with the theoretical study of religion.</p>
	2018- 2022(Man and Environment)	<b>SEC-B</b>	<b>Men and Environment</b>	<p><b><u>Men and Environment:</u></b></p> <p>Men and Environment is a valuable resource for students who want to learn more about the relationship between humans and the environment. The book can help them to understand the challenges that we face, develop solutions, and become more engaged in environmental protection.</p> <p><b><u>Value Education:</u></b></p>
	2022(Value		<b>Value</b>	

	Education)		<b>Education</b>	<p>The subject helps students to develop their moral values, become better citizens, live a more fulfilling life, and be more successful in their careers. It teaches them about the importance of values such as honesty, integrity, respect, compassion, happiness, gratitude, self-awareness, hard work, teamwork, and perseverance.</p> <p>By learning about these values, students can make good decisions in life, be involved in their communities, find meaning in life, and develop the skills and qualities they need to succeed.</p>
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## JOURNALISM AND MASS COMMUNICATION

### Course Outcome Journalism and Mass Communication (Honours) under CBCS

#### SEMESTER-I

##### **CC-1-1: Introduction to Journalism TH+P**

**100 marks (4+2)=6 Credits**

On completion of the course, the students will be able to:

- Define and describe the role and significance of Journalism as a profession.
- Understand the development of key journalistic concepts, research and practices.
- Demonstrate an elementary knowledge and importance of communication at media platforms analyzing different theories and concepts..
- Understand the basics treatments and sociology as well as politics of news and recognize the theories and principles of media.
- Present different types and categories of news and create a new page with elements.

##### **CC-1-2: History of Journalism TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Provide concept of the emergence and growth of press in the Indian sub-continent.
- Inculcate the challenges faced by early eminent journalists of the country and the values and morals with which they produced their newspapers.
- Explain the role played by Indian Media in the Indian National Movement. Discuss the contribution made by various important Journalists-Thinkers in the pre-independence era.
- Examine the development of Indian Journalism in Post Independence Era.
- Outline brief history of Important Newspapers, Milestones in Indian Journalism post-Independence

#### SEMESTER-II

##### **CC-2-3: Reporting and Editing TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Explain the typical Structure of a Newspaper Organization. Identify the roles and responsibilities played by Editorial and Reporting Departments personnel.
- Describe the significance of News in any Media Organization and recall values and principles of News writing and editing.
- Acquire the skills required in order to work as a reporter and sub editors, new editors as well as different types of news correspondents.
- Handle the important news sources and specific beat reporting and copy testing.
- Execute the process of news creation comprising reporting, Headlining, editing,
- Design news paper and supplementary pages.



- Identify methods of writing different types of News Story, features, articles and column.

**CC-2-4: Media and Communication TH+P**

**100 marks (4+2)=6 Credits**

On completion of the course, the students will be able to:

- Understand the process of communication, including different forms, levels and their functions as well as different types of communication and understand barriers to communication.
- Explain the role of Media in a democratic society.
- Learn basic concepts related to in-depth report and specialized reporting based on local socioeconomic and political situations.
- Apply skills in the process of data collection comparing and assess new ways of reporting – Open Source, Data Based and Citizen Journalism.
- Carry out basic exercises related to page designing using In-Design Software.
- Modify patterns in page designing to suit the content and evaluate importance of tools required for page designing and specify advanced skills necessary for page designing.

**SEMESTER-III**

**CC-3-5: Communication, Media, Society TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Formulate communication models and its application by understanding Media Systems and Communication Theories.
- Recall basic concepts, principles and scope of communication and explain different key factors, key components associated with the communication process and theories of communication.
- Examine the nature and significance of Mass Communication and interpret role played by Mass Communication in bringing Social Change.
- Compare and assess Media-Society relationship, Functionalism and the technological determinants involved in development through Mass Media.
- Develop an understanding regarding the influence of Mass Communication on Globalization and influence of Political-economy.

**CC-3-6 : Media and Cultural Studies TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Appraise culture as a distinguishing factor of any society and assess influence of media in projecting culture and discuss type of culture and cultural industry.

- Develop an understanding about the need of media literacy in society and formulate media texts learning from different Schools of Communication.
- Demonstrate the structure and paradigm of communication and development communication theories and models in different spheres.
- Analyse the effect of Corporatization and Globalization of Mass Media in post colonial and post modern era and related concepts.
- Examine the nation, class, caste and gender issues in media and outline different stereotypes depicted by media.

**CC-3-7 Introduction to Radio TH+P**

**100 marks (4+2)=6 Credits**

On completion of the course, the students will be able to:

- Discuss the concepts of radio as a significant medium of mass communication, radio broadcasting in India and its development, technicalities, AM and FM radio.
- Analyze functioning of Public and private radio broadcaster and the role of the radio broadcasting personnel eg. Radio Jockey.
- Acquire knowledge about different radio programs and understanding the formats and genres of radio programming.
- Work on broadcast language, style of writing, news script writing.
- Design a radio programme as having the training on basic Radio production and sound editing skills.

**SEC-A-3-1 Radio Writing and Presentation TH**

**80 marks (2 Credits)**

On completion of the course, the students will be able to:

- Write original scripts, recording and editing the radio spot having skills for writing for the ear, time management, voice modulation, usage of sound effects and transitions.
- Conduct preproduction background research for producing radio news ,feature, reels and interviews.
- Analyze the importance of key components of audio-production with respect to different genres keeping in mind the ethical issues.
- Acquire the knowledge of working on Radio news room and recording studio.
- Design the overall process of radio production as having skills on basic Radio production and sound editing skills and produce a mini-drama and a straight announcement.

**SEC-A3-2 Photo Journalism TH**

**80 marks (2 Credits)**

On completion of the course, the students will be able to:

- Build an understanding regarding key elements associated with photography. Plan and execute assignments for photography.
- Understand and cite the basic concepts and principles of Photography. Identify the scope and functioning of camera. Articulate the process of photography, effects of aperture & shutter speed, types and elements of Photo (Formal, Informal).
- Analyze Patterns (Natural, Artificial) of photography. Differentiate lighting for Rough & Smooth Texture. Explain importance of Lighting for form & shape.
- Acquire the sense of news photography. Can capture, edit and caption different news and amateur photograph.
- Execute and direct indoor and outdoor Photo shoot of different types of events and assess their significance.

#### **SEMESTER-IV**

##### **CC-4-8 Introduction to Television:TH+P**

**100 marks (4+2)=6 Credits**

On completion of the course, the students will be able to:

- Explain the concept of evolution of television in India and exposure to the development of television as a technology and as a medium
- Analysis of TV program formats, news formats and Concept of television news room structure.
- Produce a professional standard Piece to Camera with real news stories, talk shows other television programmes.
- Understand the audio-visual package of satellite channels, viewership rating: TAM, TRP.
- Create write-ups for the visuals, Voice Over, and conduct shooting, editing, produce news and Tele documentary at per standard.

##### **CC-4-9- Film Theories and Production TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Understand Film as a medium of mass communication its early development and evolution of global cinema .
- Discuss relationship of different movements: impressionism, cubism, surrealism. Explain vocabulary of film, tools of expression and film formats.
- Explore and review the celebrated works of renowned national and international film makers and their contribution to world cinema,

- Classify different film styles and genres like action, adventure, comedy, drama, epic/historical, horror, Sci-fi, war and documentaries.
- Inculcate film making techniques using practical tools and undertaking stages of film making and visual languages.
- Specify importance of Film appreciation, analysis, criticism as well as need and relevance of Censorship and different film bodies of India.

#### **CC-4-10 Media Management and Press Law TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Articulate nature of media management its functions and principles to run media as an industry & profession and classify different ownership and organizational patterns of print media and functional framework of broadcasting organizations.
- Outline functions of different departments of print and audio visual media and analyze various factors associated with revenue of different Media organizations and current financial structure.
- Compare corporatization of mass media after globalization; convergence and conglomerates as a newly emerged media management trend.
- Build understanding regarding the current challenges and opportunities in both public and private sector media management and working of different regulatory bodies.
- Describe fundamental legal regulations with special emphasis on Media. State laws related to media,
- Examine philosophy of journalism and its ethics, evolution of ethics, Press Commission and press council of India and its role in maintaining ethical journalistic standards. Implement Code of Conduct and Ethics for broadcast, radio and advertising.
- Build an understanding about the ethical concerns and media behavior in context of India and analyze Major debates and court cases concerning ethics.

#### **SEC-B-4-1 Documentary Film Production TH**

**80 marks (2 Credits)**

On completion of the course, the students will be able to:

- Understand the importance of documentary- Realism, and its different types.
- Apply the knowledge of research, scripting, budgeting into practically making a documentary.
- Produce Documentary and short film in required format.
- Perform the Pre-Production and postproduction stages of documentary making.

- Acquire the knowledge of location shooting and editing.

**SEC-B-4-2 Feature Film Production TH**

**80 marks (2 Credits)**

On completion of the course, the students will be able to:

- Develop story ideas from contemporary events, personal experiences for film.
- Apply the knowledge of research, scripting, budgeting into practically making films.
- Make an outline of basic plot development (setup, confrontation, payoff); filling it in with descriptions of the action, and finally the dialogue.
- Acquire the knowledge of effective and efficient methods of shooting scenes ,linear and non-linear editing, and working with actors;
- Handle the preproduction, Production and Post production stages producing a film single handedly.

**SEMESTER- V**

**CC-5-11 Introduction to New Media TH+PR**

**100 marks (4+2=6 credits)**

On completion of the course, the students will be able to:

- Understand the notion of online communication and Internet and able to distinguish New Media from print and electronic media.
- Appraise the importance of newly emerged new media, digital communication and Web Journalism, virtual Cultures and digital Journalism as Information society .
- Describe process of digitalization and significance of digital technologies and social networking, Computer Mediated Communication (CMC) in Networked Society.
- Measure Online Communities, User Generated Content and Web 2.0, Networked Journalism, Alternative and Participatory Journalism.
- Develop digital content and websites and evaluate influence of new media on identity projection keeping in minds the challenges and ethical issues.
- Perform visual design, hyperlinks. Audience Analysis, create and promote a Blog.

**CC-5-12- Development Communication TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Measure Social development, Human development and Development versus growth,
- Understand different approaches and models to development, its problems, issues and case studies.

- Analyse Development communication, concept about several paradigms and models of Development support communication-, genesis, and area woods triangle.
- Critically appraise dev comm. programmes and govt. schemes as having knowledge about characteristics of developing societies and finding gaps between developed and developing societies
- Understand role of Mass Media, and rural extension agencies, development agencies and NGOs in development communication.
- Examine importance of five-year planning in the initial development of India. Explain role of contemporary policies in national development.
- Examine importance of five-year planning in the initial development of India and explain role of contemporary policies in national development.

**DSE A -5-1 Global Media Politics TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Demonstrate the imbalances in Global Information Flow Exposure to concepts of international communication dynamics to democratize of international communication.
- Explain Cross Culture Communication and the problems among nations and rise of global media.
- Describe the concept of Media Imperialism, Information War and Fake Information;
- Understand the role of Global Satellite system and international bodies to securing access to communication.
- Illustrate contemporary scenario related to international communication and news flow in the era of globalization and conglomeration.

**DSE A-5-2 Media, Human Rights, Gender, Environment Studies. TH+TU 100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Understand the Conceptual Frameworks in Human Rights ,Gender Studies and Environmental Studies Theory and application.
- Strategize Media for Human Rights and environment campaigns and do the advocacy.
- Adapt with local, national and international environmental and gender issues
- Acquire skills of writing in depth and interpretative Human rights, gender and environmental reports
- Know the role and working of different Human Rights Institutions and follow the case studies.

**DSE- B-5-1-Multimedia Journalism TH+TU****100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Explain Multimedia as emerging tool and its interactivity, reporting ,editing, and multicultural sensitivity.
- Produce audio, photo and video production in the newsroom in contemporary times.
- Tell story with video, broadcasting/ webcasting; collecting content, Structuring story and writing.
- Understand Mobile journalism, responsive web, Information multimedia and web architecture, corporate websites, web feature stories,
- Perform web interactive, narrative, linear narratives, Interactive writer using various 2D, 3D programmes and software.

**DSE- B-5-2-Communication Research TH+TU****100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Describe basic concepts related to communication and social research and tell scope and nature of research and state components related to scientific enquiry.
- Understand theoretical, conceptual and operational framework of qualitative and quantitative approach research.
- Examine case studies which followed different research approaches. Employ literature review and data collection while pursuing research.
- Formulate a research question. Write a research report. Specify methodology and approach which has been followed.
- Analyze key elements associated with a research proposal and identify care needs to be taken while drafting a research proposal.
- Formulate tools of data collection and data interpretation using both statistical and non statistical methods.
- Appraise importance and utility of different approaches to data analysis in media and prepare a research project..

**SEMESTER - VI****CC-6-13- Advertising TH+PR****100 marks (4+2)=6 Credits**

On completion of the course, the students will be able to:

- Describe Origin and History of Advertising. State types of advertising. Understand creative process involved in advertising.

- Understand the fundamentals of advertising, knowledge about Advertising and Marketing campaigns.
- Classify different types of media for advertising and elements of ad copy and copy writing for advertisements.
- Examine Creative Ads, Structure, Emerging Areas of Growth, Shifting Patterns of Consumption.
- Classify specialized department in an Ad. Agency: (Account. Planning, Account Servicing, Creative, Media Planning HRD)
- Detect client related issues. Explain key factors associated with business and brand development and understand the Legal and Ethical aspects of Advertising.
- Appraise relationship between brand management and audience psychology. Assess the general process branding product.
- Specify importance of brand personalities, marketing in brand development. Write a copy for an advertisement with specific target audience.
- Design creative advertising for different media using software.

**CC-6-14 Public Relations TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Describe fundamental concepts, history, evolution and models of public relations and Public relation practices in India.
- Build an understanding about the significance of PR, corporate communication and crisis communication in today's world. Specify role of technology in maintaining communication.
- Understand the relationship between journalism, Corporate Communication and Public Relations and importance of Media Relations.
- Appraise the importance of PRO in any organization and his role and responsibilities and as well as Identify stakeholders of Corporate Communications and infer types of corporate publics (Internal and External).
- Learn to manage Crisis Communication, Corporate Branding, corporate image management, Investor relations, Community Relation & CSR.
- Handle different aspects of PR agency and client-agency relations

**DSE-A-6-3 Dissertation with Presentation TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Plan and conduct communication research and make presentation.
- Design and evaluate the plan in order to complete qualitative and quantitative research by synchronizing all the skills starting from research proposal to referencing.
- Find research problems and develop research methodology on any social issues.



- Formulate questionnaire and collect data using different data collection tools.
- Interpret data using both statistical and non statistical methods.
- Write and publish well contented research papers in reputed journals

**DSE-A-6-4 Political Communication TH+TU                      100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Develop a political communication plan that incorporates core communication and information-processing principles as well as techniques such as targeting and audience segmentation for democratic participation.
- Produce a clear and concise assessment of a political communication theories and models including both situational analysis and strategic recommendations.
- Demonstrate the ability to identify appropriate creative solutions to strategic political communication challenges in social advocacy.
- Identify politics in India and its role with mass media in local assertions and its links to global assertions.
- Analyse the symbolic and cultural forms of communication between politicians and their publics

**DSE- B-6-3-Folk and Community Media TH+TU                      100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Understand culture as a social institution, value systems and differentiating eastern and western perspectives.
- Explain the difference between Culture and Tradition, and their types.
- Acquire the knowledge about Community and Folk Media of Bengal and India and its classification.
- Use of Traditional folk media in disseminating developmental message.
- Understand the notion of popular Mass Media and Folk media .
- Understanding the concept of not-for-profit participatory media, the scenario, policies in India.

**DSE- B-6-4-Health & Science Communication TH+TU                      100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Understand the concept of health & science communication with contemporary media dynamics.
- Formulate Health literacy and communication theories related to health communication for engaging patients in healthcare.
- Analyse the role mass media play in securing access for masses of health infrastructure and science communication.

- Formulate Social Media Strategies and tactics for Health Communicators by writing about medicine; mobile health design.
- Produce science based serials on radio and television; science journalism for the print and digital media.

### **Course Outcome Journalism and Mass Communication (General) under CBCS**

#### **SEMESTER – I**

##### **CC/GE 1: TH+TU: Basics of Journalism**

**100 marks( 6 Credits)**

On completion of the course, the students will be able to:

- Explain the typical Structure of a Newspaper Organization. Identify the roles and responsibilities played by Editorial and Reporting Departments personnel.
- Describe the significance of News in any Media Organization and recall values and principles of News writing and editing.
- Acquire the skills required in order to work as a reporter and sub editors, new editors as well as different types of news correspondents.
- Handle the important news sources and specific beat reporting and copy testing.
- Execute the process of news creation comprising reporting, Headlining, editing,
- Design news paper and supplementary pages and identify methods of writing different types of News Story, features, articles and column.

#### **SEMESTER – II**

##### **CC/GE 2 TH+TU: Media Management.**

**100 marks ( 6 Credits)**

On completion of the course, the students will be able to:

- Identify the Ownership of the media, how they are run, what are their sources of revenue and also the printing of the papers in both private and public sector in India.
- Assess the contribution of Advertising, Circulation Departments in the Newspaper Business and revenue generation.
- Build inclusive opinion based on the importance other departments in a newspaper organization.
- Construct an insight regarding the overall coordination required to publish a newspaper on a daily basis.
- Handle the apex bodies related to running a media business.
- Demonstrate the role and responsibilities of Managers of Newspaper organization.

### SEMESTER – III

#### **CC/GE 3: TH+PR Advertising and Public Relations**

**100 marks( 4+2=6 Credits)**

On completion of the course, the students will be able to:

- Define Advertising and its different types. Different advertisement mediums, their selection criterion and relative advantages, ethics of advertising, market research, brand positioning, creative strategy, market and its segmentation and sales promotion
- Understand the structure and functioning of an advertising agency and also client agency relationship
- Discuss copy writing with its main features, types and principles of writing. The qualities, duties and responsibilities of a copy writer, copy for electronic media and print media, ad-administration and video production
- Define public relations with its various aspects, role of the PRO with the qualities and duties, PR in Public and Private Sector, various PR tools, Corporate PR, planning, data collection and editing principles for house journal, PR as a management function, PR institutions, PR and new technology

#### **Skill Enhancement Course A 3/5:**

There are 4 options in this paper out of which the students have to choose one either in semester 3 or semester 5.

#### **JORG-SEC-A-3/5-1: Journalistic Writing**

**2 Credits**

On completion of the course, the students will be able to:

- Recall and cite the specific facts, basic concepts and principles of writing skills.
- Differentiate and compare between diverse types of writing.
- Discuss advantages and limitations of news writing, feature writing, article writing, and captions writing. movie review, book review and summary.
- Evaluate skills and style of the content of any type. Determine reasoning for a particular write-up.
- Build an insight about the necessity and utility of writing skills. Assemble the content in the required writing type to suit the need of communication.

#### **JORG-SEC-A-3/5-2: Newspaper Designing**

**2 Credits**

On completion of the course, the students will be able to:

- Describe basic concepts related to page design.
- Understand and discuss importance of page design.
- Carry out basic exercises related to page designing .

- Analyze types of page design. Modify patterns in page designing to suit the content. Evaluate importance of tools required for page designing.
- Specify advanced skills necessary for page designing.
- Design and perform specific tasks related to page designing. Design content of various types.

### **JORG-SEC-A-3/5-3: Film Appreciation**

**2 Credits**

On completion of the course, the students will be able to:

- Classify different film styles and genres and analyze recurrent themes, images, and narrative structures.
- Appraise development of film in Europe, US and India. Important directors and their contribution to world cinema, film companies and film.
- Review Development and contribution of important Film Makers (Global/Indian).
- Specify importance of Film appreciation, analysis, criticism as well as need and relevance of Censorship. Write about key components related to Film as an industry.

### **JORG-SEC-A-3/5-4:Print Advertising**

**2 Credits**

On completion of the course, the students will be able to:

- Classify different types of print advertising and elements of ad copy and writing for ad copy for specific target audience.
- Understand the fundamentals of advertising, knowledge about Advertising and Marketing campaigns.
- Perform the role of copywriter in ad agencies.
- Appraise relationship between brand management and audience psychology. Assess the general process branding product.
- Design creative advertising for print media using software.

## **SEMESTER – IV**

### **CC/GE 4: The Press Laws and Indian Constitution. TH+TU**

**100 marks( 6 Credits)**

On completion of the course, the students will be able to:

- Comprehend the main features of the Indian constitution and the powers and position of the president, Prime minister, chief minister, governor, parliament, supreme court, high court, local governance.
- Understand the foreign policy, national economic policy, role of the finance commission, five year plans, NitiAyog.
- Describe fundamental legal regulations with special emphasis on Media. State laws related to media,

- Analyze the efficacy of Press laws and freedom of Press.
- Understand journalistic ethics, objectives and guidelines of Media Council and the responsibilities of Press Council of India.

**Skill Enhancement Course B 4/6** – The students have to opt any one out of the four subjects either in semester 4 or semester 6.

**JORG-SEC-B-4/6-1: Documentary Script Writing**

**2 Credits**

On completion of the course, the students will be able to:

- Understand the general introduction of writing scripts, such as the main elements of the script, the methods to promote the plot, and learn the different writing methods through case analysis.
- Appreciate and analyze the script, and learn from it how to set up themes, how to establish the relationship between the characters and the plot, etc.
- Write a Documentary script and experimental writing, from ideation to breakout to material preparation.

**JORG-SEC-B-4/6-2: Radio – Television Script Writing**

**2 Credits**

On completion of the course, the students will be able to:

- Describe norms and practices of Script Writing and storytelling..
- Classify elements of a script and generalize importance of theme, plot, character profiles, scene design and dialogue in a script.
- Build an understanding about different styles and formats of script writing of different genre.
- Pursue career in electronic media as script writers both news and entertainment programme.

**JORG-SEC-B-4/6-3: Anchoring**

**2 Credits**

On completion of the course, the students will be able to:

- Shine in challenging careers like Anchoring, Show Hosting, Radio Jockeying, Public Speaking, News Reporting, podcasting and vlogging. , etc.
- Learn soft skills, professionalism, self confidence, and networking
- Host for award functions, reality shows, comedy, music and dance shows, or even live events.
- Organise live shows, group discussion and exclusive interviews with experts of any field.

**JORG-SEC-B-4/6-4: Media Presentation**

**2 Credits**

On completion of the course, the students will be able to:

- Contribute the corporate sectors in many areas like Corporate Communication, Corporate Marketing etc.
- Develop their skill in making presentation, planning, creating strategies etc. in different sectors.
- Make power point presentation on different topics related to socio-political and economical development.

### **SEMESTER – V**

There are two options out of which the students have to choose one Discipline Specific Elective.

#### **DSE A-5-1 Film Studies TH+TU**

**100 marks( 6 Credits)**

On completion of the course, the students will be able to:

- Appraise development of film in Europe, US and India. Important directors and their contribution to world cinema, film companies and film.
- Classify different film styles and genres like action, adventure, comedy, drama, epic/historical, horror, Sci-fi, war.
- Review Development and contribution of important Film Makers (Global/Indian). Specify importance of Film appreciation, analysis, criticism as well as need and relevance of Censorship.
- Produce Fiction or non-fiction films and write review about key components related to released Film.

#### **DSE A-5-2 Specialized Writing TH+TU**

**100 marks( 6 Credits)**

On completion of the course, the students will be able to:

- Write on various social issues: fashion, music and art, education, employment opportunities; health, environment, crime, legal in print media.
- Cover Press Conference and Interview and write Press Release.
- Write article and feature on magazines especially on women.
- Design Ad-Copy for electronic media and print media and write Storyboard

### **SEMESTER – VI**

There are two options out of which the students have to choose one Discipline Specific Elective.

#### **DSE 6 B-1 Broadcasting Media TH+TU**

**100 marks( 6 Credits)**

On completion of the course, the students will be able to:

- Describe Brief history of Radio and state qualities required for R. J and identify production process of radio programmes.
- Discuss different writing styles for radio, writing for a specific programme.
- Examine way of new writing for radio. Classify different radio programming styles.
- Explain the concept of evolution of television in India and exposure to the development of television as a technology and as a medium
- Analysis of TV program formats, news formats and Concept of television news room structure.
- Create write-ups for the visuals, Voice Over, and conduct shooting, editing, produce news and Tele documentary at per standard.

**DSE 6 B-2 International Relations TH+TU**

**100 marks (6 Credits)**

On completion of the course, the students will be able to:

- Explain the concepts of international relations between countries and communication dynamics.
- Understand the role of international bodies to securing access to communication and development of global relation.
- Appraise the democratization and Indian foreign policy and its relation with other countries.
- Interpret Contemporary scenario related to international communication and news flow and global media economy.

## HUMAN RIGHTS

### Course outcome of Human Rights under CBCS

Human rights subject is the study of the basic rights and freedoms to which every individual is entitled, simply because they are human beings. These rights are inherent, inalienable, and universal, meaning they apply to every person on the planet, regardless of their nationality, ethnicity, gender, religion, or any other characteristic. It is a multidisciplinary field that explores the principles, laws, and practices surrounding the protection and promotion of these fundamental rights. It encompasses various subjects and approaches, making it an exciting and vital area of study for students interested in justice, ethics, social change, and international relations.

Studying human rights equips students with the knowledge and skills to become advocates for positive change in the world. It empowers them to address global challenges, such as poverty, inequality, discrimination, and conflict, through a rights-based approach. It also fosters a deep sense of empathy and a commitment to making the world a more just and humane place.

In essence, the discipline of human rights is about understanding, defending, and advancing the rights of every individual, contributing to a more inclusive and equitable society and a better world for all.

### Course Specific Outcomes

#### Semester 1

#### **HR-G-CC/GE -1-1 -TH Introduction to Human Rights: Jurisprudence, Norms, Standards and Mechanisms**

##### *A Human Rights and Duties: Jurisprudence*

- This will help them understand the human rights discourse from the ancient, medieval times to the contemporary times. With giving importance in conceptualising the values of varied cultures and fundamental principles. Understanding the theories that seek to explain the nature and origin of human rights.
- Ability to define and categorise human rights while exploring the inherent relationship between human rights and duties.
- Understanding to balance the conflicts arising due to political tension in internalising human rights and duties.
- Recognising the duty to respect the rights of others, is central to fostering a just and inclusive society.

##### *B International Human Rights: Norms, Standards and Mechanisms*

- Understanding the historical evolution of human rights and duties at the international level,
- The foundational role of the United Nations Charter,



- Understand the significance of key international documents such as the Universal Declaration of Human Rights (UDHR) and the Covenants.
- Recognizing the importance of various UN conventions in addressing specific human rights challenges around the world.

## **Semester 2**

### **HR-G-CC/GE -2-2 -TH Promotion of Human Rights and Humanitarian Law**

#### *A. United Nations for Promotion of Human Rights and Regional Human Rights Standards and Mechanisms*

- Equip with the knowledge of the existence and functions of United Nations (UN) bodies, conventions, and mechanisms but also an understanding of their roles in safeguarding and promoting human rights at the international and regional levels.
- Awareness of the specific mandates and mechanisms for addressing human rights violations and monitoring compliance with human rights obligations.

#### *B. International Humanitarian Law*

- Tracing the historical development of International Humanitarian Law (IHL) since the mid-nineteenth century.
- Understanding the milestones include the Geneva Conventions of 1864, the Hague Conventions of 1899 and 1907, the Geneva Convention of 1929, and the significant Geneva Conventions of 1949. The 1977 Geneva Protocols, specifically Protocols I and II, are also crucial components of modern IHL.
- Equipped with the fundamental principles that underpin IHL
- Learning of India's adoption of the Geneva Conventions and its enactment of the Indian Geneva Conventions Act in 1949.
- The vital role of The Indian Red Cross Society (IRCS) in promoting humanitarian principles and providing assistance during emergencies.

## **Semester 3**

### **HR-G-CC/GE -3- 3- TH Refugee Law and Specially Disadvantaged Sections of Society in**

#### **India**

#### *A International Refugee Law*

- Analyse the historical context of refugee and displaced person situations, understanding the root causes and patterns of displacement throughout history.

- Insight into the evolution of responses to displacement with legal and humanitarian frameworks to address the needs of refugees and displaced populations.
- They will also be equipped to critically analyse and assess contemporary challenges and developments in the field of refugee law and humanitarian assistance.

*B Human Rights of Specially Disadvantaged Sections of Society in India Scheduled Castes/Scheduled Tribes and Other Backward Classes*

- Students will be able to comprehend the historical and social context of Scheduled Castes, Scheduled Tribes, and Other Backward Classes in India, understanding the challenges they face in accessing their human rights.
- Critically analyse the concept of minorities in India, examining the challenges related to cultural, religious, and linguistic rights of minority communities.
- Students will be proficient in evaluating the legal and policy frameworks in place to protect minority rights and promote cultural diversity in India.
- They will also be equipped to assess the legal and policy measures in place to protect and promote the rights of these vulnerable groups and contribute to efforts aimed at enhancing social justice and human rights in India.

**HR-G-SEC-A-3-1 Development, International Trade and Human Rights**

- Students will develop a well-rounded understanding of the complexities surrounding the right to development.
- Learn the issues of international equity, justice, access to resources, trade, and technology.
- They will also be equipped to critically evaluate policies, practices, and international frameworks aimed at ensuring equitable and sustainable development for all.

**Semester 4**

**HR-G-CC/GE -4-4- TH Emerging Dimensions of Human Rights and Evolution of the Concept of Human Rights and Duties in India**

*A Emerging Dimensions of Human Rights*

- The topics will help the students to address complex and dynamic aspects of human rights, including the balance between national sovereignty and international enforcement, the political dimensions of human rights, the impact of technology, and the recognition of new rights to address contemporary global challenges. Each area involves critical analysis of how human rights are understood, applied, and adapted in a changing world.

*B Evolution of the Concept of Human Rights and Duties in India*

- By achieving these course outcomes, students will gain a holistic understanding of India's rich cultural and historical tapestry, the philosophical foundations of human welfare and rights, the current state of human rights and duties in India, the significance of social movements and leaders

in shaping the nation, and the importance of the Indian Constitution in upholding these values in modern Indian society.

#### **HR-G-SEC-B-4 -1 Societal Problems of Human Rights in India**

- By achieving this course, students will be well-equipped to analyse and address contemporary human rights challenges and social issues in India.
- They will have a nuanced understanding of the complex interplay between socio-economic factors, cultural practices, legal frameworks, and human rights, enabling them to contribute to efforts aimed at promoting justice and equality.

### **Semester 5**

#### **HR-G-DSE-A-5-1-TH Human Rights and Duties in India: Normative Framework,**

##### **Constitution and Statutory Mechanisms**

###### *A. Normative Framework*

- In this topic, students will explore the constitutional framework of India and its significance for human rights.
- Students will explore the interrelationships between Fundamental Rights, Directive Principles, and Fundamental Duties. They will grasp how these constitutional provisions work together to create a framework for balancing individual rights with the collective welfare of society.

###### *B. Enforcement Of Human Rights: Constitution And Statutory Mechanisms In India*

- Students will learn how the three branches of government; legislature, executive, and judiciary in playing crucial roles in upholding human rights. They will understand how laws are enacted, implemented, and interpreted to protect and promote human rights.
- Students will gain knowledge about the NHRC and other statutory commissions tasked with safeguarding human rights in specific areas, such as women's rights or rights of minorities. They will understand the functions, powers, and limitations of these bodies.
- Students will explore the challenges and complexities involved in enforcing human rights in India. They will critically analyse the obstacles posed by social inequalities, economic disparities, political factors, and administrative shortcomings that hinder the effective protection of human rights.

#### **HR-G-DSE-A-5-2-TH Children and Human Rights**

- Students will gain the impact of poverty and illiteracy to understand the prevalent social and cultural practices regarding girl child.
- Understand the issues of child labour and international norms for protection of the child. Special national protection system, laws and government policies for the child.

## **HR-G-5-SEC-A-(2)-TH Human Rights Education, Teaching and Training**

- Students will learn about Conferences and its impact on Human Rights Education.
- Understand the role of the Central and State Government, Government and Non-Governmental Organisations in promoting Human Rights Education.
- Students will develop a comprehensive understanding of the concept of human rights education, its significance, and its role in promoting a culture of human rights. Analyse the various approaches and methods used in human rights education, including formal and informal education, to effectively communicate human rights principles.
- Students will gain a comprehensive and multidimensional understanding of human rights education, its historical context, legal frameworks, implementation at different levels of education, and its role in advancing human rights, social change, and peace. They will also develop critical thinking and research skills to engage with human rights issues effectively.

### **Semester 6**

## **HR-G-DSE-B-6-1-TH Human Rights Movements and Criminal Justice System in India**

### *1 Human Rights Movements in India*

- students will develop a deep understanding of the history, dynamics, and significance of Dalit movements, Women's movements and Environmental movements.
- They will also gain critical thinking skills to analyse the complexities and impacts of these social and political movements on society, policy, and human rights.

### *2 Human Rights and Criminal Justice System in India*

- Students will acquire a comprehensive understanding of the criminal justice system's dynamics and its interface with human rights protection.
- They will also develop critical thinking skills to analyse the challenges and opportunities in upholding human rights in various stages of the criminal justice process and within correctional facilities.

## **HR-G-DSE-B-6-2-TH Protection of Scheduled Castes, Scheduled Tribes and Other**

### **Backward Classes**

- Students will gain a holistic understanding of the historical, legal, and institutional aspects of the status and protection of Scheduled Castes, Scheduled Tribes, and Other Backward Classes in Indian society.
- They will also be equipped to critically analyse the challenges and opportunities in promoting social and economic justice for these communities.

## **HR-G-6-SEC-B-(2) Environment and Human Rights**

### *1. Environment, Resources and Human Rights*

- Understanding of environmental rights and the role of social movements in environmental protection.
- The legal and institutional framework for environmental governance in India.
- The complexities surrounding the right to development and inclusive growth.
- Developing thinking skills to assess the impact of development projects on the environment and society

PHYSICS

**1.B. Course outcome: (Honours Syllabus)**

<b>Course code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHS-A-CC-1-1	Mathematical Physics I	Provide students a strong mathematical foundation that can be applied to solve physical problems. In practical classes they are Introduced to plotting graphs with Gnuplot and also introduced to programming in python.
PHS-A-CC-1-2	Mechanics	Creates understanding of classical mechanics, which deals the motion of objects under the influence of forces. Apply the principles of mechanics to solve real-world problems like the motion of projectiles, motion in a central potential, and mechanical systems like pulleys and levers. In practical classes they perform some practical related to Mechanics.
PHS-A-CC-2-3	Electricity and Magnetism	This course provides students the fundamental principles and concepts related to electric and magnetic fields, electromagnetism, and the behavior of electric charges and currents. They perform some practical related to Electricity and Magnetism.
PHS-A-CC-2-4	Waves and Optics	Provide students a comprehensive understanding of wave phenomena and their applications. They perform some practical related to Waves and Optics.
PHS-A-CC-3-5	Mathematical Physics II	Provide students with advanced mathematical tools and concepts relevant to physics. In practical classes they introduced to numpy and scipy.
PHS-A-CC-3-6	Thermal Physics	Provide students with a fundamental understanding of the principles governing the behavior of heat and the laws of thermodynamics. They perform some practical related to Thermal Physics.
<b>Course code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHS-A-CC-3-7	Modern Physics	It provides students the idea about elements of Modern Physics, Basics of Quantum Mechanics, Nuclear Structure, Interaction with and within

		<p>Nucleus, and Lasers.</p> <p>They perform some practical related to Modern Physics.</p>
PHS-A SEC-B	Scientific Writing	<p>Scientific Writing is a course with a focus on LaTeX in Linux and MiKTeX in Windows typically aims to equip students with the skills and knowledge needed to effectively communicate scientific research and findings through written documents.</p>
PHS-A-CC-4-8	Mathematical Physics III	<p>Provide students with advanced mathematical and analytical skills that are essential for pursuing further studies in theoretical physics or for applying mathematical methods to solve complex problems in various scientific and engineering disciplines.</p> <p>They learn some advance programming in python.</p>
PHS-A-CC-4-9	Analog Electronics	<p>Provide students with a strong foundation in analog electronics.</p> <p>Preparing them for careers in electronics design, telecommunications, instrumentation, and other fields where analog circuitry is fundamental.</p> <p>Students are able to analyze, design, and troubleshoot a wide range of analog electronic circuits upon completion of the course.</p>
PHS-A-CC-4-10	Quantum Mechanics	<p>Provide students a strong foundation in the theory and applications of quantum mechanics, preparing them for further studies in physics and related fields.</p> <p>It helps students to understand the behavior of matter and energy at the quantum level, which underpins modern physics and technology.</p> <p>They learn some advance programming in python associate to the course.</p>
<b>Course code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHS-A-SEC-B	Arduino	<p>Provide students skills and knowledge to independently design, program, and implement microcontroller-based projects using Arduino boards. Students can create innovative solutions to various problems with the Arduino platform for their own creative endeavors.</p>
PHS-A-CC-5-11	Electromagnetic Theory	<p>Provide students a thorough understanding of the fundamental principles of electromagnetism, the behavior of electromagnetic waves, and their interactions with different media.</p>

		They perform some practical related to Electromagnetic Theory.
PHS-A-CC-5-12	Statistical Physics	Provide students an understanding of the statistical foundations of thermodynamics, the behavior of particles in various ensembles, and the practical applications of statistical physics in understanding complex physical systems. They learn some advance programming in python associate to the course.
PHS-A-DSE-A2	Laser and Fiber Optics	Provide students a clear idea about lasers and optical fiber systems, its underlying principles, design optical systems, and appreciate the wide-ranging applications of these technologies in modern science and industry.
PHS-A-DSE-A2	Nuclear and Particle Physics	Provide students an understanding the behavior of atomic nuclei and subatomic particles, describe their interactions, and appreciate the significance of this knowledge in advancing our understanding of the fundamental forces and particles that make up the universe. This knowledge is essential for careers in nuclear and particle physics research, as well as related fields in science.
PHS-A-CC-6-14	Digital Systems and Applications	Students are well-prepared to design, implement, and analyze digital systems for a wide range of applications. At the end of the course, they gathered practical skills and knowledge needed to work with digital electronics in engineering, computer science, and related fields. In practical classes they learn to design some digital circuits.
PHS-A-CC-6-14	Solid State Physics	Provide students a thorough understanding of the properties and behaviors of materials in the solid state. The students can contribute to materials research, technology development, and scientific exploration in a variety of fields. They perform some practical related to Electromagnetic Theory.
<b>Course code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHS-A-DSE-A2	Nano Materials and Applications	Provide students the necessary knowledge to work with nanomaterials, understand their unique properties, and how to apply them in various fields, from electronics and healthcare to energy and environmental science. They also be aware of the ethical and safety considerations associated with nanomaterial research and applications.
PHS-A-DSE-A2	Communication Electronics	Provide student a comprehensive knowledge of communication systems, modulation techniques, and related topics.

## 2.B. Course outcome of physics Post-Graduate (M.Sc)

Course code	Course Name	Course Outcome
PHY 411	Mathematical Methods	Provide students a solid mathematical foundation and problem-solving skills. Students are able to analyze and



		solve complex mathematical problems, can apply these methods in practical situations.
PHY 412	Classical and Relativistic Mechanics	This advanced course Classical and Relativistic Mechanics. Provide students the knowledge and skills necessary to tackle complex problems in classical and relativistic mechanics. Students learn how to apply advanced mathematical and analytical techniques to solve challenging problems and understand how these principles underpin various physical phenomena in the universe.
PHY 413	Quantum Mechanics I	Provide students a deep understanding of the core principles of quantum mechanics and the mathematical tools necessary to analyze quantum systems. Students can apply quantum mechanics to solve complex physical problems, understand the limitations and subtleties of the theory, and appreciate the experimental tests and consequences that probe the foundations of quantum mechanics.
PHY 414	Electronics and Instrumentation	Provide students with a solid understanding of electronic circuits, and semiconductor devices. Students are able to design, analyze, and construct electronic circuits, use instrumentation for measurements and experiments, and apply their knowledge to solve real-world problems in fields such as electronics, telecommunications, and instrumentation.
PHY 415	General Practical - 1	Students gain hands-on experience in conducting experiments and using laboratory equipment relevant to their field.
PHY 421	Classical Electrodynamics	Provide students a deep understanding of the behavior of electromagnetic fields and their interactions with charges and currents, both in static and time-dependent scenarios. Students can apply advanced mathematical and analytical techniques to solve complex electrodynamics problems and understand the physical principles that govern electromagnetic radiation and its effects on charged particles.
<b>Course code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHY 422	Quantum Mechanics II	It is an advanced course that deepens students' understanding of quantum mechanics and introduces them to more specialized topics. Students are capable of solving complex quantum mechanical problems in various areas of physics, including atomic and molecular physics, nuclear physics, and particle physics.
PHY 423	Statistical Mechanics	Provide students a deep understanding of statistical mechanics and its applications to a wide range of physical systems, including gases, liquids, and phase transitions.
PHY 424	General Practical - II	Students learn how to design experiments, formulate hypotheses, and plan data collection strategies.

PHY 425	Computer Practical	Students learn programming in python in advance level.
PHY 511	Atomic, Molecular, and Laser Physics	Provide students a understanding of the behavior of atoms and molecules, as well as the principles underlying laser technology. They are able to apply their knowledge to analyze and interpret experimental data, make predictions about atomic and molecular behavior, and appreciate the wide-ranging applications of these concepts in fields such as spectroscopy, quantum optics, and materials science.
PHY 512	Solid State Physics	Provide students a solid foundation in the principles of solid-state physics and a comprehensive understanding of the structural, electronic, thermal, and magnetic properties of materials. Students also be aware of the technological applications of these concepts, ranging from semiconductors and superconductors to advanced materials and electronic devices.
PHY 513	Nuclear and Particle Physics	Students have a comprehensive understanding of nuclear and particle physics, including the structure of atomic nuclei, the behavior of subatomic particles, and the fundamental forces that govern their interactions. They are able to analyze and interpret experimental data in these fields and appreciate the significance of nuclear and particle physics in understanding the fundamental nature of matter and the universe.
PHY 524	Advanced Experiments I	Students learn a deep understanding of the fundamental principles and theories that govern condensed matter physics, including quantum mechanics, statistical mechanics, and solid-state physics.
PHY 525	Advanced Experiments II	Students develop a deep and comprehensive understanding of electronic principles, including circuit theory, semiconductor physics, and electronic component behavior.

Course code	Course Name	Course Outcome
Advanced I PHY 521	Condensed Matter Physics I	Provide students a comprehensive understanding of the behavior of matter in condensed phases, including the electronic, magnetic, and structural properties of materials. They are able to analyze and interpret complex phenomena in condensed matter physics and appreciate the significance of condensed matter physics in various technological applications and scientific advancements.
Advanced II PHY 522	Solid State Electronics	Provide students a strong foundation in solid-state electronics, semiconductor device operation, and electronic circuit design. They are able to analyze, design, and implement electronic circuits and devices, as well as understand the physics and

		technology behind modern semiconductor devices, including those used in nanoscale applications.
Advanced III PHY 523	Physics of Microwaves	Provide students a strong foundation in the physics and engineering of microwave systems. They are able to design, analyze, and troubleshoot microwave circuits, components, and systems. Additionally, they are able to understand the practical applications of microwaves in various fields, including telecommunications, aerospace, and scientific research.

### 3.B. Course outcome of Bachelor of Science (B.Sc.):

Course code	Course Name	Course Outcome
PHS-G-CC-1-1	Mechanics	Provide students basic understanding of Newtonian Mechanics Students learn the basic mathematical tools required. Develop practical skills in setting up and conducting experiments related to Mechanics
PHS-G-CC-2-2	Electricity and Magnetism	Provide students an understanding of basic laws that govern electricity and magnetism. They also learn how they couple to each other to create electromagnetic waves. Develop practical skills in setting up and conducting experiments related to Electricity and Magnetism.
PHS-G-CC-3-3	Thermal Physics and Statistical Mechanics	Provide basic understanding of heat as a form of energy flow and different thermal properties of matter. They also learn different classical and quantum statistics of macroscopically large number of particles. Develop practical skills in setting up and conducting experiments related to Heat.
PHS-G-CC-4-4	Waves and Optics	Provide students understanding of general properties of waves and different phenomena associated with wave nature of light. Develop practical skills in setting up and conducting experiments related to Waves and Optics.
PHS-G-DSE-A	Analog Electronics	Provide students understanding of the motion of electrons in different devices like diodes and transistor. They also learn the design principles behind these devices.

		Develop practical skills in setting up and conducting experiments related to Analog Electronics.
<b>Course Code</b>	<b>Course Name</b>	<b>Course Outcome</b>
PHS-G SEC-B	Scientific Writing	Provide students with the skills and tools needed to write and format scientific documents using LaTeX, a popular typesetting system in academia and scientific publishing.
PHS-G-DSE-B	Digital Electronics	Provide students an understanding of binary number system, binary logic and logic gates. They learn how to implement them to make counters and memory devices etc. They also learn about conversion techniques between binary and analog technologies. Develop practical skills in setting up and conducting experiments related to Digital Electronics.
PHS-G-SEC-B	Arduino	Provide students skills and knowledge to independently design, program, and implement microcontroller-based projects using Arduino boards.

## FILM STUDIES

### **The Course outcomes of a Film Studies course typically include:**

- **Understanding Film History:** Students gain knowledge about the history of cinema, from its origins to contemporary developments.
- **Analytical Skills:** They develop the ability to critically analyze and interpret films, including their themes, cinematography, editing, and sound.
- **Film Theory:** Students learn about various film theories and approaches to understanding cinema, such as auteur theory, genre theory, and semiotics.
- **Cultural Context:** They explore the cultural, social, and historical context of films, including how films reflect and influence society.
- **Production Knowledge:** Some courses may include hands-on experience or knowledge of film production techniques and processes.
- **Writing Skills:** Students often improve their writing skills, as film studies often involve writing essays and critiques.
- **Research Skills:** They learn how to conduct research in the field of film studies, which may include exploring film archives, analyzing primary sources, and conducting interviews.
- **Film Appreciation:** Ultimately, the goal is to develop a deep appreciation for the art of filmmaking and its impact on culture and society.

### **Film Studies B.A/B.SC (Honours/General) under CBCS.**

#### **Semester -I**

The course outcome for a topic like “Film Language and Cinema’s Journey from Primitive to Narrative” could include:

1. Understanding the evolution of film as an art form, from its early primitive forms to the development of narrative storytelling.
2. Analyzing the key milestones and movements in cinema history, such as silent films, the transition to sound, and the emergence of genres.
3. Gaining knowledge of film language, including cinematography, editing, sound design, and visual storytelling techniques

## Semester II

World cinema underwent significant changes and developments in the periods following World War I and World War II. Here's an overview of World Cinema during these two post-war eras:

### World Cinema Post World War-I (1920s – 1930s):

1. Expressionism in Germany: German cinema during the Weimar Republic era produced iconic expressionist films like "The Cabinet of Dr. Caligari" and "Nosferatu." These films are known for their innovative visual styles and themes of psychological horror.
2. Soviet Montage and Silent Era: In the Soviet Union, filmmakers like Sergei Eisenstein and Dziga Vertov pioneered the concept of montage, using film editing to create intellectual and emotional impact. Films like "Battleship Potemkin" exemplify this style.
3. Hollywood's Silent and Early Sound Era: Hollywood was a dominant force in world cinema during this time, with stars like Charlie Chaplin and Buster Keaton achieving international fame. The transition to sound in the late 1920s with movies like "The Jazz Singer" marked a major shift.

### World Cinema Post World War -II (1940s – 1950s):

- Italian Neorealism: After World War II, Italy gave birth to the Neorealism movement, which emphasized realistic, often impoverished settings and non-professional actors. Films like "Bicycle Thieves" and "Rome, Open City" are quintessential examples.

- French Nouvelle Vague (New Wave): French filmmakers of the Nouvelle Vague, including Jean-Luc Godard and François Truffaut, rejected traditional filmmaking conventions. Their work often explored youth culture and existential themes.
- Japanese Cinema and Akira Kurosawa: Japanese cinema saw the emergence of iconic director Akira Kurosawa, known for films like “Rashomon” and “Seven Samurai.” His works blended Eastern and Western storytelling techniques.
- Post-War Hollywood: In the United States, Hollywood continued to thrive with the emergence of stars like Marlon Brando and Audrey Hepburn. This era also witnessed the dominance of the studio system.

### **SEMESTER-III**

Early Indian cinema, particularly during the mid-20<sup>th</sup> century, is known for several distinct features and influential filmmakers, including melodrama, Satyajit Ray, and Ritwik Ghatak:

Hiralal Sen and Dadasaheb Phalke are significant figures in the history of early Indian cinema:

1. Hiralal Sen: Hiralal Sen is considered one of the pioneers of Indian cinema. He was a filmmaker and photographer who is credited with making some of the earliest Indian films in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. His short films, like “Dancing Scenes” and “A dancing scene at the foot of the stairs,” were among the first motion pictures produced in India.
2. Dadasaheb Phalke: Dadasaheb Phalke, also known as the “Father of Indian Cinema,” is a towering figure in the history of Indian filmmaking. He made India’s first full-length feature film, “Raja Harishchandra,” in 1913. Phalke’s pioneering efforts laid the foundation for the Indian film industry. His work marked the beginning of a new era in Indian cinema, and he is celebrated for his vision and dedication to the medium.
3. Early Indian cinema, especially in the 1940s and 1950s, often embraced melodramatic storytelling. Films were characterized by emotional intensity, dramatic conflicts, and a focus on family values and societal norms. Melodrama was a prominent genre that resonated with a wide audience.
4. Satyajit Ray: Satyajit Ray is one of India’s most celebrated filmmakers and a pioneer of the Indian New Wave cinema. He is renowned for his realistic and deeply human storytelling. His “Apu Trilogy” (Pather Panchali, Aparajito, and Apur Sansar) is considered a landmark in Indian cinema and is known for its lyrical narrative and character-driven storytelling.

5. Ritwik Ghatak: Ritwik Ghatak, another influential filmmaker, is known for his poignant and often tragic narratives. His films frequently explored themes of displacement, identity, and the socio-political struggles faced by ordinary people. "Meghe Dhaka Tara" and "Subarnarekha" are among his notable works.

6. The Indian New Wave refers to a film movement in Indian cinema that emerged in the late 1940s and gained prominence in the 1950s and 1960s. It was characterized by a departure from traditional Bollywood filmmaking and a focus on more realistic and artistic storytelling. Filmmakers like Satyajit Ray, Ritwik Ghatak, and Guru Dutt were influential in this movement, producing films that tackled social issues, showcased regional diversity, and explored innovative storytelling techniques. The Indian New Wave had a significant impact on world cinema and continues to influence contemporary Indian filmmaking.

"Jaane Bhi Do Yaaro" is a classic Indian comedy film directed by Kundan Shah. Released in 1983, the film is known for its satirical take on corruption and hypocrisy in Indian society. It features an ensemble cast and is regarded as one of the most iconic and influential comedies in Indian cinema history. The film's memorable scenes and witty humor have made it a cult favorite among film enthusiasts.

#### **SEMESTER IV**

The history of documentary films is rich and spans over a century. Here's a brief overview of key moments and popular documentary films that have left a lasting impact:

1. Early Documentary Films (1890s-1920s): The origins of documentary filmmaking can be traced back to the late 19<sup>th</sup> century with pioneers like Thomas Edison and the Lumière Brothers. These early films often featured everyday life and events.
2. Nanook of the North (1922): Directed by Robert J. Flaherty, this silent film is considered one of the earliest feature-length documentaries. It follows the life of an Inuk man and his family in the Canadian Arctic.
3. The Triumph of the Will (1935): Directed by Leni Riefenstahl, this controversial documentary captured the 1934 Nazi Party Congress in Nuremberg. While it is technically well-crafted, it serves as Nazi propaganda.
4. Night and Fog (1956): Directed by Alain Resnais, this short documentary explores the Holocaust, using haunting imagery and narration to reflect on the horrors of concentration camps.
5. Rabindranath Tagore (1961, Directed by Satyajit Ray) This documentary is a tribute to the famous Bengali poet and Nobel laureate Rabindranath Tagore. It explores Tagore's life, work, and his impact on literature and culture.

**# Practical work ( Compulsory in every Semester).**



Teaching the making of short films and short documentaries through practical experience is a highly effective approach for several reasons:

**Hands-On Learning:** Filmmaking is a practical art form. By engaging in the actual process of creating short films or documentaries, students get hands-on experience with equipment, techniques, and software. This practical knowledge is essential for aspiring filmmakers.

Filmmaking is a creative endeavor, and practical exercises allow students to express their creativity and ideas. They learn how to translate their concepts into visual and narrative elements on screen.

**Time Management:** Filmmaking requires careful planning and time management to meet deadlines. Practical experience teaches students the importance of time management and project organization.

**Feedback and Improvement:** When students create short films, they can receive feedback from instructors and peers. This feedback loop is crucial for improvement, as students can apply suggestions to their next projects.

**Real-World Skills:** Practical filmmaking exercises prepare students for the real-world challenges they will face in the industry. They learn how to navigate the production process, from pre-production planning to post-production editing.

**Understanding the Medium:** By making films, students gain a deeper understanding of the medium, including camera operation, lighting, sound recording, and editing. This knowledge is fundamental for anyone pursuing a career in filmmaking.

In summary, teaching filmmaking through practical experience is vital because it not only imparts technical skills but also nurtures creativity, problem-solving abilities, collaboration, and a deeper understanding of the medium. It equips students with the skills and knowledge needed to succeed in the dynamic and competitive world of film and video production.

## COMPUTER SCIENCE

### Course Outcome of B.Sc. Computer Science (Honours)

Semester-1
<b>CC1- Digital Logic(Theory &amp;Practical): Credit-6</b> 1. The course introduces the fundamental principles and concepts of digital logic, which form the foundation of digital systems and computer architecture. 2. Students will learn about Boolean algebra, logic gates, combinational and sequential circuits, and the design and analysis of digital systems.
<b>CC2-Programming Fundamentals using C(Theory &amp; Practical): Credit 6</b> 1.Student will learn every aspect of “C” language. C being the mother computer language, in depth theoretical knowledge is very crucial for becoming future software developer 2.They give practical examination, so theoretical knowledge is examined properly.
Semester-2
<b>CC3-Data Structure Using C (Theory &amp; Practical): Credit 6</b> 1. Students are acquainted with Abstract Data Type, Arrays, Linked lists, Queues, Stacks, Recursion, Trees, Searching and Sorting and hashing. They get both theoretical and practical knowledge. They also give practical examination, so their knowledge is examined also.
<b>CC4-Basic Electronic Devices and Circuits (Theory &amp; Practical): Credit 6</b> <b>1.Students must acquire knowledge of electronics. In this course, they learn basic circuit theory,</b> Theory of Semiconductor devices, Diode and its applications, Bipolar Junction Transistor, Unipolar Junction Transistor, PNP Devices, Optoelectronic materials, Operational Amplifiers (OPAMP), Timer, Data Acquisition. They also face practical examination, so their knowledge is tested. 2.If any student goes to IC manufacturing company, this knowledge will be helpful for them.
Semester-3
<b>CC5- Computer Organization &amp; Architecture(Theory &amp; Practical): Credit 6</b> 1. Students learn about Basic Structure of Computers, Register Transfer and Micro-operation, Basic Computer Organization and Design. 2. They gain knowledge about CPU Organization, Control Unit, CPU Registers, Instructions. 3. They learn about CISC and RISC processors, Computer Peripherals, Input / Output Organization and Memory. Their practical knowledge is also examined
<b>CC6- Computational Mathematics (Theory &amp; Practical): Credit 6</b> 1. It gives idea about SET theory, Probability theory, Growth functions, Recurrence relations, Numerical Methods and Graph Theory. 2.They also give practical examination, so their knowledge is also examined .
<b>CC7-Operating System (Theory &amp; Practical): Credit 6,</b> 1. Students learn about OS and its basic structure, process, deadlock, Memory management, File & I/O management. They also learn about protection and security 2. In practical paper they give exam on Shell scripting, Linux commands etc.
<b>Two Skill Enhancement Courses are offered: SEC-A1: Theory, Credit: 2 Computer Graphics and SEC-A2: Theory, Credit :2 . Internet of Things (IoT) . Student has to opt for any one of them.</b> <b>SEC-A1: Theory, Credit:2 Computer Graphics</b> 1. Students learn about Basic concepts of Graphics Devices– CRT monitor, Monochrome and Color Monitor, Basic geometrical shapes formation algorithms, Two and Three Dimensional Transformations, Two Dimensional Clipping, Projection and Applications.
<b>SEC-A2: Theory, Credit :2. Internet of Things (IoT)</b> 1. They gather knowledge about definition and characteristics of IoT. 2.They learn about IoT and M2M, Network & Communication aspects, IoT Physical Servers and Cloud Offerings, Developing IoTs, IoT Physical Devices and Endpoints, IoT Analytics and Domain specific applications of IoT
Semester-4
<b>CC8- Data Communication, Networking and Internet Technology (Theory &amp; Practical): Credit 6</b> 1. Students will learn about Network Hardware, Internet, Data, Signals, Various conversion methods, Transmission Mediums, Physical Addresssing, Http, www,OSI layers etc. 2. In practical paper, they will learn about web page design by HTML, Handling HTML form, Array

etc. They give practical examination on these topics too.

**CC9-Introduction to Algorithms & its Applications (Theory & Practical): Credit 6**

1. Students will learn about Asymptotic Complexity Analysis of Algorithms, Algorithm Design Techniques, Graph Representation and Algorithm and Classification of Problems: Concept of P, NP.
2. In practical paper, they will give examination depending on Implementation of Graph algorithms: Single Spanning Tree Generation using - BFS, DFS, Minimal Spanning Tree Generation using - Prim's Algorithm, Kruskal's Algorithm, Shortest Path finding using - Floyd's Algorithm, Floyd-Warshall Algorithm, Dijkstra's Algorithm, Graph Partitioning Algorithm.

**CC10-Microprocessor and its Applications (Theory & Practical): Credit 6**

1. Students will learn about Introduction to Microcomputer based system, Microprocessor Architecture and Memory Interfacing, Interfacing I/O Devices, Programming 8085, Interfacing Peripheral Devices and Applications and Microprocessor 8086.
2. In practical paper, they will learn about Programming with Microprocessor 8085 in Assembly Language. Various programs are given in practical examination, so their knowledge is also tested.

**Skill Enhancement Course: SEC-B1: Information Security Theory Credit -2 and SEC-B2 E-Commerce, Theory Credit -2. Student has to opt one of them**

**Skill Enhancement Course: SEC-B1: Information Security Theory Credit -2**

1. Students will learn about Cryptography, Finite Field and Number Theory, Hash Functions and Digital Signatures, Internet Firewalls for Trusted System, E-Mail, IP & Web Security

**Skill Enhancement Course: SEC-B: E-Commerce Theory Credit -2**

1. Students will have idea about An introduction to Electronic commerce, The Internet and WWW, Internet Security, Electronic Data Exchange, Planning for Electronic Commerce, Internet Marketing.

**Semester-5**

**CC11- Database Management System (DBMS)(Theory and Practical) Credit 6**

1. Students will learn Entity Relationship(ER) Modeling, Relational Model, Integrity Constraints, Relational Database Design, SQL, Record Storage and File Organization
2. In practical paper, they gain knowledge about practical implementation of theoretical knowledge. Their practical knowledge is examined also.

**CC12- Object Oriented Programming System (OOPs) Theory and Practical Credit 6**

1. Students start to learn Concept of OOPs, Introduction to Java, Arrays, Strings and I/O, Object-Oriented Programming Overview, Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata. Exception Handling, Threading, Networking and Database Connectivity, Applets.
2. In practical paper, they actually implement above mentioned theoretical knowledge.

**Discipline Specific Elective Course A: DSE-A1: Digital Image Processing(Theory & Practical): Credit 6 Students have to opt for any one of DSE paper**

1. Students start to learn about Image definition and its representation, Pixels, Co-ordinate conventions, Spatial Domain, Thresholding and Image Segmentation
2. In practical paper, Assignments are given on different Image Processing Functions based on Open CV & Python/Scilab

**Discipline Specific Elective Course A: DSE-A2: Data Mining & its Applications. (Theory & Practical): Credit 6 Students have to opt for any one of DSE paper**

1. Students learn about Definition of Data Mining, Data pre-processing, Data cleaning, Data transformation, Data Reduction, Data Visualization, Data extraction from large dataset, Data integration, sub-sampling, Feature selection, Scalability issues of data mining algorithms, text mining, web mining.
2. They also learn about Classification and Prediction, Data Warehousing (DWH)
3. They practice Data mining using PYTHON/C language. They give practical examination too.

**Discipline Specific Elective Course B: DSE-B1: Operation Research (Theory & Practical): Credit 6, Contact hours: 60 Students have to opt for any one of DSE paper**

1. Students will learn about Linear Programming Problem, Simplex Method, Duality, Transportation Problem, Assignment Problem, Game Theory, Network Scheduling: Introduction, Critical Path Method (CPM), PERT calculation
2. In practical paper, Students will have to use C language to implement Lab sessions related to Simplex Method, Transportation Problem and Assignment Problem

**Discipline Specific Elective Course B: DSE-B2: Programming using Python 3 (Theory & Practical): Credit 6, Students have to opt for any one of DSE paper**

1. Students will learn various aspects of Python language like Strings, Lists, Tuples, Conditionals, Iterators, and Generators, User-defined Functions and Recursion, User-defined Functions and

Recursion, Unordered data types - Sets and Dictionaries, Unordered data types - Sets and Dictionaries, Dictionaries, Intro to Object Oriented Programming  
2. Students use Python 3.6 or above. They have to implement above mentioned topics of theory in practical during practical examination.

#### **Semester-6**

#### **CC13-Software Engineering(Theory) Credit:04**

1.Students will learn Software Life Cycle, Software Requirement and Specification Analysis, Software Testing, Software Quality Assurance. This knowledge will help students to check software quality, feasibility etc.

**CC13- (Practical) consists of Project Report.** Students do projects under faculty member of department.

#### **CC14- Theory of Computation. (Theory )Credit:04**

1. Students will develop ideas about Finite Automata, Formal Languages and Grammar, Regular Expression, Turing Machine.

**CC-14(Practical) consists of Project Presentation and Viva Voce.** In front of External Examiner students have to defend their projects.

#### **Discipline Specific Elective Course A: DSE-A-3-Theory: Embedded Systems Credit-4 Students have to opt for one DSE A3 or A4**

1. Students will learn Introduction to 8051, Introduction to Embedded System Programming, Programmable logic devices and Hardware description Language, Hardware Description Language (VHDL)

2. **DSE-A-3-Practical should cover** Assembly Language Programming related to Microcontroller 8051. 2. Programming Using Embedded C for 8051. 3. VHDL programs for construction and simulation of various digital circuits.

#### **Discipline Specific Elective Course A: DSE-A-4Theory: Multimedia and its Applications Credit-4 Students have to opt for one DSE A3 or A4**

1.Students will learn about : Multimedia and its Applications, Making Multimedia, Text, Images, Sound, Video, Animation, Multimedia System, Multi-modal Communication.

2. Students will do theory related practical in **DSE-A-4-Practical paper.**

#### **Discipline Specific Elective Course B: DSE-B3-Theory: Introduction to Computational IntelligenceCredit-4 to opt for Students have one DSE B3 or B4**

**1.Students will learn** Introduction to Artificial Intelligence, Neural Network, Rough sets, Fuzzy Logic and Application.

2.In **DSE-B3-practical paper**, students will do Computational intelligence lab using Prolog / LISP

#### **Discipline Specific Elective Course B: DSE-B4-Theory: Advanced Java Credit-4 Students have to opt for one DSE B3 or B4**

**1. Students will learn** Basics of Servlet, Session Management, Basics of JSP, Design Pattern, Javascript, JQuery, Spring Framework

2. In **DSE-B4-practical paper**, students will do Advanced Java Laboratory based on above mentioned topics.

Department of GeographyCourse Outcome (CO) of Geography Honours under CBCS

Geography is the subject of studying places and it's relationship between people and their environments. The subject's multidisciplinary nature focuses on all contemporary issues which nurture the young minds and encourages them to explore all the dimensions of the nature, content of subject matter of Geography. Today it is an extremely broad discipline with multiple approaches and modalities. The subject composed of core concepts like Space, Place, Time, Scale and sub four disciplines like location, tradition, area or regional tradition, human – environment interaction tradition and earth tradition. There is a vast scope of exploring all the genres of this multidisciplinary nature which creates ample opportunities and open new horizons to explore various facets of the subject. Various approaches to study physical geography and human geography broaden the basket of opportunities for the student folks where they can opt from a vast pool of choices. The subject not only multidisciplinary in nature but all serves as interdisciplinary nature which is related to other subjects. The modern academic discipline of geography is rooted in ancient practice, concerned with the characteristics of places, in particular their natural environments and peoples, as well as the relations between the two.

Semester	Core Course	Paper Code	Course Title	Course Outcome
I	I	GEO-A-CC-1-01-TH	Geo tectonics and Geomorphology	<ul style="list-style-type: none"> <li>✓ To know the content of this broad topic.</li> <li>✓ Understanding about endogenetic and exogenetic matters of the earth.</li> <li>✓ Ability to understand various models which are developing to clear the core concepts.</li> <li>✓ Learning about the existence of earth and its all spheres, their forms of regulating and acting in a different manner</li> <li>✓ Various phenomenons responsible for moving of earth and creating landforms.</li> <li>✓ Field work for knowing the real situation and experiencing through studies.</li> </ul>
		GEO-A-CC-1-01-P	Geo tectonics and Geomorphology(Lab)	
	II	GEO-A-CC-1-02-TH	Cartographic Techniques	

II		GEO-A-CC-1-02-P	Cartographic Techniques(Lab)	<ul style="list-style-type: none"> <li>✓ Gain knowledge about implementing different methods while preparing maps.</li> <li>✓ Analysing the ways of implementing data in a different manner.</li> </ul>
	III	GEO-A-CC-2-03-TH	Human Geography	<ul style="list-style-type: none"> <li>✓ Learning the concepts of human aspects and developing other branches of geography</li> <li>✓ Learn various approaches to describe man nature relationship.</li> <li>✓ Developing a knowledge of space human and society.</li> <li>✓ Learning evolution of humankind and its sustainability.</li> </ul>
		GEO-A-CC-2-03-P	Human Geography(Lab)	
	IV	GEO-A-CC-2-04-TH	Thematic Mapping and Surveying	<ul style="list-style-type: none"> <li>✓ Comprehensive study of the major pillars of geography like scale, time, space, location.</li> <li>✓ Learning the interpretation of weather maps, geological maps, topographical maps</li> <li>✓ Recording data using field survey instruments</li> <li>✓ Get to know about various thematic mapping techniques.</li> </ul>
		GEO-A-CC-2-04-P	Thematic Mapping and Surveying(Lab)	
V	GEO-A-CC-3-05-TH	Climatology	<ul style="list-style-type: none"> <li>✓ Understanding different relationship about weather and climate elements.</li> <li>✓ Learning various weather instruments and recording real time data.</li> <li>✓ How the atmosphere is related to earth sphere and its working pattern</li> <li>✓ Importance of all the atmospheric phenomena.</li> <li>✓ Learning and interpreting weather maps.</li> </ul>	
	GEO-A-CC-3-05-P	Climatology(Lab)		
III	VI	GEO-A-CC-3-06-TH	Hydrology and Oceanography	<ul style="list-style-type: none"> <li>✓ Learn the basic concepts of hydrology and oceanography.</li> </ul>

		GEO-A-CC-3-06-P	Hydrology and Oceanography(Lab)	<ul style="list-style-type: none"> <li>✓ Gaining knowledge about Hydrological cycles and its impact on other agents of earth surface.</li> <li>✓ Learning major movements of ground water and circulation of ocean current</li> <li>✓ The various elements, properties of oceans seas and their correlation.</li> <li>✓ Knowing about the ecosystem development.</li> </ul>
	VII	GEO-A-CC-3-07-TH  GEO-A-CC-3-07-P	Statistical Methods in Geography  Statistical Methods in Geography(Lab)	<ul style="list-style-type: none"> <li>✓ Learn the significance of statistics in geography.</li> <li>✓ Statistical implementation for processing data.</li> <li>✓ Learning systematic approach to quantify and proper analysis of data.</li> <li>✓ Learn to know application of statistical methods.</li> </ul>
	Skill Enhancement Course-I	GEO-A-SEC-A-3-02-TH	Tourism Management	<ul style="list-style-type: none"> <li>✓ Learning about the various domains of inbound outbound tourism concepts</li> <li>✓ Knowing the global tourism impact on India and developing specific Indian places as global tourism centres</li> <li>✓ To get knowledge about tourism and sustainability and types of tourism.</li> </ul>
	VIII	GEO-A-CC-4-08-TH  GEO-A-CC-4-08-P	Economic Geography  Economic Geography(Lab)	<ul style="list-style-type: none"> <li>✓ Assess the role of economic geography, the concept of economic man and theories of choice</li> <li>✓ Understanding various economic activities as a basis of economic geography.</li> <li>✓ Learning models and approaches to give an insight thought.</li> <li>✓ Get to know about measuring techniques and parameters.</li> </ul>

IV	IX	GEO-A-CC-4-09-TH  GEO-A-CC-4-09-P	Regional Planning and Development  Regional Planning and Development(Lab)	<ul style="list-style-type: none"> <li>✓ To understand and identify the regions as an approach of deduction method</li> <li>✓ Knowing and identifying regional imbalances</li> <li>✓ Understanding the concepts of different regions on the basis of scale and dimensions</li> <li>✓ Evaluating India as a region from different aspects.</li> </ul>
	X	GEO-A-CC-4-010-TH  GEO-A-CC-4-010-P	Soil and Bio geography  Soil and Bio geography(Lab)	<ul style="list-style-type: none"> <li>✓ Having the knowledge of pedological science and biosphere as a unit.</li> <li>✓ Ecosystem study along with energy flow.</li> <li>✓ Factors, characteristics of various types of soils.</li> <li>✓ Identifying and knowing different cycles and biospheres of the world.</li> <li>✓ Concepts of conservation.</li> </ul>
	Skill Enhancement Course-II	GEO-A-SEC-B-4-03-TH	Rural Development	<ul style="list-style-type: none"> <li>✓ Knowing basic concepts of rural areas and their identification over space.</li> <li>✓ Knowing approaches of developing rural areas.</li> <li>✓ Analysing and learning different government schemes to know how the schemes work.</li> <li>✓ Learning about the regional development in rural areas.</li> </ul>
	XI	GEO-A-CC-5-11-TH  GEO-A-CC-5-11-P	Research Methodology and Fieldwork  Research Methodology and Fieldwork(Lab)	<ul style="list-style-type: none"> <li>✓ Will expertise in identification of the area of problem</li> <li>✓ Learning of research designs</li> <li>✓ Having a proper idea of research methodology</li> <li>✓ Handle logistics and other emergencies on field</li> <li>✓ Develop skills in photography, mapping and videorecording.</li> </ul>
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VI	XII	GEO-A-CC-5-12-TH	Remote Sensing, GIS and GNSS	<ul style="list-style-type: none"> <li>✓ Gaining knowledge of the principles of remote sensing, sensor resolutions and image referencing schemes.</li> <li>✓ Extracting and interpretation of satellite maps on the basis of false colour composite.</li> <li>✓ Learning how to use GIS software for contemporary mapping techniques.</li> <li>✓ Analyzing and interpreting remotely sensed satellite images in order to understand topographical and cultural variations on the Earth's surface.</li> </ul>
		GEO-A-CC-5-12-P	Remote Sensing, GIS and GNSS(Lab)	
	XIII	GEO-A-CC-6-13-TH	Evolution of Geographical Thought	<ul style="list-style-type: none"> <li>✓ Learning the evolution journey of the subject</li> <li>✓ Knowing about the philosophers' contribution to develop the subject</li> </ul>
		GEO-A-CC-6-13-P	Evolution of Geographical Thought(Lab)	<ul style="list-style-type: none"> <li>✓ Learning the multiple dimensions and approaches of Geography</li> <li>✓ Developing the concept of space over time.</li> <li>✓ Learning about leading eras of Geography.</li> </ul>
	XIV	GEO-A-CC-6-14-TH	Hazard Management	<ul style="list-style-type: none"> <li>✓ Following the steps to learn how to mitigate undesirable situations.</li> <li>✓ Knowing the risk effect and vulnerability measurements.</li> <li>✓ How the growing number of hazard and disasters are affecting humankind.</li> <li>✓ Learn to prepare hazard zonation map.</li> <li>✓ Will be able to prepare reports on particular hazard of West Bengal and India.</li> </ul>
		GEO-A-CC-6-14-P	Hazard Management(Lab)	

**COURSE OUTCOME**  
**Discipline Specific Outcome**

Se me ste r	Core Course	Paper Code	Course Title	Course Outcome
V	Discipline Specific Elective I	GEO-A-DSEA-5- 01TH  GEO-A-DSEA-5-01P	Fluvial Geomorphology  Fluvial Geomorphology(Lab)	<ul style="list-style-type: none"> <li>✓ Understanding about river dynamics and its creation and abduction process</li> <li>✓ Learning about measures of courses changing and upgrading</li> <li>✓ Knowing about channel, drainage system, networks formation and its importance.</li> <li>✓ Learning of various fluvial landforms and allied changes.</li> </ul>
	Discipline Specific Elective II	GEO-A-DSEB-5- 05TH  GEO-A-DSEB-5-05P	Cultural and Settlement Geography  Cultural and Settlement Geography(Lab)	<ul style="list-style-type: none"> <li>✓ Understanding various concepts of cultural geography and its impact on society</li> <li>✓ Identifying racial, religious, language components of cultural areas</li> <li>✓ Learning rural and urban patterns of settlement formations</li> <li>✓ Concept of climate, site, situations to describe formations of settlements</li> </ul>
	Discipline Specific Elective III	GEO-A-DSEA-6- 04TH  GEO-A-DSEA-6-04P	Resource Geography  Resource Geography(Lab)	<ul style="list-style-type: none"> <li>✓ Understanding the concept, distribution, types of resources and mineral over earth surface.</li> <li>✓ Understand the concept of Sustainable Resource development</li> <li>✓ Understand the distribution, utilization, problems and management</li> <li>✓ Analyze the contemporary energy crisis and assess the future</li> </ul>

	<p>Discipline Specific Elective IV</p>	<p>GEO-A-DSEB-6-07TH  GEO-A-DSEB-6-07P</p>	<p>Urban Geography  Urban Geography(Lab)</p>	<ul style="list-style-type: none"> <li>✓ Understanding the nature, scope, approaches and recent trends in Urban Geography</li> <li>✓ Learning various theories of urban morphology</li> <li>✓ Tracing various growth models of urban settlements.</li> <li>✓ Learning various models of urban areas of India like Delhi, Kolkata, Chandigarh.</li> </ul>
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**Department of Biochemistry****Course Outcome (CO) of Biochemistry Honours under CBCS**

Biochemistry, the study of biological phenomena at cellular and molecular level, is studied to gain knowledge about the principles that govern complex biological systems. The primary objective of this course is to give students a solid foundation in biochemical processes, to develop analytical, technical and critical thinking skills and to make them scientifically literate so as to contribute to the discipline after graduation.

Today it is an extremely broad discipline with multiple approaches and modalities. The subject composed of core concepts like biochemistry, cell biology, molecular biology, analytical, organic and physical chemistry. Demonstrate excellent critical thinking and problem-solving abilities. Ability to integrate chemical concepts and ideas learned in lecture courses with skills learned in laboratories to formulate hypotheses, propose and perform experiments, collect data, compile and interpret results and draw reasonable and logical conclusions. Demonstrate technical mastery of fundamental wet laboratory skills, use proper laboratory safety protocols and demonstrate proficiency in using computers to solve chemical problems. Apply experience and knowledge of the discipline in the successful conduct of at least 100 hours of undergraduate research. Demonstrate effective scientific communication skills – both written and oral. The course has the potential to make the student able to write reports and present the results of their own scientific works or the works of another scientist. There is a vast scope of exploring all the genres of this multidisciplinary nature which creates ample opportunities and open new horizons to explore various facets of the subject. Various approaches to study different skill enhancement course and discipline specific course broaden the basket of opportunities for the student folks where they can opt from a vast pool of choices. The subject not only multidisciplinary in nature but all serves as interdisciplinary nature which is related to other subjects.

<b>Sem ester</b>	<b>Core course</b>	<b>Paper Code</b>	<b>Course Title</b>	<b>Course Outcome</b>
I	I	BCM-A-CC-1-1	Molecules of Life	The course aims to provide students with an understanding of biomolecules, the basic building blocks of living organisms, focusing on their structural underpinnings, unique properties, biological roles and functions and inter relations. The course will outline the importance of water as a biological solvent and vitamins as vital ingredients of life. Emphasis will be on the association between structure and function of various biomolecules at a chemical level with a biological perspective as well as hands on approach and laboratory techniques.

		BCM-A-CC-1-1-P	Molecules of Life-Practical	<ul style="list-style-type: none"> <li>• Acquainted with chemical and molecular foundations of life and appreciate the role of water in biological systems.</li> <li>• Able to comprehend the structure, function and acid base properties of amino acids.</li> <li>• Introduced to the structure, properties and roles of carbohydrates, lipids and nucleic acids.</li> <li>• Aware of the importance of vitamins in biological systems.</li> <li>• Able to independently identify and quantitate various biomolecules in the laboratory.</li> </ul> <ul style="list-style-type: none"> <li>• To understand the principles of chromatography and the factors influencing separation.</li> <li>• Reflect on the scientific principles underlying each experiment and relate them to real-world applications.</li> </ul>
II		BCM-A-CC-1-2-TH	General Organic Chemistry	<ul style="list-style-type: none"> <li>• To understand the structure of an atom and the fundamental nature of chemical bonds in chemistry and biology.</li> <li>• To understand the impact of strong and weak interactions on the properties of biological macromolecules.</li> <li>• Grasp the concept of hybridization and apply it to explain molecular shapes.</li> <li>• Analyse the stereochemistry of chiral compounds, including optical activity, specific rotation, racemization, and resolution.</li> <li>• Understanding the nature of reactive intermediates, their structure and functions.</li> <li>• Explore electrophilic and nucleophilic reactions and correlate with biological scenarios.</li> </ul>
		BCM-A-CC-1-2-P	General Organic Chemistry-Practical	<ul style="list-style-type: none"> <li>• Understand and perform Lassaigne's tests to detect</li> </ul>

II				<p>special elements in organic compounds.</p> <ul style="list-style-type: none"> <li>• Apply these tests to determine the presence of these elements, providing clues about the compound's structure.</li> <li>• Utilize systematic chemical tests to detect specific functional groups within organic compounds.</li> </ul>
	III	BCM-A-CC-2-3-TH	General Physical chemistry	<ul style="list-style-type: none"> <li>• To understand thermodynamic concepts and apply them in real world scenarios.</li> <li>• Grasp the concept of thermodynamic equilibrium and temperature.</li> <li>• Understand the temperature dependence of equilibrium constant and its application.</li> <li>• Analyse hydrolysis of weak acids and bases, calculate pH, <math>pK_a</math>, <math>pK_b</math>, and pOH.</li> <li>• Grasp the concept of electrochemical cells, cell reactions, and EMF.</li> </ul>
		BCM-A-CC-2-3-P	General Physical chemistry-Practical	<ul style="list-style-type: none"> <li>• Develop practical skills in using a polarimeter to determine optical activity and specific rotation.</li> <li>• Gain hands-on experience in formol titration techniques for amino acids under different pH conditions.</li> <li>• Analyse titration curves to determine equivalence points and concentration of amino acids.</li> </ul>
	IV	BCM-A-CC-2-4-TH	Enzyme	<p>The course is designed to enable students understand enzymes, properties, mechanism of action and regulation of their activity. To acquaint students grasp the basic cascades of energy transfer system and subsequent products in biology. The course will help the students understand fundamental energetics of</p>

III		BCM-A-CC-2-4-P	Enzyme-Practical	<p>biochemical processes, their functionalities.</p> <ul style="list-style-type: none"> <li>• Students will learn the nature and importance of enzymes in living systems.</li> <li>• Students will gain insight into the thermodynamic and molecular basis of catalysis by enzymes and underlying the basis of their specificity.</li> <li>• They will understand the mechanism of enzyme action, Kinetics of the enzyme catalysed reactions and clinical importance of the enzyme inhibitors.</li> <li>• Students will also learn to appreciate how enzymes are regulated</li> <li>• The course will introduce students to the applications of enzymes in research and medicine as well as in industry, which will boost up their incursion into industrial and biochemical research.</li> <li>• To study enzyme kinetics practically in the invitro system, such as effect of pH, temperature, Substrate concentration and inhibitor on enzyme catalysed reaction.</li> <li>• To learn the relationship between enzyme activity with pH, temperature, substrate concentration and competitive inhibitor by graphical representation.</li> </ul>
	V	BCM-A-CC-3-5-TH	Bio-Physical chemistry	<p>The course will help students to acquaint with basic instrumentation, principle and procedure of various sophisticated instruments like Fluorescence microscope, TEM, SEM, HPLC, FACS, GLC and NMR etc. This will enable the students to implement the use of these techniques in biological</p>

				<p>research and in discovering new products/compounds.</p> <ul style="list-style-type: none"> <li>• The course will help students to acquaint with basic instrumentation, principle and procedure of various sophisticated instruments like phase contrast, fluorescence, electron microscopy, confocal microscopy, fluorescent activated cell sorting, and Freeze drying.</li> <li>• The students will get the theoretical knowledge of various instruments and their practical applications like Geiger-Muller counter, Liquid scintillation counter, autoradiography, X-ray crystallography, and Biosensors.</li> <li>• The students will learn about Centrifugation &amp; Electrophoresis, and Protein Sequencing.</li> <li>• The students will be able to implement the use of instruments like chromatography, UV-VIS spectroscopy, NMR, CD, ORD in biological research.</li> </ul>
		BCM-A-CC-3-5-P	Bio-Physical chemistry-Practical	<ul style="list-style-type: none"> <li>• Students will learn how to determine the viscosity coefficient of a given liquid/solution with Ostwald viscometer.</li> <li>• To understand the principles of chromatography and the factors influencing separation.</li> </ul>
	VI	BCM-A-CC-3-6-TH	Metabolism of Carbohydrates and Lipids	<ul style="list-style-type: none"> <li>• To understand the concepts of metabolism (catabolism and anabolism) and energy currency</li> <li>• To gain a detailed knowledge about various metabolic pathways in carbohydrate metabolism</li> </ul>



		BCM-A-CC-3-6-P	Metabolism of Carbohydrates and Lipids-Practical	<ul style="list-style-type: none"> <li>• To know the enzymes involved in these metabolic pathways and their regulation</li> <li>• To understand the basic concepts of Bioenergetics</li> <li>• To know what about the structure of mitochondria, concept of Electron Transport Chain</li> <li>• Learning the concept of chemiosmotic hypothesis and the mechanism of Oxidative phosphorylation and ATP synthesis.</li> <li>• To train students on the basic techniques of biochemistry. The course gives hands on training on the practical experiments and techniques relating to metabolism in biochemistry.</li> <li>• Developing the knowledge about serum and plasma.</li> <li>• Estimation of serum creatinine, plasma glucose by enzymatic method and serum amylase by kinetic method.</li> <li>• Understanding whether haemoglobin is glycosylated or not.</li> <li>• At the end of this course, students will be able to analyse metabolic problems and will be able to approach a research problem specifically.</li> <li>• It will also help in understanding the significance of biochemical tests.</li> <li>• Students will be able to carry biomolecular estimation based on the coloration reaction.</li> </ul>
VII		BCM-A-CC-3-7-TH	Cell Biology	The study of cell biology aims to increase understanding of living systems and to consider the systems in relationship to the self and other organisms in the natural environment. The course gives the life activities at cellular and molecular level and basic

		BCM-A-CC-3-7-TH	Cell Biology- Practical	<p>functions of the various cellular compartments and organelles. This course also aims to develop knowledge among the students about signalling system in cell.</p> <ul style="list-style-type: none"> <li>• On completion of the course, students shall be able to identify and present relevant information from research publications dealing with issues of cell biology.</li> <li>• To assess and relate the information to the context of cell biology.</li> <li>• To gain knowledge on cell division and regulation.</li> <li>• They will plan and carry out simple experiments on the basis of cell.</li> <li>• This course introduces the students to the visualization of animal and plant cell and its components</li> <li>• This gives them a strong foundation on the basic unit of life and different stages of cell division by permanent slides.</li> <li>• At the end of the course, the student has a strong foundation on the functions of the cell, cellular protein isolation and molecular weight determination.</li> </ul>
	Skill Enhancement Course -I	BCM-A-SEC-A1-TH	Tools and Techniques in Biochemistry	<ul style="list-style-type: none"> <li>• To understand and adhere to laboratory safety protocols, minimizing risks associated with chemical handling and experimentation.</li> <li>• Grasp the concept of buffering systems and their role in maintaining stable pH conditions in biochemical experiments.</li> <li>• Comprehend the theory of sedimentation coefficients and Svedberg units, and utilize centrifugation methods, including micro-</li> </ul>

IV		BCM-A-SEC-A1-P	Tools and Techniques in Biochemistry- Practical	<p>centrifugation and ultracentrifugation, to isolate cell components through density gradient centrifugation.</p> <ul style="list-style-type: none"> <li>• Apply UV-visible spectroscopy to study proteins and nucleic acids, and understand its applications in biochemical analysis.</li> <li>• Adhere to and implement essential safety measures and practices in laboratory settings.</li> <li>• Demonstrate competence in handling laboratory equipment and reagents safely.</li> <li>• Understand the significance of proper pipetting techniques in obtaining reliable experimental results.</li> <li>• Comprehend the concept of pH and its importance in biochemical reactions and stability.</li> <li>• Utilize a spectrophotometer to measure the absorbance of different BSA solutions.</li> </ul>
	VIII	BCM-A-CC-4-8-TH	Membrane Biology and Bioenergetics	<p>The objective of the course is to provide students with the basic understanding of membrane composition, structure-function relationship and properties of membranes. The course will also provide an understanding of the various types of membrane transporters and their molecular mechanisms. The course will introduce students to the basic tenets of bioenergetics and detail out the molecular mechanisms of oxidative phosphorylation and photophosphorylation.</p>

		BCM-A-CC-4-8-P	Membrane Biology and Bioenergetics-Practical	<ul style="list-style-type: none"> <li>• Student will understand the general composition and structure of biomembranes.</li> <li>• They will understand the basic properties of biomembrane theory.</li> <li>• They will have knowledge about the various types of membrane transport mechanisms.</li> <li>• They will understand the basic tenets of Bioenergetics.</li> <li>• Students will understand the concept of chemi-osmotic theory and the mechanism of oxidative photophosphorylation and ATP synthesis.</li> <li>• They will understand the basic mechanism of photophosphorylation in plants and microbes.</li> <li>• Student will learn the determination of CMC of detergents.</li> <li>• The course will have the knowledge how to prepare RBC ghost cell and its importance in biomembrane research.</li> <li>• To understand the separation of photosynthetic pigment by TLC/ silica gel column.</li> <li>• The course demonstrates the determination of phosphate from crude phospholipid (Lecithin/Cephalin).</li> </ul>
IX		BCM-A-CC-4-9-TH	Metabolism of Amino Acid and Nucleic Acid	<ul style="list-style-type: none"> <li>• To understand detailed and comprehensive knowledge about the synthesis and catabolism (transamination, deamination, decarboxylation) of amino acids.</li> <li>• Learning urea cycle, Kreb's bicycle, disorders of amino acid metabolism.</li> <li>• Giving a basic idea of precursor functions of amino acids and porphyrin metabolism.</li> </ul>

		BCM-A-CC-4-9-P	Metabolism of Amino Acid and Nucleic Acid-Practical	<ul style="list-style-type: none"> <li>• Systematic learning of the biosynthesis of nucleotides (de novo and salvage pathway).</li> <li>• Learning the degradation of nucleotides and role of inhibitors (used as chemotherapeutic drugs) and disorders of nucleotide metabolism.</li> <li>• To comprehend how the amino acid and nucleotide metabolism are integrated with carbohydrate and lipid metabolism.</li> <li>• Student will learn the assay of SGOT, SGPT by kit.</li> <li>• They will learn the estimation of serum uric acid.</li> <li>• They will have to estimate the total protein and albumin in serum</li> </ul>
X		BCM-A-CC-4-10-TH	Basic Microbiology and Microbial Genetics	<p>The course is to introduce origin of microbiology, contribution of various scientists in the origin of microbiology. It will also give various salient features of microbes and the different methods of microbial culture techniques. The objective of the course is learning and understanding the fundamentals of Microbiology like important characteristics and biology of bacteria, fungi, mycoplasma, viruses etc. Moreover, this course is designed to learn basic knowledge of fermentation process and industrial application of microbes for the production various useful products.</p> <ul style="list-style-type: none"> <li>• Understand the basics of microbiology like Characterization and classification of microorganisms, cultivation, nutrition, physiology.</li> </ul>

		BCM-A-CC-4-10-P	Basic Microbiology and Microbial Genetics-Practical	<ul style="list-style-type: none"> <li>• The student will learn about Bacterial toxins, and mode of action of bacterial protein toxins. Host Microbe Interactions, Viruses of bacteria, plant and animal cells, Mycoplasma and virioids.</li> <li>• The student will learn Methods of sterilization and preparation of various culture media, Purification techniques.</li> <li>• Identification of isolated bacteria, and Growth curve of microorganisms.</li> <li>• Having the Knowledge of the genomic organisation of <i>E.coli</i>, <i>Saccharomyces</i> Sp, <i>Tetrahymena</i> Sp.</li> <li>• Aspects of mutation in genes, mutagenesis and plasmids.</li> <li>• The various mechanisms of genetic exchange such as transformation, conjugation and transduction.</li> <li>• Basic concept of the transposable elements, features of T4 and <math>\lambda</math> phage with the later genetic basis of lytic and lysogenic switch.</li> </ul> <p>At the end of the course, students will be able to carry out:</p> <ul style="list-style-type: none"> <li>• blood typing.</li> <li>• Microbial culture media preparation.</li> <li>• Isolation of microbes from the culture.</li> <li>• Staining and screening of microbes.</li> </ul>
	Skill Enhancement Course -II	BCM-A-SEC-B-TH	Clinical Biochemistry	<p>Students will learn about the normal constituents of urine, blood and their significance in maintaining good health. Students will become aware with the variations in the levels of triglycerides and lipoproteins and their relationship with various diseases. Students will get acquainted with the role of</p>

		BCM-A-SEC-B-P	Clinical Biochemistry- Practical	<p>enzymes in diagnosis of various diseases.</p> <ul style="list-style-type: none"> <li>• Learning the basic idea of different biological samples such as blood, urine and faeces and their collection and preservation techniques.</li> <li>• Different instruments and their specific application with correct accuracy</li> <li>• Gain knowledge about Diagnostic biochemical profile : Clinical significance in variation of blood glucose, lipid profile and its clinical significance</li> <li>• To understand different functions of liver and to assess liver function tests, Different types of Jaundice</li> <li>• To know the basic idea of kidney function and classification of renal function test, urine analysis by dip stick method, normal and abnormal constituents of urine.</li> </ul> <ul style="list-style-type: none"> <li>• Acquire the knowledge about biosafety in the clinical laboratory, using gloves and mask while performing the experiment and disposal of used accessories in proper place.</li> <li>• Estimation of lipid profile like cholesterol, triglycerides, serum alkaline phosphatase.</li> <li>• Gain knowledge about serum LDH activity.</li> </ul>
	XI	BCM-A-CC-5-11-TH	Gene, Expression Regulation Gene and	<p>The course explains the fundamental aspects of gene and genome organization to get basic knowledge to students. It also explains various molecular events in cell so that students can interestingly learn and project molecular status within the cell. The course gives an in-depth insight into the molecular aspects</p>

V		BCM-A-CC-5-11-P	Gene, Expression and Regulation-Practical	<p>of life - the central dogma. On completion of the course, students shall be able to:</p> <ul style="list-style-type: none"> <li>• identify and present relevant information dealing with issues of molecular biology.</li> <li>• get an idea about the principles behind molecular biology which makes students to understand the basic molecular events in the cell.</li> <li>• Understand occurrence of error and repair system in DNA.</li> <li>• Concepts on regulation of bacterial gene expression, with primary focus on genes, operons, regulons and stimulants.</li> <li>• Having a clear view on the regulation of eukaryotic gene expression.</li> <li>• Gene regulation in bacteriophages with its related topics.</li> </ul> <p>At the end of the course, student will able to conduct:</p> <ul style="list-style-type: none"> <li>• isolation of DNA from biological samples.</li> <li>• quantification of DNA samples.</li> </ul>
	XII	BCM-A-CC-5-12-TH	Physiology and Hormones	<ul style="list-style-type: none"> <li>• To understand the basic organization and homeostatic control of the fluid components of the human body in regulating and connecting the various organ systems.</li> <li>• To learn the basics of circulatory system including homeostasis and diseases of blood.</li> <li>• To understand the fundamentals of cardiovascular system, respiratory system, neural</li> </ul>



VI		BCM-A-CC-5-12-P	Physiology and Hormones-Practical	<p>and chemical regulation of respiration, digestive system, excretory system like GFR, reabsorption and tubular secretion, water and electrolyte imbalance and related diseases.</p> <ul style="list-style-type: none"> <li>• Understanding the endocrine systems and different hormones.</li> <li>• Hormones and their origin, target organs, functions, regulation and their deficiencies.</li> <li>• To learn hormone mediated signalling.</li> <li>• To get an idea for estimation of haemoglobin and calcium in serum,</li> <li>• To understand the electrophoresis (SDS-PAGE) used for separation of proteins</li> <li>• Estimation of cholesterol in serum</li> </ul>
	XIII	BCM-A-CC-6-13-TH	RDT and Genetic Engineering	<p>The course is designed to illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences. It will give students exposure to application of recombinant DNA technology in biotechnological research, giving ideas in strategizing research methodologies employing genetic engineering techniques. It will also give introduction to the various transformation techniques employed in plant system and application of genetically modified plants in the various fields of science.</p> <ul style="list-style-type: none"> <li>• Student will understand the concept of recombinant DNA technology.</li> <li>• They will learn tools and technique used in</li> </ul>

		BCM-A-CC-6-13-P	RDT and Genetic Engineering-Practical	<p>Recombinant DNA technology.</p> <ul style="list-style-type: none"> <li>• The course will help for the identification of cloned gene.</li> <li>• After successful completion of the course they will know the application of recombinant DNA technology in various fields.</li> </ul> <p>At the end of the course, student will able to conduct:</p> <ul style="list-style-type: none"> <li>• Isolation of plasmid DNA from <i>E. coli</i> cells.</li> <li>• Digestion of plasmid DNA with restriction enzymes and size estimation of fragments by gel electrophoresis.</li> <li>• Preparation of competent cells, transformation and estimation of transformation efficiency.</li> </ul>
XIV		BCM-A-CC-6-14-TH	Immunology	<p>The objective of the course is to apprise the students about components associated with immune system and molecular mechanism of their working. The course also deals with implications of deregulation of basic regulatory networks that lead to immune system related disorders. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.</p> <ul style="list-style-type: none"> <li>• Learn the fundamental principles of immune response including molecular, biochemical and cellular basis of immune homeostasis.</li> <li>• The course will aid in understanding various aspects of immunological</li> </ul>

		BCM-A-CC-6-14-P	Immunology- Practical	<p>response and how it's triggered and regulated.</p> <ul style="list-style-type: none"> <li>• The student will learn and understand the rationale behind various assays used in immunodiagnosis of diseases and will be able to transfer knowledge of immunology in clinical perspective.</li> <li>• The course will aid in understanding the principles of Graft rejection, Auto immunity and Antibody based therapy.</li> <li>• Develop the capacity for problem-solving about immune responsiveness, knowledge of pathogenesis of diseases</li> <li>• This course gives an overview on Assays based on agglutination reactions - Blood typing (active) &amp; passive agglutination.</li> <li>• The students learn about Assays based on precipitation reactions - Ouchterlony double diffusion (ODD) and Mancini radial immunodiffusion.</li> <li>• The course develops in the student an appreciation for principles of Enzyme linked immune-sorbent assay (ELISA) and its applications in treating human diseases by different techniques like immunoelectrophoresis.</li> </ul>
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**COURSE OUTCOME**  
**Discipline Specific Outcome**

Se me ste r	Core Course	Paper Code	Course Title	Course Outcome
V	Discipline Specific Elective I	BCM-A-DSE A1-TH	Nutritional Biochemistry	<p>To provide information on concept of nutrition &amp; health and understand the physiological and biochemical significance of micronutrients and macronutrients. This course will also help the student to know the clinical aspects of various disorders due to deficiency of nutrients.</p> <ul style="list-style-type: none"> <li>• To learn about the basic concepts of nutrition, nutritional values of foods, BMR and measurement of energy requirement.</li> <li>• Explaining the dietary requirement of carbohydrates, lipids and proteins and their biological significance.</li> <li>• To know the dietary source, functions, nutritional requirement, deficiency symptoms of water and fat soluble vitamins and minerals.</li> <li>• Basic study of the assessment of nutritional status, food and drug interactions and nutraceuticals.</li> </ul>
		BCM-A-DSE A1-P	Nutritional Biochemistry-Practical	<ul style="list-style-type: none"> <li>• To learn how to estimate Vitamin C from fruit juice.</li> <li>• Estimation of calcium from milk.</li> <li>• Determination of total phenolic content from black tea.</li> </ul>
	Discipline Specific Elective II	BCM-A-DSE A3-TH	Advanced Cell Biology	<ul style="list-style-type: none"> <li>• Comprehending about the concept of nuclear transport and important signal transduction methods.</li> </ul>

		BCM-A-DSE A3-P	Advanced Cell Biology-Practical	<ul style="list-style-type: none"> <li>• Moreover, the role of hormones in cell signalling is also focussed.</li> <li>• Clear conception about cell cycle apoptosis, necrosis with its related topics</li> <li>• Concept of stem cells, Therapeutic cloning is also included</li> <li>• Efforts will also be there to teach about Cancer Biology.</li> <li>• Study of the morphology of cancer cells.</li> <li>• Cell count of RBC/Yeast by haemocytometer</li> <li>• Study of death assay by trypan blue and mitosis in onion root tip.</li> <li>• Microscopic measurement of bacterial /yeast cell.</li> <li>• Demonstration of ladder assay.</li> </ul>
	Discipline Specific Elective III	BCM-A-DSE B1-TH	Advanced Biochemistry	<ul style="list-style-type: none"> <li>• An ability to acquire in-depth theoretical and practical knowledge of Biochemistry and the ability to apply the acquired knowledge to provide cost efficient solutions in Biochemistry.</li> <li>• An ability to properly understand the technical aspects of existing technologies that help in addressing the biological and medical challenges faced by humankind.</li> <li>• An ability to translate knowledge of Biochemistry to address environmental, intellectual, societal and ethical issues through case studies presented in the class.</li> <li>• Emphasis is put on the structural study of protein and its folding.</li> <li>• Various types of biomolecular interactions.</li> <li>• Drug discovery and development.</li> <li>• Students can estimate</li> </ul>

		BCM-A-DSE B1-P	Advanced Biochemistry-Practical	<p>proteins from standard curve.</p> <ul style="list-style-type: none"> <li>• Spectroscopic study of DNA-small molecule interaction.</li> <li>• Analysis of interaction study through softwares such as Pymol and Molecular Docking.</li> <li>• In silico visualization of protein with a drug.</li> </ul>
	Discipline Specific Elective IV	BCM-A-DSE B3-TH  BCM-A-DSE B3-P	Molecular Diagnostics  Molecular Diagnostics-Practical	<p>A clear concept on the investigation, evaluation and interpretation of molecular diagnostic cases. Students will be able to select and recommend appropriate molecular assays after its diagnosis.</p> <ul style="list-style-type: none"> <li>• Students will have an idea about the inborn error diseases.</li> <li>• The various diagnostic methods to identify and assess diseases from the symptoms observed.</li> <li>• Hands on experience in estimating the lipid profile, enzymes etc.,</li> <li>• Knowing about the histology/cytology of cancer cells in comparison to normal cells.</li> <li>• In addition to know the features of <i>P. vivax</i> and <i>P. falciparum</i>.</li> </ul>

ENVIRONMENTAL SCIENCE

**ENVIRONMENTAL SCIENCE (Hons.)  
&  
ENVIRONMENTAL SCIENCE (GEN.)**

**Programme Outcome (PO):**

The programmes – Environmental Science (Hons.) and Environmental Science (General) had been developed with two basic goals. The first one being to spread awareness regarding environmental degradation and its’ consequences on the human civilisation, while the second one is capacity building for implementation of policies and strategies related to environmental conservation and augmentation.

The specific goals of the programme are:

- i. To make students well informed on all the components of the environment and their integrities so that the management options can be better facilitated and performed.
- ii. To create human resource available to assess and manage the degradation of environment with use of available technological options.
- iii. To create a group of sensitive young minds, those can penetrate the society and teach the coming generation about the ways of sustainable development.

	Course Code	Course Name	Course Outcome (CO)
<b>SEMESTER 1</b>	CC 1	Earth and Earth Surface Processes	<ul style="list-style-type: none"> <li>• The students will develop knowledge on the basics of earths physical components and processes.</li> <li>• They will acquire basic idea about the stratigraphy of India, its physical systems etc.</li> <li>• They will be able to interpret maps and topographical sheets as the base of environmental study.</li> <li>• They will learn about the fundamentals of Rocks and Minerals along with the techniques of identification.</li> </ul>
	CC 2	Physics and Chemistry of Environment	<ul style="list-style-type: none"> <li>• Students will learn about the fundamentals of physical processes that run the environmental system.</li> <li>• Thermodynamics and its application in environmental system are also being dealt with in this course.</li> <li>• They will gather idea on basic chemistry and their relationships with different environmental components.</li> <li>• They will also acquire knowledge on the green chemistry and other chemicals being used in civilization along with their interactions with the nature.</li> <li>• The students will be well versed with some of the water and soil quality parameters.</li> </ul>
<b>SEMEST</b>	CC 3	Water and Water Resources Management	<ul style="list-style-type: none"> <li>• Development of knowledge on the water resources availability, stress and management.</li> </ul>

			<ul style="list-style-type: none"> <li>Acquiring details information on the water chemistry, particularly in reference to the environment.</li> <li>Knowledge acquisition on groundwater hydrology, pollution and recharge.</li> <li>Learning on watershed management and other ways of water conservation and use.</li> </ul>
	CC 4	Land Management and Soil Conservation	<ul style="list-style-type: none"> <li>Students learn about the structure and composition of soil and land.</li> <li>They will acquire knowledge on different causes of land erosion and their conservation strategies.</li> <li>They will be well versed with ways of land management, its tenancy and ways of land sharing to maximise the returns from a piece of land.</li> <li>They will learn a few soil quality parameters particularly in relation to the soil fertility.</li> </ul>
<b>SEMESTER – III</b>	CC 5	Ecology and Ecosystem	<ul style="list-style-type: none"> <li>Students will gather vivid knowledge on ecology including population ecology, community ecology and ecosystem ecology.</li> <li>They will also learn about different types of ecosystems of the world.</li> <li>The field work on ecosystem enables them to understand the real structure of the ecosystems and their integrity.</li> </ul>
	CC 6	Environmental Biotechnology	<ul style="list-style-type: none"> <li>The students will come to know about the basics of Biotechnology and its use in different fields of environmental science and technology.</li> <li>They will learn about different types of environmental biotechnology for waste management and resource extractions.</li> <li>The practical with preparation of review article is expected to make the students ready to read and write scientific communications.</li> </ul>
	CC 7	Atmosphere and Global Climate Change	<ul style="list-style-type: none"> <li>This course is expected to create in depth knowledge on the global atmospheric and oceanic circulation and its effects on the global climate and vice versa.</li> <li>The students will acquire in dept knowledge on global issues like greenhouse effects, climate change, ozone depletion etc.</li> <li>They will also gather knowledge on the global efforts to curb down the aforesaid problems.</li> <li>In practical they will be ready with the knowledge of climatological parameter recordings.</li> </ul>
	SEC A1	Remote Sensing, Geographical Information System and Modelling	<ul style="list-style-type: none"> <li>This course is expected to give the students details knowledge on the Remote Sensing and GIS technologies and their application in Environmental Monitoring and management.</li> </ul>
	CC 8	Systematics and Biogeography	<ul style="list-style-type: none"> <li>The students will develop a concept on the ways and applications of systematics in living world.</li> </ul>
<b>SEMESTER – IV</b>			



			<ul style="list-style-type: none"> <li>The course also leads to learning of different biogeographical realms and their implications on the distribution of biodiversity.</li> </ul>
	CC 9	Urban Ecosystem	<ul style="list-style-type: none"> <li>To develop concept of urban development and the impacts of urbanisation on the environment.</li> <li>It will make the students well verse on the ways of managing the urban development aligned with the sustainable development goals, thorough use of green technology, green infrastructure and sustainable energy options.</li> <li>The Urban Survey module in practical will give the students exposure to the ways of survey and its limitations.</li> <li></li> </ul>
	CC 10	Environmental Legislation and Policy	<ul style="list-style-type: none"> <li>This course is expected to inculcate knowledge about the legislative tools available in India and at the global context to fight back the environmental degradation.</li> <li>The law review in practical enables the students with the ways of legal practices in the field of environmental science.</li> <li></li> </ul>
	SEC B1	Environmental Impact and Risk Assessment	<ul style="list-style-type: none"> <li>This course is designed to make students well versed with the procedure and scopes of environmental impact assessment, the major application in the field of corporate environment management.</li> </ul>
SEMESTER – V	CC 11	Biodiversity and Conservation Biology	<ul style="list-style-type: none"> <li>The students acquire knowledge on levels of biodiversity and its assessment technologies.</li> <li>To make the students well acquainted with the importance, threats and management options for biodiversity and its conservation scopes and techniques.</li> <li>The practical segment inculcates ability of the students in practice of biodiversity assessment and their field applications.</li> </ul>
	CC 12	Organismal and Evolutionary Biology	<ul style="list-style-type: none"> <li>This course teaches the students about the biomolecular aspects of the life.</li> <li>It also deals with the evolutionary biology to make students well aware of the ways of evolution and changes since origin of life.</li> <li>The practical segment includes testing of biochemical molecules, to get the students exposed to the procedure, which may be needed in assessment of stress etc.</li> </ul>
	DSE A1	Energy and Environment	<ul style="list-style-type: none"> <li>This course develops in depth idea about the present-day energy use and its impact on the environment.</li> <li>This also gives idea on the alternative energy resources with less potential of environmental degradation.</li> <li>The students gets knowledge about the non-conventional and renewable energy technology too.</li> </ul>

			<ul style="list-style-type: none"> <li>The practical on energy audit provides the students with the in hand experience of doing energy accounting and suggesting the way of energy efficient activities.</li> </ul>
	DSE B1.1	Solid waste management	<ul style="list-style-type: none"> <li>This course is expected to give the students a vivid idea on the different kinds of solid waste and their management options.</li> <li>It provides with the exposure to e-waste, biomedical waste, municipal solid waste, plastic wastes etc.</li> <li>The field work in practical, provides the students with exposure to waste management site, enabling them understanding the actual scenario.</li> </ul>
<b>SEMESTER – VI</b>	CC 13	Environmental Pollution and Human Health	<ul style="list-style-type: none"> <li>Through this course students are expected to get exposure to as many as kinds of pollutions, their effects on health and environment and also the mitigation options.</li> <li>The practical segment is expected to make them capable doing pollution monitoring on their own, if supplied with the required materials and instrumentation.</li> </ul>
	CC 14	Natural Resource Management and Sustainability	<ul style="list-style-type: none"> <li>This course makes students aware of the details of natural resources and their availability. The scope and ways of extraction/ exploitation resources and environmental impact of resource exploitation.</li> <li>The students are also made aware of the sustainability concept and ways of sustainable development.</li> <li>The project work in the course is designed to provide students with the scope of actual field research methods and expose them to the nitty-gritty of research activities.</li> </ul>
	DSE A2.1	Environmental Economics and Statistics	<ul style="list-style-type: none"> <li>To provide the students with idea of relationships of economic theories with environmental changes and the policy formulation for sustainable or ecofriendly development.</li> <li>To provide with the tools of environmental valuation and their importance.</li> <li>To develop the basic knowledge of statistical analysis of data and their interpretation, enabling the students to handle the data.</li> </ul>
	DSE B2	Natural Hazards and Disaster Management	<ul style="list-style-type: none"> <li>The major outcome of this paper is to make the students well aware of the causes, nature and mitigation of natural and manmade disasters.</li> <li>It is expected that the students will be able to formulate disaster management plan and to implement the same in case of need.</li> <li>The practical activity of disaster management plan formulation provide the students with the scope of working in actual field of disaster management.</li> </ul>

<b>SEMESTER – I</b>	CC 1/GE1	Fundamentals of Environmental Science	<ul style="list-style-type: none"> <li>• The students acquires knowledge on basic components and functioning of the environmental system.</li> <li>• It also make the students well aware of the recent changes in the environmental conditions and their implications of human and nature.</li> <li>• The assignment on current issues on environment is expected to make the students more intuitive about the environmental degradation and their management.</li> </ul>
<b>SEMESTER – II</b>	CC 2/GE2	Ecology and Biodiversity	<ul style="list-style-type: none"> <li>• Students will gather vivid knowledge on ecology including population ecology, community ecology and ecosystem ecology.</li> <li>• They will also learn about different types of ecosystems of the world.</li> <li>• They also acquire knowledge on the biodiversity, its conservation strategies and assessment.</li> </ul>
<b>SEMESTER – III</b>	CC 3/GE3	Chemistry of the Environment	<ul style="list-style-type: none"> <li>• They will gather idea on basic chemistry and their relationships with different environmental components.</li> <li>• They will also acquire knowledge on the green chemistry and other chemicals being used in civilization along with their interactions with the nature.</li> <li>• The students will be well versed with some of the water and soil quality parameters.</li> </ul>
<b>SEMESTER – IV</b>	CC4/GE4	Environmental Physics and Meteorology	<ul style="list-style-type: none"> <li>• Students will learn about the fundamentals of physical processes that run the environmental system.</li> <li>• Thermodynamics and its application in environmental system are also being dealt with in this course.</li> <li>• They are also expected to built idea on the fundamentals of meteorological processes, monitoring and recording.</li> </ul>

<b>Course Outcome: B.SC HONOURS ELECTRONICNS CBCS</b>		
<b>FIRST SEMESTER</b>		
<b>COURSE TITLE AND CODE THEORY</b>	<b>BASIC CKT THEORY AND NETWORK ANALYSIS CC-1</b>	<b>NO. OF CREDITS-4</b>
C01	Understanding Basic Circuit Concepts:	
C02	Broad discussion on Circuit Analysis:	
C03	DC transient Analysis, AC Circuit Analysis:	
C04	Network Theorems and its application	
C05	Knowledge about Two Port Networks, Network Graph Theory and its applications.	
<b>PRACTICAL</b>	<b>Basic Circuit Theory and Network Analysis Lab</b>	<b>2</b>
C01	<p>Familiarization with:</p> <p>(a) Resistance in Series, Parallel and Series-Parallel; (b) Capacitors and Inductors in Series and Parallel;</p> <p>(c) Multimeter - Checking of Components; (d) Voltage Sources in Series, Parallel and Series-Parallel;</p> <p>(e) Voltage and Current Dividers.</p> <p>2. Measurement of Amplitude, Frequency and Phase Difference using CRO.</p> <p>3. Verification of Kirchoff's Law.</p> <p>4. Verification of Norton's Theorem.</p> <p>5. Verification of Thevenin's Theorem.</p> <p>6. Verification of Superposition Theorem.</p> <p>7. Verification of the Maximum Power Transfer Theorem.</p> <p>8. RC Circuits: Time Constant, Differentiator, Integrator.</p> <p>9. Designing of a Low Pass RC Filter and study of its Frequency Response.</p> <p>10. Designing of a High Pass RC Filter and study of its Frequency Response.</p> <p>11. Study of the Frequency Response of a Series LCR Circuit and determination of its (a) Resonant Frequency;</p> <p>(b) Impedance at Resonance; (c) Quality Factor Q; (d) Band Width.</p>	
<b>THEORY</b>	<b>Mathematics Foundation for Electronics CC2</b>	<b>4</b>

C01	Ordinary Differential Equation:	
C02	Knowledge about Series Solution of Differential Equations and Special Functions:	
C03	Matrices, Sequences and Series, Complex Variables and Functions,	
C04	Getting acquainted with Laplace Transform	
PRACTICAL	Mathematics Foundation for Electronics Lab	<b>2</b>
C01	Scilab/MATLAB/Any Other Mathematical Simulation Software 1. Solution of First Order Differential Equations. 2. Solution of Second Order Homogeneous Differential Equations. 3. Solution of Second Order Non-Homogeneous Differential Equations. 4. Convergence of a given Series. 5. Divergence of a given Series. 6. Solution of Linear System of Equations using Gauss Elimination Method. 7. Solution of Linear System of Equations using Gauss-Seidel Method. 8. Solution of Linear System of Equations using L-U Decomposition Method.	
THEORY	Ability Enhancement Compulsory Course (AECC) – 1	<b>2</b>
C01	Communicative English/MIL	
THEORY + PRACTICAL	Generic Elective (GE) - 1	<b>6</b>
C01	Choose 1 Paper from other Subject/Discipline	
<b>SECOND SEMESTER</b>		
THEORY	Applied Physics CC3	<b>4</b>
C01	Broad overview on Physics of Crystalline Solids	
C02	Quantum Mechanics	
C03	Mechanical Properties of Materials, Thermal Properties, Electric Properties, Magnetic Properties:	
C04	Statistical Mechanics	
PRACTICAL	Applied Physics Lab	<b>2</b>
C01	1. To Measure the Resistivity of a Si Crystal with Temperature by Four-Probe Method from Room Temperature to 200 OC). 2. To Determine the Value of Boltzmann Constant by Studying Forward Characteristics of Diode. 3. To Determine the Value of Planck's Constant by using LEDs of Different Wavelengths. 4. Simulation Studies: (a) Find Lowest Energy Eigenvalues for 1-D Schrodinger Equation.	

	(b) Plotting Tunneling Probability as a Function of Barrier Width. (c) Plot Energy Band-Diagram corresponding to Different Potential Profile.	
<b>THEORY</b>	<b>C Programming and Data Structures CC4</b>	<b>4</b>
C01	C Programming Language, Decision Making, Branching and Looping	
C02	Structures, Introduction to C++	
C03	Data Structures, Searching and Sorting:	
<b>PRACTICAL</b>	<b>C Programming and Data Structures Lab</b>	<b>2</b>
C01	Students should do programs which make use of the different programming techniques and data structures.	
<b>THEORY</b>	<b>Ability Enhancement Compulsory Course (AECC) – 2</b>	<b>2</b>
C01	Environmental Science	
<b>THEORY + PRACTICAL</b>	<b>Generic Elective (GE) - 2</b>	<b>6</b>
C01	Choose 1 Paper from other Subject/Discipline	
<b>THIRD SEMESTER</b>		
<b>THEORY</b>	<b>Semiconductor Devices CC5</b>	<b>4</b>
C01	Semiconductor Basics: Carrier Transport Phenomena	
C02	Physics of Junctions: Homojunction and Heterojunction PN Junction Diode	
C03	Application of Junction Properties Bipolar Junction Transistors (BJT)	
	Field Effect Transistors JFET MOSFET Power Devices	
<b>PRACTICAL</b>	<b>Semiconductor Devices Lab</b>	<b>2</b>
C01	1. Study of the I-V Characteristics of PN Junction Diode and Zener Diode. 2. Study of the I-V Characteristics of the Common Emitter Configuration of BJT and obtain $r_i$ , $r_o$ , $\beta$ . 3. Study of the I-V Characteristics of the Common Base Configuration of BJT and obtain $r_i$ , $r_o$ , $\alpha$ . 4. Study of the I-V Characteristics of the SCR. 5. Study of the I-V Characteristics of the Diac. 6. Study of the I-V Characteristics of the Triac. 7. Study of the I-V Characteristics of JFET/MOSFET. 8. Study of Characteristics of Solar Cell. 9. Study of Hall Effect.	

THEORY	Electronic Circuits CC6	4
C01	Diode Circuits, Bipolar Junction Transistor Circuits, Feedback Amplifiers	
C02	MOSFET Circuits, Power Amplifiers, Single Tuned Amplifiers	
PRACTICAL	Electronic Circuits Lab	2
C01	<p><b>Hardware and Circuit Simulation Software:</b></p> <ol style="list-style-type: none"> <li>1. Study of the Half-Wave Rectifier and Full-Wave (Center-tap and Bridge) Rectifier.</li> <li>2. Study of Power Supply using C Filter and Zener Diode.</li> <li>3. Designing and Testing of 5V/9V DC Regulated Power Supply using Two Transistors and find its Load Regulation.</li> <li>4. Study of Clipping and Clamping Circuits.</li> <li>5. Study of Fixed Bias, Voltage Divider Bias and Collector-to-Base Bias Feedback Configuration for Transistors.</li> <li>6. Designing of a Single Stage CE Amplifier.</li> <li>7. Study of the Colpitt's Oscillator.</li> <li>8. Study of the Phase Shift Oscillator</li> <li>9. Study of the Frequency Response of Common Source FET Amplifier.</li> </ol>	
THEORY	Electromagnetics CC7	4
C01	Vector Analysis, Poisson's Equation and Laplace Equation,	
C02	Electrostatics, Magnetostatics	
C03	Time-Varying Fields and Maxwell's Equations	
C04	Electromagnetic Wave Propagation	
PRACTICAL	Electromagnetics Lab	2
C01	<p><b>Scilab</b></p> <ol style="list-style-type: none"> <li>1. Understanding and Plotting Vectors.</li> <li>2. Transformation of Vectors into Various Coordinate Systems.</li> <li>3. 2D and 3D Graphical Plotting with Change of View and Rotation.</li> <li>4. Representation of the Gradient of a Scalar Field, Divergence and Curl of Vector Fields.</li> <li>5. Plots of Electric Field and Electric Potential due to Charge Distributions.</li> <li>6. Plots of Magnetic Flux Density due to Current Carrying Wire.</li> <li>7. Programs and Contour Plots to Illustrate Method of Images.</li> <li>8. Solutions of Poisson and Laplace Equations - Contour Plots of Charge and Potential Distributions.</li> <li>9. Introduction to Computational Electromagnetics - Simple Boundary Value Problems by Finite Difference/Finite Element Methods.</li> </ol>	
THEORY	Design and Fabrication of Printed Circuit Boards	2
	Skill Enhancement Course (SEC) - 1	
C01	PCB Fundamentals, Schematic and Layout Design, Technology of PCB	

C02	PCB Technology:	
THEORY + PRACTICAL	Generic Elective (GE) - 3	6
C01	Choose 1 Paper from other Subject/Discipline	
<b>FOURTH SEMESTER</b>		
THEORY	Operational Amplifiers and Applications CC8	4
C01	Basic Operational Amplifier, Op-Amp Parameters, Op-Amp Circuits and Applications, Comparators	
C02	Signal Generators, Timers Circuits,	
C03	Fixed and Variable IC Regulators, Signal Conditioning Circuits	
PRACTICAL	Operational Amplifiers and Applications Lab	2
C01	<p style="text-align: center;"><b>Hardware Analysis for the following</b></p> <ol style="list-style-type: none"> <li>1. Study of Op-Amp Characteristics: CMRR and Slew Rate.</li> <li>2. Designing of an Amplifier of given Gain for an Inverting and Non-Inverting Configuration using an Op-Amp.</li> <li>3. Designing of Analog Adder and Subtractor Circuit.</li> <li>4. Designing of an Integrator using Op-Amp for a given Specification and Study its Frequency Response.</li> <li>5. Designing of a Differentiator using Op-Amp for a given Specification and Study its Frequency Response.</li> <li>6. Designing of a First Order Low-Pass Filter using Op-Amp.</li> <li>7. Designing of a First Order High-Pass Filter using Op-Amp.</li> <li>8. Designing of a RC Phase Shift Oscillator using Op-Amp.</li> <li>9. Designing of a Wien Bridge Oscillator using Op-Amp.</li> <li>10. Study of IC 555 as Astable Multivibrator.</li> <li>11. Study of IC 555 as Monostable Multivibrator.</li> <li>12. Designing of Fixed Voltage Power Supply using IC Regulators using 78 Series and 79 Series.</li> </ol>	
THEORY	Digital Electronics and VHDL CC9	4
C01	Number System and Codes, Logic Gates and Boolean Algebra, Digital Logic Families	
C02	Combinational Logic Analysis and Design Sequential Logic Design	
C03	Programmable Logic Devices VHDL	
PRACTICAL	Digital Electronics and VHDL Lab	2
C01	<p style="text-align: center;"><b>Hardware</b></p> <ol style="list-style-type: none"> <li>1. To Verify and Design AND, OR, NOT and XOR Gates using NAND Gates.</li> <li>2. To Convert a Boolean Expression into Logic Gate Circuit and Assemble it using</li> </ol>	



	<p>Logic Gate IC's.</p> <ol style="list-style-type: none"> <li>Design Half and Full Adder.</li> <li>Design Half and Full Subtractor.</li> <li>Design Seven Segment Display Driver.</li> <li>Design 4 × 1 Multiplexer using Gates.</li> <li>To Build Flip-Flop Circuits (RS, Clocked RS, D-type) using Elementary Gates.</li> <li>Design Counters (Ring, Ripple, Johnson and Mod-N) using D/T/JK Flip-Flop.</li> <li>Design Shift Register and Study Serial and Parallel Shifting of Data.</li> </ol> <p style="text-align: center;"><b>Experiments in VHDL (Circuit Simulation)</b></p> <ol style="list-style-type: none"> <li>Write Code to Realize Basic and Derived Logic Gates.</li> <li>Half Adder and Full Adder using Basic and Derived Gates.</li> <li>Half Subtractor and Full Subtractor using Basic and Derived Gates.</li> <li>Clocked D FF, T FF and JK FF (with Reset Inputs).</li> <li>Multiplexer (4×1, 8×1) and Demultiplexer using Logic Gates.</li> <li>Decoder (2×4, 3×8), Encoders and Priority Encoders.</li> <li>Design and Simulation of 4-Bit Adder.</li> <li>Code Converters (Binary to Gray and Vice Versa).</li> <li>2-bit Magnitude Comparator.</li> <li>3-bit Ripple Counter.</li> </ol>	
<b>THEORY</b>	<b>Signals and Systems CC10</b>	<b>4</b>
C01 C02	Signals and Systems, Linear Time Invariant Systems (LTI) Fourier Series, Fourier Transforms, Z-Transform	
<b>PRACTICAL</b>	<b>Signals and Systems Lab</b>	<b>2</b>
C01	<p style="text-align: center;"><b>Scilab</b></p> <ol style="list-style-type: none"> <li>Generation of Continuous Time Signals.</li> <li>Generation of Discrete Time Signals.</li> <li>Time Shifting and Time Scaling of Signals.</li> <li>Convolution of Signals.</li> <li>Solution of Difference Equations.</li> <li>Fourier Series Representation of Continuous Time Signals.</li> <li>Fourier Transform of Continuous Time Signals.</li> <li>Laplace Transform of Continuous Time Signals.</li> <li>Introduction to Xcos/Similar Function and Calculation of Output of Systems Represented by Block Diagrams.</li> </ol>	
<b>THEORY</b>	<b>Internet and Java Programming Skill Enhancement Course (SEC)</b>	<b>2</b>
C01 C02 C03	Internet, Data types, Arrays, Operators, Flow Control, Exception Handling File Handling	
<b>THEORY + PRACTICAL</b>	<b>Generic Elective (GE) - 4</b>	<b>6</b>
C01	Choose 1 Paper from other Subject/Discipline	

<b>FIFTH SEMESTER</b>		
<b>THEORY</b>	<b>Electronic Instrumentation CC11</b>	<b>4</b>
C01 C02 C03 C04 C05 C06	Qualities of Measurement, Basic Measurement Instruments, Connectors and Probes, Measurement of Resistance and Impedance A-D and D-A Conversion Oscilloscope Signal Generators Transducers and Sensors	
<b>PRACTIAL</b>	<b>Electronic Instrumentation Lab</b>	<b>2</b>
C01	1. Design of Multi Range Ammeter and Voltmeter using Galvanometer. 2. Measurement of Resistance by Wheatstone Bridge and Measurement of Bridge Sensitivity. 3. Measurement of Capacitance by de' Sautys. 4. Measure of Low Resistance by Kelvin's Double Bridge. 5. Design and Implementation of Instrumentation Amplifier using 741 Op-Amp. 6. To Determine the Characteristics of Resistance Transducer - Strain Gauge (Measurement of Strain using Half and Full Bridge). 7. To Determine the Characteristics of LVDT. 8. To Determine the Characteristics of Thermistors and RTD. 9. Measurement of Temperature by Thermocouples and Study of Transducers like AD590 (Two Terminal Temperature Sensor), PT-100, J- type, K-type. 10. To Study the Characteristics of LDR, Photodiode, and Phototransistor: (a) Variable Illumination; (b) Linear Displacement. 11. Design and Implementation of Temperature Controller.	
<b>THEORY</b>	<b>Microprocessors and Microcontrollers CC12</b>	<b>4</b>
C01 C02	Introduction to Microprocessors, Microprocessor 8085, 8085 Instructions Introduction to Microcontrollers, PIC16F887 Microcontroller, Interfacing to PIC16F887	
<b>PRACTICAL</b>	<b>Microprocessors and Microcontrollers Lab</b>	<b>2</b>
C01	Assembly Language Programming: 1. Program to Transfer a Block of Data. 2. Program for Multibyte Addition. 3. Program for Multibyte Subtraction. 4. Program to Multiply Two 8 Bit Numbers. 5. Program to Divide a 16 Bit Number by 8 Bit Number. 6. Program to Search a given Number in a given List. 7. Program to Generate Terms of Fibonacci Series. 8. Program to find Minimum and Maximum among N Numbers. 9. Program to find the Square Root of an Integer. 10. Program to find GCD of Two Numbers. 11. Program to Sort Numbers in Ascending/Descending Order.	

C02	12. Program to Verify the Truth Table of Logic Gates.  PIC Microcontroller Programming:	
<b>THEORY</b>	<b>Control Systems (DSE-1-A-2) Theory</b>	<b>4</b>
C01 C02 C03	Introduction to Control Systems, Time Domain Analysis, Concept of Stability Frequency Domain Analysis, State Space Analysis, Controllers and Compensation Techniques	
<b>PRACTICAL</b>	<b>Control Systems Lab</b>	<b>2</b>
C01	<b>Implementation using Hardware and Scilab</b> 1. To Study Characteristics of: (a) Synchro Transmitter Receiver; (b) Synchro as Error Detector. 2. To Study Position Control of DC Motor. 3. To Study Speed Control of DC Motor. 4. To Find Characteristics of AC Servo Motor. 5. To Study Time Response of Type 0, 1 and 2 Systems. 6. To Study Frequency Response of First and Second Order Systems. 7. To Study Time Response Characteristics of Second Order System. 8. To Study Effect of Damping Factor on Performance of Second Order System. 9. To Study Frequency Response of Lead and Lag Networks. 10. Study of P, PI and PID Controller.	
<b>THEORY</b>	<b>Power Electronics (DSE-2-B-2)</b>	<b>4</b>
C01 C02 C03 C04	Power Devices, SCR, Diac and Triac, IGBT Application of SCR Power MOSFETs Power Inverters, Choppers, Regulators and Converters, Electromechanical Machines	
<b>PRACTICAL</b>	<b>Power Electronics Lab</b>	<b>2</b>
C01,	1. Study of I-V Characteristics of DIAC. 2. Study of I-V Characteristics of a TRIAC. 3. Study of I-V Characteristics of a SCR. 4. SCR as a Half Wave and Full Wave Rectifiers with R and RL Loads. 5. DC Motor Control using SCR. 6. DC Motor Control using TRIAC. 7. AC Voltage Controller using TRIAC with UJT Triggering. 8. Study of Parallel and Bridge Inverter. 9. Design of Snubber Circuit. 10. V-I Characteristic of MOSFET and IGBT (Both).	

	11. Study of Chopper Circuits.	
<b>SIXTH SEMESTER</b>		
<b>THEORY</b>	<b>Communication Electronics CC13</b>	<b>4</b>
C01 C02	Electronic Communication, Amplitude Modulation, Angle Modulation, Pulse Analog Modulation, Pulse Code Modulation, Digital Carrier Modulation Techniques	
<b>PRACTICAL</b>		
<b>PRACTICAL</b>	<b>Communication Electronics Lab</b>	<b>2</b>
C01	<b>Circuit Simulation Software</b> 1. Study of Amplitude Modulation. 2. Study of Amplitude Demodulation. 3. Study of Frequency Modulation. 4. Study of Frequency Demodulation. 5. Study of Pulse Amplitude Modulation. 6. Study of Pulse Width Modulation. 7. Study of Pulse Position Modulation. 8. Study of Pulse Code Modulation. 9. Study of Amplitude Shift Keying. 10. Study of Phase Shift Keying. 11. Study of Frequency Shift Keying.	
<b>THEORY</b>		
<b>THEORY</b>	<b>Photonics CC14</b>	<b>4</b>
C01 C02	Light as Electromagnetic Wave, Interference, Diffraction, Polarization: Light Emitting Diodes, Lasers, Photo detectors, LCD Displays, Guided Waves and Optical Fiber	
<b>PRACTICAL</b>		
<b>PRACTICAL</b>	<b>Photonics Lab</b>	<b>2</b>
C01	1. To Determine Wavelength of Sodium Light using Newton's Rings. 2. To Determine the Resolving Power and Dispersive Power of Diffraction Grating. 3. Diffraction Experiments using a Laser. 4. To Determine the Specific Rotation of Scan Sugar using Polarimeter. 5. To Determine Characteristics of LEDs and Photo-Detector. 6. To Measure the Numerical Aperture of an Optical Fiber.	
<b>THEORY</b>		
<b>THEORY</b>	<b>Basic VLSI Design (DSE-3-A-1)</b>	<b>4</b>
C01	MOS, MOS Inverter, Combinational MOS Logic Design, Memory Design.	
<b>PRACTICAL</b>		
<b>PRACTICAL</b>	<b>Basic VLSI Design Lab</b>	<b>2</b>
C01	<b>SCILAB</b> 1. To Plot the Output Characteristics and Transfer Characteristics of n-Channel and p-Channel MOSFET. 2. To Design and Plot the Static (VTC) and Dynamic Characteristics of Digital	

	<p>CMOS Inverter.</p> <p>3. To Design and Plot the Output Characteristics of 3-Inverter Ring Oscillator.</p> <p>4. To Design and Plot the Dynamic Characteristics of 2-Input NAND, NOR, XOR and XNOR Logic Gates using CMOS Technology.</p> <p>5. To Design and Plot the Characteristics of a 4×1 Digital Multiplexer using Pass Transistor Logic.</p> <p>6. To Design and Plot the Characteristics of a Positive and Negative Latch Based on Multiplexers.</p> <p>7. To Design and Plot the Characteristics of a Master-Slave Positive and Negative Edge Triggered registers</p>	
<b>THEORY</b>	<b>Transmission Lines, Antenna and Microwave Devices (DSE-4-B-2)</b>	<b>4</b>
C01	Transmission Lines, Guided Waves and Waveguides	
C02	Antenna Fundamentals and Parameters	
C03	Antenna as Transmitter/Receiver	
C04	Types of Antennas (Qualitative Study Only)	
C05	Propagation of Radio Waves, Microwave Devices	
<b>PRACTICAL</b>	<b>Transmission Lines, Antenna and Microwave Devices Lab</b>	<b>2</b>
C01	<ol style="list-style-type: none"> <li>1. Program to Determine the Phasor of Forward Propagating Field.</li> <li>2. Program to Determine the Instantaneous Field of Plane Wave.</li> <li>3. Program to Find the Phase Constant, Phase Velocity, Electric Field Intensity and Intrinsic Ratio.</li> <li>4. Program to Find Skin Depth, Loss Tangent and Phase Velocity.</li> <li>5. Program to Determine the Total Voltage as Function of Time and Position in Loss Less Transmission Line.</li> <li>6. Program to Find the Characteristic Impedance, Phase Constant and Phase Velocity.</li> <li>7. Program to Find the Output Power and Attenuation Coefficient.</li> <li>8. Program to Find the Power Dissipated in Lossless Transmission Line.</li> <li>9. Program to Find the Total Loss in Lossy Lines.</li> <li>10. Program to Find the Load Impedance of Slotted Line.</li> <li>11. Program to Find the Input Impedance of Transmission Line Terminated with Pure Capacitive Impedance.</li> <li>12. Program to Determine the Operating Range of Frequency for TE<sub>10</sub> Mode of Air-Filled Rectangular Waveguide.</li> <li>13. Program to Determine Directivity, Bandwidth, Beamwidth of Antenna.</li> <li>14. Program to Determine Diameter of Parabolic Reflector.</li> <li>15. Program to Find Minimum Distance between Primary and Secondary antenna.</li> <li>16. Simple Problems using Smith Chart.</li> </ol>	

## Course Outcomes of B. sc.(Statistics Hons.)

B.Sc. Programs specialization in Statistics typically aim to provide students with a strong foundation in the following main objectives:

**Data Visualizations Expertise:** The details of the *graphical representation* give the students a strong base to analyze real life data.

**Statistical Computing Expertise:** Different types of *computing techniques using different software* give the students a strong base to analyze real life data accurately.

**Data Interpretation Expertise:** The details of the *Statistical Inference* theory and practical problem-solving techniques give the students a strong base to analyze real life data make proper conclusions.

**Data Management Expertise:** Different types of *Data base management* - techniques give the students a strong base to store real life data properly and precisely.

**Data Simulation Expertise:** : Different types of *Simulating techniques* give the students a strong base to generate real life data accurately.

**Data Modeling Expertise:** : Different types of *Statistical Modeling techniques* give the students a strong base to analyze real life data purposively.

**Official Data Analysis Expertise:** The details of the *Official Statistics* theory and practical problem-solving techniques give the students a strong base to analyze govt. official data and make proper conclusions.

**Demographical Data Analysis Expertise:** The details of the *Vital statistics* theory and practical problem-solving techniques give the students a strong base to analyze real life Demographical data and make proper conclusions.

**Economical Data Analysis Expertise:** The details of the *Economic Statistics* theory and practical problem-solving techniques give the students a strong base to analyze real life Economical data and make proper conclusions.

**Industrial Data Analysis Expertise:** The details of the *Statistical Quality Control* theory and practical problem-solving techniques give the students a strong base to analyze real life Industrial data and make proper conclusions.

**Medical Data Analysis Expertise:** The details of the *Survival Analysis* theory and practical problem-solving techniques give the students a strong base to analyze real life medical data and make proper conclusions.

**Operational Data Analysis Expertise:** The details of the *Operations Research* theory and practical problem-solving techniques give the students a strong base to analyze real life managerial data and make proper optimum conclusions.

<b>Course Outcome</b>
<b>SEMESTER-1</b>
<b>Descriptive Statistics (cc1):</b> <ol style="list-style-type: none"> <li>1. Give knowledge about Data collection, Table constructions, graphical representations and visual interpretation.</li> <li>2. Different theoretical formulae, their inter relationships &amp; different results creates a strong base in the development of data analysis.</li> </ol>
<b>Descriptive Statistics Practical (cc1P):</b> <ol style="list-style-type: none"> <li>1. Give practical experience about Data collection, Table constructions, graphical representations and visual interpretation.</li> <li>2. Give practical experience about computing different measures of Central Tendency, Dispersion, Skewness &amp; Kurtosis, Association measures etc.</li> </ol>
<b>Probability and Probability Distribution-1 (cc2):</b> <ol style="list-style-type: none"> <li>1. Give knowledge about Objective &amp; Subjective definition of probability, Random Variable, Popular Probability Distributions.</li> <li>2. Different theoretical formulae, their inter relationships &amp; different results create a strong base in the development of data analysis.</li> </ol>
<b>Probability and Probability Distribution-1 Practical (cc2P):</b> <ol style="list-style-type: none"> <li>1. Give practical experience about calculation of probability in real life data.</li> <li>2. Give practical experience about computing different Probability measures of Central Tendency, Dispersion, Skewness &amp; Kurtosis, Association measures etc. in case of theoretical study.</li> </ol>
<b>SEMESTER-II</b>
<b>Mathematical Analysis (cc3):</b> <ol style="list-style-type: none"> <li>1. Give knowledge about the Real Numbers and their properties.</li> <li>2. Different theoretical formulae, their inter relationships &amp; different results create a strong base in the development of real analysis and their application areas like Maxima-Minima, Integration, Measure Theory.</li> </ol>
<b>Mathematical Analysis Tutorial (cc3):</b>

Give practical experience about application of mathematical analysis theories in real life data.

Probability and Probability Distribution-II (cc4):

1. Give knowledge about definition of conditional probability, Bivariate Random Variable, Popular Univariate & Bivariate [Discrete & Continuous] Probability Distributions.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of data analysis.

Probability and Probability Distribution-II Practical (cc4P):

1. Give practical experience about calculation of probability & different measures of probability distributions in real life data.
2. Give practical experience about computing different Probability measures of Central Tendency, Dispersion, Skewness & Kurtosis, Association measures etc. in case of theoretical study.
3. Fitting techniques to different probability distribution from real life data.

### SEMESTER-III

Linear Algebra (cc5):

1. Give knowledge about the Vector Space, Matrices & determinants, Eigen Values, Eigen Vectors, Quadratic Form, System of Linear Equations and their properties.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of data analysis.

Linear Algebra Practical(cc5P):

1. Give practical experience about calculation of Rank, Determinant, Inverse of a matrix, Dimension of a vector space, Eigen Values, Eigen Vectors, Basis of a vector space, solving system of linear equations.
2. Reading of multivariate real life data using vector space & matrix to create a strong base in the theoretical development of data analysis.

Demography Vital Statistics(cc6):

1. Give knowledge about Population, Rates & Ratios measures of Fertility & Mortality situations, graphical representations and visual interpretations about population growth, population estimates and population projection.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of Demographical data analysis.



3. Determining the health situation of a country.

Demography Vital Statistics Practical(cc6P):

1. Give practical experience about calculation of Rates & Ratios measures of Fertility & Mortality situations, graphical representations and visual interpretations about population growth, population estimates and population projection.
2. Study the Registration of the data related to demographic study, health, age-sex composition of the population and their effect on society.

Statistical Computing and Numerical Analysis Using C Programming(ccc7):

1. Give knowledge about different algorithm, program in different environment of C language.
2. Give deep knowledge about different types of loop structure used in the program related to probability distribution, descriptive statistics, random sampling, simulation, inference, graphical representation, linear algebra, numerical analysis.
3. Different methods and approaches of numerical analysis in interpolation, solution of transcendental equations, differentiation & integration to create a strong base in the theoretical development of data analysis.

Statistical Computing and Numerical Analysis Using C Programming Practical(ccc7P):

1. Give practical experience about different types of loop structure used in the program related to probability distribution, descriptive statistics, random sampling, simulation, inference, graphical representation, linear algebra, numerical analysis.
2. Hand on practice of data analysis using computer.

R Programming (SEC):

1. Give knowledge about different algorithm, program in different environment of R Software.
2. Give deep knowledge about different types of loop structure used in the program related to probability distribution, descriptive statistics, random sampling, simulation, inference, graphical representation, linear algebra, numerical analysis.

SEMESTER-IV

Survey Sampling & Indian Official Statistics (cc8):

1. Give knowledge about Population, sample, Official Statistics---their nature.
2. Give knowledge about survey, Census techniques.
3. Give knowledge about Different theoretical formulae, their inter relationships & different results create a strong base in the theoretical development of Survey data analysis.

Survey Sampling & Indian Official Statistics Practical (cc8P):

1. Give practical experience about calculation of popular estimators and their comparative efficiencies used in sample survey.
2. Experience of Performing different types of survey and calculate their efficacy.

Statistical Inference-1& Sampling Distributions(cc9):

1. Give knowledge about definition of different terminologies, Principles of inference based on sample.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of data analysis and Decision theory based on sample.

Statistical Inference-1& Sampling Distributions Practical(cc9P):

1. Give practical experience about P-value, Critical Region, Confidence Interval, Type-I & II error, Level of Significance.
2. Different types of Exact & Approximate Testing experience creates a strong base in the theoretical development of data analysis and decision making rules.

Index Number and Time Series Analysis(cc10):

1. Give knowledge about definition of different terminologies, Principles of Index Number based on sample.
2. Study 'Problems in construction of Index number' helps students in the construction of different types of index.
3. Studying the pattern of Time Series Data helps students to analyze the real-life data.
4. Stationary Time series helps students to modify the analysis theoretically.

Index Number and Time Series Analysis Practical(cc10P):

1. Give practical experience about Graphical Representation of time series data, model selection, estimation of model parameters and their interpretation.
2. Time series analysis gives future prediction experiences.
3. Give practical experience about the perfect formulae in a real-life situation.
4. Give aptitude to compare different types of index model.
5. This overall knowledge creates a strong base in the theoretical development of data analysis and decision-making rules.

Data Base Management System (SEC):

1. Give knowledge about definition of different terminologies, Principle of Data Base Management System [DBMS].
2. It creates a logical and scientific structure for storing desired data.
3. It creates a logical and scientific structure for searching query.

4. It creates a logical and scientific structure for Artificial Intelligence.

SEMESTER-V

Statistical Inference-II (cc11):

1. Give knowledge about definition of different terminologies, Principles of inference based on sample.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of data analysis and Decision theory based on sample.
3. In this course we study the Inference in a more advanced mode.

Statistical Inference-II Practical(cc11P):

1. Give practical experience about P-value, Critical Region, Confidence Interval, Type-I & II error, Level of Significance etc.in a more advanced level.
2. It creates a strong base for the students in the field of Market Research.

Linear Models and Regression (cc12):

1. Give knowledge about definition of different terminologies, Principles of Modelling based on sample.
2. Construction of different types of models, their adequacy level, testing of plan parameter & their limitations helps to creates a strong base in the theoretical development of data analysis and Decision theory based on sample.

Linear Models and Regression Practical (cc12P):

1. Give practical experience about construction of Linear & Non-Linear models and their testing procedures.
2. By using various Software creates a strong base in the practical development of data analysis and decision-making rules.

Operations Research (DSE-B1):

1. Give knowledge about definition of different terminologies, Principles of Operations Research based on managerial data.
2. It helps to optimize real time business output.
3. It helps to solve critical managerial problems in a best possible manner.

Operations Research Practical (DSE-B1P):

1. Give practical experience about Inventory problems, Transportation Problems, Assignment Problems, Game Theory Problems.
2. It helps theoretical basis to solve network problems.

Statistical Quality Control (DSE-A1):

1. Give knowledge about definition of different terminologies, Principles of Quality Control based on industrial data.

2. It helps to create quality products in the industries in a continuous process.
3. It creates an alarm for disruption in a continuous production process in the industries.
4. Six-Sigma Control Techniques creates a strong base in the theoretical development of production system and Decision making for the development of industries.

Statistical Quality Control Practical (DSE-B1P):

1. Give practical experience about Process Control, Product Control, Risk Management.
2. It helps to construct Military standards to different field of industry like Health sector, Defense sector, Service sector, Entertainment Industry etc.

SEMESTER-VI

Design of Experiments(cc13):

1. Give knowledge about definition of different terminologies, Principles of ANOVA techniques & Design of Experiment based on sample data.
2. It helps in Agricultural development in advance level.
3. It helps in biological development in advance level.
4. It helps in Sociological development in advance level.
5. It helps in psychological development in advance level.
6. It helps in Sericulture development in advance level.
7. It helps in Pisciculture development in advance level

Design of Experiments Practical(cc13P):

1. Give practical experience about Analysis of Variance application in Experimental Design, Factorial Design.
2. Missing Plot technique helps to test the hypothesis in different areas in the absence of few experimental units.
3. Analysis of Covariance [ANCOVA] helps to test the associations between study variables in different area of interest.

Multivariate Analysis and Nonparametric Methods(cc14):

1. Give knowledge about definition of different terminologies, Principles of Multivariate Analysis based on multivariate data.
2. It helps the study in Science, Arts & Commerce where more than one variable is present.
3. Principle Component Analysis [PCA] helps in reduction of unnecessary unimportant variables in models to enhance statistical conclusion in a desired level.
4. Factorial Analysis gives a strong base to extract minimal-fundamental factors that are responsible for complicated outputs unexplained, inconclusive in nature.

<p>5. Nonparametric study widens the use of statistical methods where the levels of information is very low such as Sociology, Psychology, Anthropology, Medical Studies etc.</p>
<p>Multivariate Analysis and Nonparametric Methods Practical(cc14P):</p> <ol style="list-style-type: none"> <li>1. Give practical experience about understanding multivariate complexed data.</li> <li>2. Learn to create conclusions on multivariate data.</li> <li>3. Learn to use PCA in various software which are very demanding for the Job providers.</li> <li>4. Learn to use Factor Analysis in various software which are demanding for the Job provider.</li> </ol>
<p>Survival Analysis (DSE-A2):</p> <ol style="list-style-type: none"> <li>1. Give knowledge about definition of different terminologies, Principles of Survival Analysis based on survival data.</li> <li>2. It helps to create theoretical basis to analyze survival data in medical science.</li> <li>3. It helps to create theoretical basis to analyze survival data in social science.</li> </ol>
<p>Survival Analysis Practical (DSE-A2P):</p> <ol style="list-style-type: none"> <li>1. Give practical experience of collection, analysis and application of theoretical knowledge of survival analysis.</li> <li>2. Learn to calculate survival probability and its estimates using parametric &amp; nonparametric approaches.</li> </ol>
<p>Project Work (DSE-B2):</p> <ol style="list-style-type: none"> <li>1. Give practical experience of collection, analysis and application of theoretical knowledge so far accumulated in the 3-year B.Sc. Statistics [Hons.] courses.</li> <li>2. It is a hand on situation for the students to use their concepts and knowledges in the real field, which enhance their courage to face the problem in Job sector.</li> </ol>

## Course Objectives of B. sc.(Statistics Gen)

B.Sc. Programs specialization in Statistics typically aim to provide students with a strong foundation in the following main objectives:

**Data Visualizations Expertise:** The details of the *graphical representation* give the students a strong base to analyze real life data.

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**Data Interpretation Expertise:** The details of the *Statistical Inference* theory and practical problem-solving techniques give the students a strong base to analyze real life data make proper conclusions.

**Data Management Expertise:** Different types of *Data base management* - techniques give the students a strong base to store real life data properly and precisely.

**Data Modeling Expertise:** : Different types of *Statistical Modeling techniques* give the students a strong base to analyze real life data purposively.

**Official Data Analysis Expertise:** The details of the *Official Statistics* theory and practical problem-solving techniques give the students a strong base to analyze govt. official data and make proper conclusions.

**Economical Data Analysis Expertise:** The details of the *Economic Statistics* theory and practical problem-solving techniques give the students a strong base to analyze real life Economical data and make proper conclusions.

<b>Course Outcome</b>
SEMESTER-I
<p><b>Descriptive Statistics (GE1):</b></p> <ol style="list-style-type: none"> <li>1. Give knowledge about Data collection, Table constructions, graphical representations and visual interpretation.</li> <li>2. Different theoretical formulae, their inter relationships &amp; different results creates a strong base in the development of data analysis.</li> </ol>
<p><b>Descriptive Statistics Practical (GE1P):</b></p> <ol style="list-style-type: none"> <li>1. Give practical experience about Data collection, Table constructions, graphical representations and visual interpretation.</li> <li>2. Give practical experience about computing different measures of Central Tendency, Dispersion, Skewness &amp; Kurtosis, Association measures etc.</li> </ol>
SEMESTER-II
<p><b>Probability and Probability Distribution-1(GE2):</b></p> <ol style="list-style-type: none"> <li>3. Give knowledge about Objective &amp; Subjective definition of probability, Random Variable, Popular Probability Distributions.</li> <li>4. Different theoretical formulae, their inter relationships &amp; different results create a strong base in the development of data analysis.</li> </ol>
<p><b>Probability and Probability Distribution-1 Practical (GE2P):</b></p> <ol style="list-style-type: none"> <li>3. Give practical experience about calculation of probability in real life data.</li> </ol>

4. Give practical experience about computing different Probability measures of Central Tendency, Dispersion, Skewness & Kurtosis, Association measures etc. in case of theoretical study.

#### SEMESTER-III

##### **Statistical Inference-1& Sampling Distributions (GE3):**

1. Give knowledge about definition of different terminologies, Principles of inference based on sample.
2. Different theoretical formulae, their inter relationships & different results creates a strong base in the theoretical development of data analysis and Decision theory based on sample.

##### **Statistical Inference-1& Sampling Distributions Practical (GE3P):**

1. Give practical experience about P-value, Critical Region, Confidence Interval, Type-I & II error, Level of Significance.
2. Different types of Exact & Approximate Testing experience creates a strong base in the theoretical development of data analysis and decision making rules.

#### SEMESTER-IV

##### **Index Number and Time Series Analysis (GE4):**

1. Give knowledge about definition of different terminologies, Principles of Index Number based on sample.
2. Study 'Problems in construction of Index number' helps students in the construction of different types of index.
3. Studying the pattern of Time Series Data helps students to analyze the real-life data.
4. Stationary Time series helps students to modify the analysis theoretically.

##### **Index Number and Time Series Analysis Practical (GE4P):**

1. Give practical experience about Graphical Representation of time series data, model selection, estimation of model parameters and their interpretation.
2. Time series analysis gives future prediction experiences.
3. Give practical experience about the perfect formulae in a real-life situation.
4. Give aptitude to compare different types of index model.  
This overall knowledge creates a strong base in the theoretical development of data analysis and decision-making rules.





**COURSE OUTCOME CHEMISTRY HONOURS**

**SEMESTER- 1**

**CEMA-CC-1-1-TH INORGANIC CHEMISTRY-1**

From this Core Course students will learn:

- Extra nuclear structure of atom which consists of quantum numbers, Schrodinger wave equation, radial and angular wave functions, radial and angular distribution curve, Shapes of s, p, d and f orbitals, Details on Pauli, Hund's and Aufbau principle, ground state term symbol of atoms and ions.
- Acid base Acid-Base concept: Arrhenius concept, theory of solvent system, Bronsted-Lowry's concept, Pauling's rules. Lux-Flood concept, Lewis concept, solvent leveling and differentiating effects. HSAB principle. Acid-base equilibria in aqueous solution pH, buffer. Acid-base neutralisation curves; indicator, choice of indicators.
- Redox reaction: Ion-electron method of balancing, Redox reactions which consists of elementary idea on standard redox potentials with sign conventions, Nernst equation, influence of complex formation, precipitation and change of  $P^H$  on Redox potentials, formal potential, redox titration, redox indicator, comproportionation and disproportionation reaction Latimer and Frost diagram, ion-electron method of balancing equation of redox reaction,  $P^H$  metric, potentiometric, conductometric titrations.
- Solubility and solubility effect – common ion effect and their applications to the precipitation and separation of common metallic ions as hydroxides, sulfides, phosphates, carbonates, sulfates and halides.

ORGANIC CHEMISTRY-1A Basics of Organic Chemistry

Students will have a clear idea about Valence bond theory, electronic displacements and Molecular orbital theory from this part. Concept of aromaticity, antiaromaticity and homo aromaticity are also discussed here.

- The students can understand different physical properties like bond dissociation energy, bond distances, bond angles, melting point/ boiling point, polarity and relative stabilities of hydrocarbons.
- Basic concept of reaction mechanism is discussed in this part. ionic, radical and pericyclic, reaction type: addition, elimination and substitution reactions.

CC-1-1-P INORGANIC CHEMISTRY: I (1) LAB

Student can learn the following experiments which are very helpful in industrial purpose.

- Acid base titrations which consist of estimation of carbonate and hydroxide, estimation of carbonate and bicarbonate in a mixture, estimation of free alkali present in different

soaps/detergents.

- Oxidation - reduction titrations which consists of permanganometry, dichrometry iodometry and iodimetry titrations.

#### ORGANIC CHEMISTRY: O (1A) LAB

Students can learn on the Separation based upon solubility, by using common laboratory reagents like water (cold, hot), dil. HCl, dil. NaOH, dil. NaHCO<sub>3</sub>, etc., of components of a binary solid mixture; purification of any one of the separated components by crystallization and determination of its melting point.

The composition of the mixture should be of the following types p-Nitrobenzoic acid/p-Aminobenzoic acid; p-Nitrotoluene/p-Anisidine; benzoic acid/naphthalene; urea/phenyl benzoate; p-toluidine/benzophenone; p-chlorobenzoic acid/benzophenone, Benzoic acid/Anthracene; Glucose/Biphenyl; Benzoic acid/Benzophenone; Urea/Benzophenone.

### CEMA-CC-1-2-TH PHYSICAL CHEMISTRY-1

From this course...

- The basic concept of Kinetic Theory of gases, Nature of distribution of velocities, Maxwell's distribution of speeds in one, two and three dimensions; Kinetic energy distribution in one, two and three dimensions, calculations of average, root mean square and most probable values in each case; behavior of real gases can be understood.
- **Transport processes:** Fick's law, Flux, force, phenomenological coefficients & their inter-relationship
- Rate of a chemical reaction and its order and molecularity can be learned
- Catalysts and its mechanism of function, Enzyme catalysis, Homogeneous catalysis etc. can be assessed.

### ORGANIC CHEMISTRY-1B

After end of this course:

- Students will understand the stereochemistry of organic compounds such as how to Bonding geometries of carbon compounds and representation of molecules. Concept of chirality and symmetry, Optical activity of chiral compounds:
- The students can understand the fundamental reaction mechanism of organic reactions through the study of various organic reactive intermediates carbocations (carbenium and carbonium ions), non-classical carbocations, carbanions, carbon radicals, carbenes: generation and stability, structure using orbital picture and electrophilic/nucleophilic behavior of reactive intermediates.

## CEMA-CC-1-2-PPHYSICALCHEMISTRY 1(LAB)

From this course students will know how to perform on the :

Study of kinetics of decomposition of  $H_2O_2$  , Study of kinetics of acid-catalyzed hydrolysis of methyl acetate , Study of viscosity of unknown liquid (glycerol, sugar) with respect to water. Study of the variation of viscosity with the concentration of the solution , Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator)

## ORGANICCHEMISTRY:O(1B)LAB

- From this particular practical course students will learn to **Determine boiling point** of common organic liquid compounds :n-butyl alcohol, cyclohexanol, ethyl methyl ketone, cyclohexanone, acetylacetone, isobutyl methyl ketone, isobutyl alcohol, acetonitrile, benzaldehyde and acetophenone.

## **SEMESTER- 2**

### **CEMA-CC-2-3-TH ORGANIC CHEMISTRY-2**

From this course students will earn:

- Students will have a brisk idea of axial chirality and their presence in different organic systems. They will be able to assign the configurational description to the compounds and the stereochemistry of biphenyl systems.
- A clear concept on the prochirality, prosteroisomerism and topicity of organic compounds will be obtained.
- Students can know the difference between conformation and configuration, and the stability of various organic compounds on the basis of conformational analysis.
- The basic concept of Kinetic isotope effect in organic reactions, different reaction mechanisms and tautomerism can be understood.
- Students will know different types of substitution reactions (free radical and nucleophilic) along with their mechanistic pathways.
- The students can have a clear idea about variety of 1, 2 Elimination reactions.

## CEMA-CC-2-3-P- ORGANICCHEMISTRY- 2(LAB)

From this particular course students will be able to prepare some organic compounds by following reactions:

- 1. Nitration of aromatic compounds
- 2. Condensation reactions
- 3. Hydrolysis of amides/imides/esters
- 4. Acetylation of phenols/aromatic amines
- 5. Brine mediated benzylation of amines/amino acids.
- 6. Side chain oxidation of aromatic compounds
- 7. Diazo coupling reactions of aromatic amines
- 8. Bromination of anilides using green approach (Bromate-Bromide method)
- 9. Redox reaction including solid-phase method
- 10. Green 'multi-component-coupling' reaction
- 11. Selective reduction of m-dinitrobenzene to m-nitroaniline

### **CEMA-CC-2-4-TH INORGANIC CHEMISTRY-2**

From this Course students will learn:

- General Characteristics of ions, types, size, packing, radius ratio rule relating to Born-Landé equation, Born-Haber cycle, Madelung constant, an elementary idea about defects of crystal.
- Covalent bonding relating to Fajan's rule, Valence bond theory, Bent's rule, hybrid orbital and VSEPR theory depicting shapes of molecules with lone pairs and bond pairs.
- The molecular orbital concept of bonding based on Linear Combination of Atomic Orbital theory; sigma and pi-bonds and delta interaction, multiple bonding; Orbital designations: gerade, ungerade, HOMO, LUMO. Orbital mixing; MO diagrams of various homonuclear and Heteronuclear molecular along with their bond properties like bond orders, bond lengths.
- The Metallic bonding based on qualitative idea of valence bond and band theories, semiconductors and insulators, defects in solids, theories of hydrogen bonding, receptor-guest interactions, Halogen bonds, effects of chemical force, melting and boiling point.
- Radioactivity, fundamental concepts of Decay Law, Half-life, Radioactive series, Nuclear model, magic number, different nuclear reactions, nuclear reactor.  
The uses of radioisotopes, radio carbon dating, artificial radioactivity, transmutation of elements, hazards of radiation and safety measures.

### **CEMA-CC-2-4-P INORGANIC CHEMISTRY-2(LAB)**

From the practical part students will be able to estimate the following experiments:

- Estimation of Vitamin C , Estimation of (i) arsenite and (ii) antimony iodometrically , Estimation of available chlorine in bleaching powder. Estimation of Cu in brass. Estimation of Cr and Mn in Steel. Estimation of Fe in cement

### **SEMESTER- 3**

#### **CEMA-CC-3-5-TH- PHYSICALCHEMISTRY-2**

From this course:

- 1<sup>st</sup> law of Thermodynamics , Thermochemistry, Second Law:Need for a Second law,
- Conductance of weak and strong electrolytes, Debye-Hückel theory of ion conductance, conductometric titrations, Transport number can be understood.
- Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases. Activities and activity coefficients. Fugacity and fugacity coefficient

**Electromotive Force:** Rules of oxidation/reduction of ions based on half-cell potentials,; Chemical cells, reversible and irreversible cells with examples; Electromotive force of a cell and its measurement, Thermodynamic derivation of Nernst equation; Standard electrode (reduction) potential and its application to different kinds of half-cells. Application of EMF measurements.

#### **CEMA-CC-3-5-PPHYSICALCHEMISTRY-2**

- In the Practical part: Use of conductometry in the titration of an acid base, saponification, potentiometric titration, solubility product determination reaction can be learned.

#### **CEMA-CC-3-6-THINORGANICCHEMISTRY-3**

From this core course students will be able to know about

- Modern IUPAC Periodic table, effective nuclear charge, screening effect, Slater's rule, atomic radii, ionic radii, ionization potential, electron affinity and electronegativity, factors influencing these properties, group trends and periodic trends in these properties in respect of s, p and d block elements, secondary periodicity, relativistic effect, inert pair effect, Pauling, Mulliken and Allred-Rochow's electronegativity scales;
- Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation. Hydrides and their classification ionic, covalent and interstitial. Basic beryllium acetate and nitrate. Study of the various compounds with emphasis on structure, bonding, preparation, properties and

uses.

- Occurrence, uses, rationalization of inertness of noble gases, Clathrates; preparation and properties of XeF<sub>2</sub>, XeF<sub>4</sub> and XeF<sub>6</sub>; Nature of bonding in noble gas compounds (Valence bond treatment and MO treatment for XeF<sub>2</sub> and XeF<sub>4</sub>). Xenon-oxygen compounds. Molecular shapes of noble gas compounds (VSEPR theory).
- Types of inorganic polymers, comparison with organic polymers, synthesis, structural aspects and applications of silicones and siloxanes, borazines, silicates and phosphazenes;
- Coordinate bonding, Werner's theory of coordination complexes, Classification of ligands, IUPAC nomenclature of coordination complexes, Isomerism in coordination compounds, Geometrical and optical isomerism in square planar and octahedral complexes.

### **CEMA-CC-3-6-PINORGANICCHEMISTRY-3**

- From the practical course students will be able to do complexometric titration of Zn(II), Zn(II) in a Zn(II) and Cu(II) mixture, Ca(II) and Mg(II) in a mixture, Hardness of water, Al(III) in Fe(III) and Al(III) in a mixture; Paper chromatographic separation of Ni(II) and Co(II), Fe(III) and Al(III); Gravimetric estimation of Ni(II) using Dimethylglyoxime (DMG), copper as CuSCN, Al(III) by precipitating with oxine and weighing as Al(oxine)<sub>3</sub> (aluminium oxinate), chloride.

### **CEMA-CC-3-7-TH ORGANIC CHEMISTRY-3**

After end of this course:

- Chemistry of alkenes and alkynes
- Addition reactions of conjugated dienes and allene are also discussed here.
- The knowledge of different types of aromatic substitution reactions, both electrophilic and nucleophilic are clearly understood from this course.
- Students will come to know about the bonding and reactivity of carbonyl groups specially addition, oxidation and reduction reactions.
- They will learn the various reactions exploiting the acidity of  $\alpha$ -H of carbonyl group and nucleophilic addition to  $\alpha,\beta$ -unsaturated carbonyl system.
- Chemistry of Carbonyl and Related Compounds

### **CEMA-CC-3-7-PORGANICCHEMISTRY-3**

Students can know about :

Identification of a Pure Organic Compound

- Solid compounds: oxalic acid, tartaric acid, citric acid, succinic acid, resorcinol, urea, glucose, cane sugar, benzoic acid and salicylic acid
- Liquid Compounds: formic acid, acetic acid, methyl alcohol, ethyl alcohol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform and nitrobenzen
- 1. Estimation of glycine by Sørensen's formol method
- 2. Estimation of glucose by titration using Fehling's solution
- 3. Estimation of sucrose by titration using Fehling's solution
- 4. Estimation of aromatic amine (aniline) by bromination (Bromate-Bromide) method
- 5. Estimation of acetic acid in commercial vinegar
- 6. Estimation of urea (hypobromite method)
- 7. Estimation of saponification value of oil/fat/ester

**SEC2**

**ANALYTICALCLINICALBIOCHEMISTRY**

- The students will have an idea about the biological importance of carbohydrates which includes metabolism, glycolysis etc along with isolation and characterization of polysaccharides.
- Classification, biological importance and structure of proteins including denaturation are clearly discussed in this part.
- The chemistry of enzymes and biocatalysis are discussed here.
- The students will learn biological importance of lipids and lipoproteins from this course.
- The structure of nucleic acids.
- Biochemistry of disease, a diagnostic approach by blood/ urine analysis is discussed in this course.
- Identification and estimation of carbohydrates[qualitative and quantitative], lipids [qualitative], iodine number of oil determination, saponification number of oil determination and determination of cholesterol using Liebermann- Burchard reaction are discussed in practical part.

## **SEMESTER- 4**

### **CEMA-CC-4-8-TH -ORGANICCHEMISTRY-4**

From this Core Course,students will learn about:

- Preparation of different aliphatic and aromatic nitrogenous compounds like amines, nitro, cyanides, isocyanides and diazonium salts and their important reactions and separation of primary, secondary and tertiary amines from their mixture.
- The importance of aromatic diazonium compounds in preparation of many important organic compounds , particularly substituted benzene.
- Hofmann-Martius rearrangement, Sommelet Hauser rearrangement, Fischer-Hepp rearrangement, N-azo to C-azo rearrangement, Bamberger rearrangement, Orton rearrangement and benzidine rearrangement How to design a target organic molecule to synthesize and prepare the strategy in a logical manner by disconnection approach. This particular course will develop the synthetic skills of the students and make the foundation of future organic synthetic chemist.
- Organic spectroscopy is a branch which is very important to diagnosis the kind of bonding, functional group present in an unknown organic molecule. Students will have a profound knowledge about the basic theory of UV-Vis, Infrared and  $^1\text{H}$  NMR spectroscopy.
- By combining all the three types of spectroscopy mentioned in the course students will be capable to identify an organic compound if the molecular formula and the spectral data are provided.

### **CEMA-CC-4-8-P-ORGANIC CHEMISTRY-4**

- From this particular course students will be able to identify an organic compound by means of different qualitative chemical tests.
- Students can detect the presence of special elements like N, S, Cl, Br in the given compound.
- They can classify the organic compound into acidic, basic or neutral in nature on the basis of solubility.
- Students can confirm the presence of the functional groups by some systematic qualitative analysis.
- Student will have a practical knowledge how to purify an organic compound by crystallization.
- From recording the melting point of the pure organic compound and literature survey students will be able to identify the exact compound from the list of possible compounds.

### **CEMA-CC-4-9-TH- PHYSICALCHEMISTRY-3**

From this Core Course,students will know about:



- The importance different colligative properties of solution irrespective of the nature of the solvent.
- Different modes of crystal packing of the ions and atoms in solid crystal can from the crystal structure
- The basic concept of quantum mechanics such as Black body radiation, Particle in one dimensional box can be learned from the course and its future implication in determining electronic state in an atom/molecule
- The fundamental concepts of quantum mechanical operators, Hamiltonian operators, well behaved wave functions and their importance in the quantum mechanics.
- A brief idea of the theory behind the specific heat of solid (i.e. Dulong Petit's law, Debye T<sup>3</sup> law can be understood from the Specific heat of solid chapter.

### **CEMA-CC-4-9-PPHYSICALCHEMISTRY-3**

From this Core Course, students will know about:

- Kinetic study of inversion of cane sugar using a Polarimeter ( Preferably Digital)
- Study of Phase diagram of Phenol-Water system.
- Determination of partition coefficient for the distribution of I<sub>2</sub> between water and CCl<sub>4</sub>
- Determination of pH of unknown solution (buffer), by colour matching method
- pH-metric titration of acid (mono- and di-basic) against strong base
- pH-metric titration of a tribasic acid against strong base.

### **CEMA-CC-4-10-TH- INORGANICCHEMISTRY-4**

From this Core Course, students will know about:

VB description and its limitations. Elementary Crystal Field Theory: splitting of d<sup>n</sup> configurations in octahedral, square planar and tetrahedral fields, crystal field stabilization energy (CFSE) in weak and strong fields; pairing energy. Spectrochemical series. Jahn- Teller distortion. Octahedral site stabilization energy (OSSE). Metal-ligand bonding fields; Spectrochemical series, Jahn- Teller distortion, Metal-ligand bonding, sigma- and pi-bonding in octahedral complexes.

- Magnetism and Colour: Orbital and spin magnetic moments, spin only moments of d<sup>n</sup> ions and their correlation with effective magnetic moments, quenching of magnetic moment: super exchange and anti-ferromagnetic interactions; L-S coupling; qualitative Orgel diagrams, elementary idea about Selection rules for electronic spectral transitions.
- A comparative study of 3d, 4d and 5d transition elements in terms of electronic configuration, oxidation states, redox properties and coordination chemistry.
- A comparative study of electronic configuration, oxidation states, colour, spectra and magnetic properties of lanthanides and actinides. Lanthanide contraction and separation of lanthanides.

- At the end of the topic (Reaction Kinetics and Mechanism), students will be able to recognize the correct methods for the assumption of inorganic reaction mechanism. They will understand the different mechanisms for substitution of octahedral and square planar complexes. They will be able to know the Trans-effect and its application in complex synthesis, theories of Trans-effect.
- Students will be able to know Thermodynamic and Kinetic stability. Kinetics of substitution. Ligand field effect and reaction rate. They will also learn different stability constants and their relation.

### **CEMA-CC-4-10-P-INORGANIC CHEMISTRY-4**

From this practical course students will be able to prepare the following inorganic compounds:

- 1.  $[\text{Cu}(\text{CH}_3\text{CN})_4]\text{PF}_6/\text{ClO}_4$
- 2. Cis and trans  $\text{K}[\text{Cr}(\text{C}_2\text{O}_4)_2(\text{H}_2\text{O})_2]$
- 3. Potassium diaquadioxalatochromate(III)
- 4. Tetraamminecarbonatocobalt (III) ion
- 5. Potassium tris(oxalato)ferrate(III)
- 6. Tris-(ethylenediamine) nickel(II) chloride.
- 7.  $[\text{Mn}(\text{acac})_3]$  and  $[\text{Fe}(\text{acac})_3]$
- Instrumental Techniques
  - 1. Measurement of  $10Dq$  by spectrophotometric method.
  - 2. Determination of  $\lambda_{\text{max}}$  of  $[\text{Mn}(\text{acac})_3]$  and  $[\text{Fe}(\text{acac})_3]$  complexes

### **SEC4**

### **PESTICIDE CHEMISTRY**

From this Course, students will know about:

- General introduction to pesticides (natural and synthetic), benefits and adverse effects,
- changing concepts of pesticides, structure activity relationship, synthesis and technical
- manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene.); Organophosphates (Malathion, Parathion ); Carbamates (Carbofuran and carbaryl); Quinones ( Chloranil), Anilides (Alachlor and Butachlor).
  - To calculate acidity/alkalinity in given sample of pesticide formulations as per
- BIS specifications.
- Preparation of simple organophosphates, phosphonates and thiophosphates

## **SEMESTER- 5**

### **CEMA-CC-5-11TH- PHYSICALCHEMISTRY-4**

From this Course,students will know about:

- Importance of Schrodinger equation for rigid rotator model of rotation of diatomic molecule, Separation of variables, Spherical harmonics can be assessed.
- Setting up of Schrödinger equation in for Hydrogen atom can be learned and its importance for the advancement of quantum chemistry can be understood
- From the statistical thermodynamics part microstates, macrostates, partition function, the importance of statistical thermodynamics in bridging between quantum and thermodynamics can be learned.

### **CEMA-CC-5-11PPHYSICALCHEMISTRY-4**

From this practical course students will be able to prepare the following :

Computer programs(Using FORTRAN or C or C ++ ) based on numerical methods :

**Programming 1:** Roots of equations: (e.g. volume of van der Waals gas and comparison with ideal gas, pH of a weak acid)

**Programming 2:** Numerical differentiation (e.g., change in pressure for small change in volume of a van der Waals gas, Potentiometric titrations)

**Programming 3:** Numerical integration (e.g. entropy/ enthalpy change from heat capacity data), probability distributions (gas kinetic theory) and mean values

### **CEMA-CC-5-12-TH-ORGANICCHEMISTRY-5**

From this Core Course,students will know about:

- Students will learn the chemistry of polynuclear hydrocarbon and their derivatives. An elaborative discussion regarding the biological importance, synthesis and reactivity of heterocyclic compounds have also been made in this section.
- The students can understand the stereochemistry of alicyclic compounds, mainly cyclohexane and stereochemistry involved in various reactions like substitution, elimination in these types of compounds.
- The knowledge of different types of pericyclic reactions like cycloaddition, electrocyclic and

sigmatropic reactions will be enriched.

- The students will have an idea about carbohydrate compounds, both monosaccharides and disaccharides from this part.
- The chemistry of amino acids, peptides and nucleic acids are discussed in details in this course.

### CEMA-CC-5-12-P- ORGANIC CHEMISTRY-5

- From this particular practical course students will be able to separate mixture of coloured organic compounds like amino acids, dyes and sugars by means of thin layer and paper chromatography.
- Students will be able to apply their knowledge on IR, <sup>1</sup>H NMR spectroscopy through analysis these spectra of various organic compounds.

### DSE-B-1-TH- INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE

From this Core Course, students will know about:

- Different types of alloys, Specific properties of elements in alloys. Various processes involved in manufacture of Steel like removal of silicon decarbonization, demanganization, desulphurization dephosphorisation, surface treatment (Arand heat treatment, nitriding, carburizing), Composition and properties of different types of steels.
- General principles and properties of catalysts, homogenous and heterogenous catalysis and their industrial applications, Deactivation or regeneration of catalysts, Phase transfer catalysts, application of zeolites as catalysts; Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX), Introduction to rocket propellants.
- Students will know about different types of fertilizers, surface coatings where they will get idea about different types of paints, dyes, wax polishing, metallic coating, metal spraying and anodizing. Students will also know about different types of batteries.
- Students will know about silicate industries which consists of glass, cements and ceramics.

### PRACTICALS-DSE-B-1:

- Students will be able to know how to determine free acidity in ammonium sulphate fertilizer, how to estimate calcium and phosphoric acid in fertilizer, electroless metallic coating on ceramic and plastic material.
- Students will know the method of determination of composition of dolomite, analysis of Cu, Ni, Zn in alloys, analysis of cement, preparation of pigment.

## DSE-A-2-TH

### APPLICATIONS OF COMPUTERS IN CHEMISTRY

From this course students will learn:

- Computer programming basics (FORTRAM)
- Introduction to spreadsheet software (MS Excel)
- Statistical analysis

### PRACTICALS-DSE-A-2:

From this practical course students will be able to prepare the following:

- The use of spread sheet to solve the Schrodinger equation

## **SEMESTER-6**

### CEMA-CC-6-13TH –INORGANIC CHEMISTRY-5

- At the end of the topic (Theoretical Principles in Qualitative Analysis) which will cover the practical part also, students will be able to know how to detect basic radicals or cations and acid radicals or anions. They will be able to detect interfering acid radicals and also be able to understand the necessity and the process of removing the interfering anions before entering Group III. Students will also be able to analyse insoluble materials.
- Students will be able to know the effect of solubility product, common ion effect in the Group analysis of cations.
- Bioinorganic Chemistry actively deals with inorganic reactions occurring “in vivo” in biological systems with special member to Fe(II), Ca(II), Na<sup>+</sup>, K<sup>+</sup> ions. For example Haemoglobin, Myoglobin, Hemocyanine and Hemerythrin.
- A brief detail about metal ion induced toxicity overcoming by chelation therapy and some specialised drugs of Pt(II) and Au(III) complexes.
- From the chapter of Organometallic Chemistry, students will understand the application of 18 electrons rule; preparatory methods, structure and bonding of different metal carbonyls, nitrosyls and cyanides; Synergic effect and use of IR data to explain the extent of back bonding in such complexes.
- Students will also be able to know the details of Zeise's salt, Ferrocene, different reactions of organometallic compounds like oxidative addition, reductive elimination etc. along with different important catalytic and industrial processes like Alkene hydrogenation, Hydroformylation, Wacker process, Fischer Tropsch reaction and Ziegler-Natta catalyst for olefin polymerisation.

## CEMA-CC-6-13-P- INORGANIC CHEMISTRY-5

From this course students will learn:

- Students will be able to detect basic radicals or cations and acid radicals or anions from a salt mixture.
- They will be able to detect interfering acid radicals and also be able to understand the necessity and the process of removing the interfering anions before entering Group III.
- Students will also be able to analyse insoluble materials.

## CEMA-CC-6-14-TH-PHYSICALCHEMISTRY-5

- The students can analyze light and matter interactions, nature of rotation and vibration in bonds, electronic transition by the various spectroscopic methods (Microwave, IR, UV spectroscopy).
- The students will be able to understand the mechanism of various photo physical (Fluorescence and Phosphorescence) and photochemical processes.
- The inherent contractile nature of the surface of a liquid can be easily understood and analysed by the study of Surface Tension of a liquid.
- The mechanism of adsorption of gas on the solid surface can be studied from Freundlich, Langmuir and BET adsorption isotherms.
- The origin of dipole moment and polarizability within a molecule can be learned from the Dipole moment and Polarizability chapter.
- The concept of Collision theory and its importance in the determination of rate of the reaction can be understood from the collision theory chapter.

## CEMA-CC-6-14-P-PHYSICALCHEMISTRY-5

- From the practical part the application surface tension experiments and spectro- photometric method in determining reaction kinetics, pH and Indicator constant can be understood.
- Use of Stalagmometer to determine surface tension can be learned.
- Validity of Lambert Beer's law, reaction kinetics of particular reaction and pH of unknown buffer solution can be determined by spectro-photometric techniques.
- How surface tension experiment can be helpful to determine CMC of surfactant that can be learned.

### DSE-A-3

## GREEN CHEMISTRY AND CHEMISTRY OF NATURAL PRODUCTS

At the end of this course:

- students will learn of Green and Sustainable Chemistry.
- They will understand the atom economy, % yield calculations and can apply them in green organic synthesis.
- They can have an idea about the green approaches of the conventional name reactions and rearrangements and get the motivation towards the future trends in Green Chemistry for sustainable development.
- Students will come to know about some important natural products found in plants and other resources.
- They will enrich the irknowledge studying the basic principles,structure elucidation process, preparation and reactions of terpenoids and alkaloids.

### PRACTICALS-DSE-A-3

- From this practical course students will be able to perform Acetylation of primary amine
- Pinacol-pinacolone rearrangement reaction
- Solid state synthesis of benzilic acid from benzil.
- Benzoin condensation using thiamine hydrochloride as a catalyst instead of potassium cyanide.
- Base catalysed aldol condensation (synthesis of dibenzal propanone from benzaldehyde and acetone).

### DSE-B-4DISSERTATION

- Students will gain aknowledge about research work.prepare a project report. □ Digital presentation of the project.

## COURSE OUT COME CHEMISTRY GENERAL

# SEMESTER- 1

## CC1/GE1 TH

From this course students will learn:

Kinetic theory of gases, Maxwell's distribution, Vander Waal's equation, critical constants, liquids, surface tension, viscosity.

- Students will get the basic knowledge on some fundamental concepts of organic chemistry like electronic displacement and the reactive intermediates.
- They will know how to represent the three dimensional structures of organic molecules in two dimensional platforms. Also they will have idea on the relative and absolute configurations of some organic molecules.
- Students will be able to know about atomic structure, chemical periodicity where they will get the knowledge of Bohr's theory, quantum numbers, Hund's rule, electronic configuration, atomic size, ionization potential, electro affinity, electronegativity, periodic and group-wise variation of above properties in respect of s and p-block elements.

Electronic displacements: inductive effect, resonance and hyper conjugation; nucleophiles and electrophiles; reactive intermediates: carbocations, carban ions and free radicals.

Stereochemistry

Different types of isomerism; geometrical and optical isomerism; concept of chirality and optical activity (upto two carbon atoms); asymmetric carbon atom; interconversion of Fischer and Newman representations; enantiomerism and diastereomerism

- Acid-Base concept: Arrhenius concept, theory of solvent system, Bronsted-Lowry's concept, relative strength of acids, Pauling's rules. Lux-Flood concept, Lewis concept, group characteristics of Lewis acids, solvent leveling and differentiating effects. HSAB

principle. Acid-base equilibria in aqueous solution (Proton transfer equilibria in water), pH, buffer. Acid-base neutralisation curves; indicator, choice of indicators.

## CC1/GE1P

- From this practical course students will be able to perform titration of sodium carbonate and sodium hydrogen carbonate in a mixture, estimation of oxalic acid by  $\text{KMnO}_4$ ,



estimation of Fe(II) by  $K_2Cr_2O_7$ , estimation of Cu(II) by sodium thiosulphate, estimation of Fe(II) and Fe(III) in a mixture by  $K_2Cr_2O_7$ .

## **SEMESTER- 2**

### **CC2/GE2 TH**

From this course students will learn:

- The thermodynamic conditions for equilibrium, variation of free energy with degree of advancement; definitions of  $K_p$ ,  $K_c$  and  $K_x$  and relation among them; shifting of equilibrium due to change in external parameters; variation of equilibrium constant with addition of inert gas; Le Chatelier's principle; Ideal solutions and Raoult's law, vapour pressure-composition and temperature-composition curves of ideal and non-ideal solutions; Nernst distribution law and its applications, solvent extraction.
- The Chemistry of Aliphatic Hydrocarbons (Alkanes, Alkenes, Alkynes) are discussed here in details comprised of Preparations and reactions of those compounds.
- The structure and bonding of the solids, different types of crystal systems and some important relationship regarding this chapter to solve numerical problems.
- While recording the experimental data sometimes analysts face the problem of data reproducibility or the data accuracy. Students will be able to classify the errors and know how to diminish them. Also some basic idea about the hardware and software of computer will grow the interest on modern technology.
- Students will be able to know about redox reactions, redox potential, redox titration, Nernst equation. They will also be able to know about phases, components and degrees of freedom of a system, criteria of phase equilibrium; Gibbs Phase Rule; Derivation of Clausius-Clapeyron equation and its importance in phase equilibria; Phase diagrams of one-component systems (water and  $CO_2$ )

### **CC2/GE2-P**

Study of kinetics of acid-catalyzed hydrolysis of methyl acetate

Study of kinetics of decomposition of  $H_2O_2$  (Clock Reaction)

Study of viscosity of unknown liquid (glycerol, sugar) with respect to water.

Determination of solubility of sparingly soluble salt in water, in electrolyte with common ions and in neutral electrolyte (using common indicator)

Preparation of buffer solutions and find the pH of an unknown buffer solution by colour matching method

Determination of surface tension of a liquid using Stalagmometer experiments are performed in this course.

### **SEMESTER-3**

#### **CC3/GE3TH**

- Students will get the basic knowledge on organometallic compounds: particularly Grignard and organozinc reagents. Also they will learn the preparation and reactions of organic halides. They will also learn the chemistry of aromatic hydrocarbons from this course. Students will be able to know about comparative study of p-block elements, coordination chemistry which consists of Werner's coordination theory, valence bond theory, inner and outer orbital complexes, IUPAC nomenclature, structural and stereo isomerism in complexes with coordination numbers of 4 and 6.
- They will also know general group trends of transition elements with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, ability to form complexes and stability of various oxidation states, electronic configurations of lanthanoids and actinoids, oxidation states, colour, magnetic properties, lanthanide contraction, separation of lanthanides.
- Students will also learn about ionic equilibria, conductance and electromotive force from this course.

#### **CC3/GE3P**

Qualitative semimicro analysis of mixtures containing two radicals.

Cation Radicals:  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{Cr}^{3+}$ ,  $\text{Mn}^{2+}/\text{Mn}^{4+}$ ,  $\text{Fe}^{3+}$ ,  $\text{Co}^{2+}/\text{Co}^{3+}$ ,  $\text{Ni}^{2+}$ ,  $\text{Cu}^{2+}$ ,  $\text{Zn}^{2+}$ ,  $\text{Pb}^{2+}$ ,  $\text{Sn}^{2+}/\text{Sn}^{4+}$ ,  $\text{NH}_4^+$ . Etc.

Anion Radicals:  $\text{F}^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{BrO}_3^-$ ,  $\text{I}^-$ ,  $\text{IO}_3^-$ ,  $\text{SCN}^-$ ,  $\text{S}^{2-}$ ,  $\text{SO}_2^-$ ,  $\text{NO}_3^-$ ,  $\text{NO}_2^-$ ,  $\text{PO}_3^-$ ,  $\text{AsO}_4^{3-}$ —etc.

### **SEMESTER -4**

#### **CC4/GE4TH**

From this Generic Elective Course students will have a clear idea about:

- The bonding and reactivity of the carbonyl groups present in aldehydes, ketones, carboxylic acids and their derivatives; preparations and reactions of Alcohols, Phenols and Ethers.
- Preparation of amines by Hofmann degradation, Reaction with  $\text{HNO}_2$ , Schotten- Baumann reaction, Diazo coupling reaction, Preparation and reactions of Diazonium salts, reduction of aromatic nitro compounds under different conditions.
- Preparations of amino acids, general properties, zwitterion, isoelectric point, classification and general properties of Carbohydrates; osazone formation, oxidation- reduction reactions; ascending and descending in monosaccharide, mutarotation.
- Crystal Field effect, Crystal Field Stabilization Energy, Crystal Field Effect for weak and strong fields, Crystal Field Splitting in different geometry, factors affecting the magnitude of

D, spectrochemical series, tetragonal distortion of octahedral geometry and Jahn-Teller Distortion.

- Basic concept of Quantum mechanics and spectroscopy covering rotational and vibrational motions of the molecules.

## **CC4/GE4P**

At the end of the practical students can identify of the following :

1. Qualitative Analysis of Single Solid Organic Compound(s) Experiment A: Detection of special elements (N, Cl, and S) in organic compounds. Experiment B: Solubility and Classification (solvents: H<sub>2</sub>O, dil. HCl, dil. NaOH) Experiment C: Detection of functional groups: Aromatic-NO<sub>2</sub>, Aromatic -NH<sub>2</sub>, -COOH, carbonyl (no distinction of -CHO and >C=O needed), -OH (phenolic) in solid organic compounds. Experiments A -C with unknown (at least 6) solid samples containing not more than two of the above type of functional groups should be done.

2. Identification of a pure organic compound Solid compounds: oxalic acid, tartaric acid, succinic acid, resorcinol, urea, glucose, benzoic acid and salicylic acid. Liquid Compounds: methyl alcohol, ethyl alcohol, acetone, aniline, dimethylaniline, benzaldehyde, chloroform and nitrobenzene

## **SEMESTER-5**

### **DSE-A-2 INORGANIC MATERIALS OF INDUSTRIAL IMPORTANCE**

From this Discipline Specific Course, students learn about

- Different types of alloys, Specific properties of elements in alloys. Various processes involved in manufacture of Steel like removal of silicon decarbonization, demanganization, desulphurization dephosphorisation, surface treatment (A and heat treatment, nitriding, carburizing), Composition and properties of different types of steels.
- General principles and properties of catalysts, homogenous and heterogenous catalysis and their industrial applications, Deactivation or regeneration of catalysts, Phase transfer catalysts, application of zeolites as catalysts; Origin of explosive properties in organic compounds, preparation and explosive properties of lead azide, PETN, cyclonite (RDX), Introduction to rocket propellants.
- Students will know about different types of fertilizers, surface coatings where they will get idea about different types of paints, dyes, wax polishing, metallic coating, metal spraying and anodizing. Students will also know about different types of batteries.

- Students will know about silicate industries which consists of glass, cements and ceramics.

### **PRACTICALS-DSE-A-2:**

- Students will be able to know how to determine free acidity in ammonium sulphate fertilizer, how to estimate calcium and phosphoric acid in fertilizer, electroless metallic coating on ceramic and plastic material.
- Students will know the method of determination of composition of dolomite, analysis of Cu, Ni, Zn in alloys, analysis of cement, preparation of pigment.

### **SEC2- ANALYTICALCLINICALBIOCHEMISTRY**

- The students will have an idea about the biological importance of carbohydrates which includes metabolism, glycolysis etc along with isolation and characterization of polysaccharides.
- Classification, biological importance and structure of proteins including denaturation are clearly discussed in this part.
- The chemistry of enzymes and biocatalysis are discussed here.
- The students will learn biological importance of lipids and lipoproteins from this course.
- The structure of nucleic acids and their activities are discussed in details.
- Biochemistry of disease, a diagnostic approach by blood/ urine analysis is discussed in this course.
- Identification and estimation of carbohydrates [qualitative and quantitative], lipids [qualitative], iodine number of oil determination, saponification number of oil Determination and determination of cholesterol using Liebermann-Burchard reaction are discussed in practical part.

### **SEMESTER-6**

#### **DSE-B1**

### **GREENCHEMISTRYANDCHEMISTRYOFNATURALPRODUCTS**

At the end of this course:

- Students will learn Green and sustainable Chemistry.
- They will understand the atom economy, % yield calculations and can apply them in green organic synthesis.
- They can have an idea about the green approaches of the conventional name reactions and rearrangements and get the motivation towards the future trends in Green Chemistry for sustainable development.
- Students will come to know about some important natural products found in plants and other resources.

- They will enrich their knowledge studying the basic principles, structure elucidation process, preparation and reactions of terpenoids and alkaloids.
- Students can get wide information about the natural products used as medicines and to some extent apply them in daily life.

## PRACTICALS-DSE-B-1

At the end of the practical students can identify of the following :

- Acetylation of primary amine (preparation of acetanilide).
- Pinacol-pinacolone rearrangement reaction (preparation of benzopinacolone).
- Solid state synthesis of benzilic acid from benzil.
- Benzoin condensation using thiamine hydrochloride as a catalyst instead of potassium cyanide.
- Base catalysed aldol condensation (synthesis of dibenzal propanone from benzaldehyde and acetone).
- Bromination of trans-stilbene using bromide/bromate mixture.

## SEC 4-PESTICIDE CHEMISTRY

At the end of this course:

- Students will learn

General introduction to pesticides (natural and synthetic), benefits and adverse effects, changing concepts of pesticides, structure activity relationship, synthesis and technical manufacture and uses of representative pesticides in the following classes: Organochlorines (DDT, Gammexene,); Organophosphates (Malathion, Parathion); Carbamates (Carbofuran and carbaryl); Quinones (Chloranil), Anilides (Alachlor and Butachlor).

## BOTANY

### **BOTANY COURSE OUTCOME (CBCS)**

#### Semester-I

##### CC1-Phycology and microbiology

At the end of this course student will be able to:

- Identify the bacteria based on Gram nature.
- Measure the reproductive part of many algae under the microscope using drawing prism and micrometer.
- Discriminate between useful and harmful bacteria.

##### Mycology & Phytopathology (CC 2)

At the end of this course students will be able to:

- Identify different groups of fungi based on their morphological features.
- Explain mycorrhizal association and appreciate adaptive strategies of algae and fungi.
- Specify plant diseases in terms of causal organisms, symptoms and diagnoses, modes of infection and methods of disease control.
- compute strategies for conventional and novel control of plant diseases.

#### Semester 2

##### CC3-Plant anatomy:

At the end of the course students will be able to:

- Understand the detailed anatomical structure of root, stem and leaf.
- Identify the anomalous secondary growth found in both root and stem.
- Identify the different types of stomata present over the leaf.
- Know how to do differential staining to differentiate different tissues of the plant body.

##### Archegoniatae ( CC 4)

After completing this course students will be able to:

- Compare Bryophytes, Pteridophytes and Gymnosperms in terms of morphology, anatomy and reproduction.
- Analyze evolution of sporophytes/gametophytes and their transition to land habit.

- Assess economic importance of all the groups.

### Semester 3

#### CC 5- Paleobotany and palynology

- In this course students get to know about the past life through plant fossils of different plant groups.
- It also Includes pollen study and it's application in different field like medicine, forensic science and paleoenvironment.
- It includes Geological time scale and study of Indian Gondwana system.

#### Reproductive Biology of Angiosperms ( CC 6)

At the end of this course students will be able to:

- Describe and identify taxa on the basis of different morphological characters i.e. inflorescence, flower, fruit and seed.
- Discuss molecular and genetic aspects of flower development.
- Explain microsporogenesis, microgametogenesis, double fertilization, embryogenesis in *Capsella*, types of Apomixis and Polyembryony.

#### Plant Systematics ( CC 7)

Students who complete this course will be able to

- Discuss classical taxonomy in terms of components of systematics viz. nomenclature, identification and classification.
- Explain ICN, its principles, different types of names, importance of author citation, Type method and various rules followed for nomenclature of taxa.
- Compare amongst recent classification systems and demonstrate role of botanical garden and herbaria for classification and identification of taxa.
- Analyze phylogenetic relationship among taxa with the help of phenetics and cladistics.
- Identify different monocotyledonous and dicotyledonous families and their representative members on the basis of diagnostic features and also to analyze systematic position and economic importance of the said families.

Skill Enhancement Course-Elective (Semester 3, SEC A, Applied Phycology, Mycology and Microbiology).

Skill Enhancement course comprising Applied Phycology, Mycology and Microbiology make the students equipped with additional skills to suffice their capabilities for entrepreneurship, academia and

industry.

On completion of course students will be able to:

- Explain Algal food sources, uses of algae as phycocolloid and diatomite, biotechnological application of algae in terms of biodiesel and bioplastics.
- Discuss Fungal food sources as well as use of fungi and microbes as source of enzyme, amino acid, vitamin, antibiotic and pharmaceuticals.
- Analyze different procedures regarding industrial production of Cheese, ethanol, Vinegar and Streptomycin and their usefulness in terms of income generation.
- Evaluate algal toxin and fungal toxin (Aflatoxin) that might help in selecting the appropriate material for use in different purposes.
- Assess role of microbes as biofertilizers, biopesticides and in mineral processing which will promote their use in a bigger way in future and in turn help in protection of environment.

#### Semester 4

CC8-Plant geography, ecology and evolution

At the end of this course students will be able to :

- Identify the plants used as metal indicator.
- Explain the reasons why the plant species are threatened.
- Analyze the leaves collected from polluted and less polluted area.
- Compute the frequency of plant species of a particular region.

Economic Botany (CC 9)

After completing this course students will be able to:

- Discuss origin of cultivated crops, plant introduction, crop domestication and importance of germplasm diversity.
- Explain origin, morphology, processing and uses of Cereal crops and legumes provides a detailed knowledge about their future sustainable cultivation and utilization.
- Assess morphology, processing and uses of cash crops like Sugarcane, spices and beverages states how these crops can be utilized for income generation.
- Outline general account of timbers mainly Sal and Teak and fiber yielding plants like Cotton and Jute. This helps in assessment of timber sources and their utilization in India and importance of use of eco-friendly plant fibers in our daily life.
- Compare therapeutic and habit-forming and health hazards associated with habit-forming drugs.



## CC10-Genetics

At the end of this course students will be able to :

- Determine the gene order in a chromosome.
- Calculate the recombination frequency of a particular gene.
- Comprehend the different types of chromosomal aberration.
- Visualise and identify the different divisional stages of mitosis and meiosis.

## Skill Enhancement Course-Elective (Semester 4, SEC B, Mushroom Culture Technology).

At the end of this course students will be able to:

- Identify edible and poisonous mushroom and analyze nutritional and medicinal value of mushrooms.
- Compare cultivation techniques of button mushroom, Paddy straw mushroom and oyster mushroom.
- Analyze detailed cultivation technology in terms of infrastructure and substrate required, techniques and factors affecting mushroom bed preparation and composting technology. Study of cultivation technology in detail will help them to set up their own production unit in future.
- Compare various long term and short-term strategies for storage of mushrooms after harvesting. A good number of recipes/types of food prepared from mushrooms have also been included to promote entrepreneurship in terms of hospitality industry.
- Knowledge of research centres of mushrooms at national and regional level will help to solve any problem met during cultivation, storage and marketing of the finished product.
- Analysis of cost-benefit ratio will help to assess the economic viability of mushroom production.

## Semester 5

### CC11-Cell and molecular biology

At the end of this course student will be able to:

- Estimate DNA and RNA content of a cell
- Measure the plant cell size using micrometry.
- Count the cell per unit volume.
- Analyze the replication, transcription and translation both in prokaryote and eukaryote.

### CC 12 – Biochemistry

At the end of this course students will be able to :

- Prepare solutions and buffers.

- Estimate the protein content of the sample.
- Classify and naming of an enzyme.

Determine velocity of an enzyme, substrate concentration in a enzyme catalysed reaction

Discipline Specific Elective Courses (Semester 5, DSE A, Biostatistics).

On completion of Biostatistics course students will be able to

- Understand fundamental concepts of biostatistics, biometry and interpretation of statistical data generated during experimental set up.
- Develop skills in data tabulation and graphical representation of data.
- Develop proficiency in hypothesis testing and interpretation.
- Understand measurement of gene frequency in terms of interpretation of Hardy- Weinberg equilibrium which will help them to undertake and propose different models with regard to population studies.

DSEB5 -5 : Plant Biotechnology

- Plant biotechnology includes basic techniques of tissue culture, culture of callus,,anther& pollen , protoplast for plantlet regeneration.
- It also includes study of somatic embryogenesis and organogenesis.

Plant genetic engineering also included in this course which includes application of Biotechnology in Agriculture and Health science.

DSE A General (Semester 5, Phytochemistry & Medicinal Botany). On completion of Phytochemistry and Medicinal Botany course students will be able to

- Identify role of medicinal plants in traditional and modern systems of medicine and the importance of holistic mode of treatment followed in Indian Traditional systems of medicine.
- Differentiate between Primary and Secondary metabolites and also evaluate terpenoids, alkaloids and phenolics.
- Assess pharmacologically active constituents present in various plants and their uses.
- Evaluate importance of folk medicine for the treatment of Jaundice, cardiac ailments and Diabetics.

Semester 6

### CC 13- Plant Physiology:

At the end of this course students will be able to :

- Understand the physiological role of different plant hormones like Auxin, Gibberellin etc.
- Know how the light monitors flowering of the plant.
- Understand how the cold temperature control the flowering of the plants.
- Determine the loss of water per stomata per hour.
- To calculate the rate of imbibition and rate of transpiration.

### CC 14- Plant Metabolism :

At the end of this course students will be able to :

- Separate plastidial pigments.
- Estimate the total chlorophyll content from different types of leaves.
- Determine the RQ of germination seeds.
- Know the macromolecular separation by chromatographic methods.

### Discipline Specific Elective Courses (Semester 6, DSE A, Medicinal and Ethnobotany).

After completing this course students will be able to

- Identify role of medicinal plants in traditional and modern systems of medicine and the importance of holistic mode of treatment followed in Indian Traditional systems of medicine.
- Assess crude drugs in terms of classification, evaluation and uses which will aid in identification and characterization of these drugs.
- Compare between primary and secondary metabolites and discuss active constituents of various plant-based drugs for identification of adulterants in herbal drugs.
- Explain ethnobotany viz. plants used by the local communities for nutritive and medicinal value which will help in transformation of Traditional knowledge for promotion of herbal medicines.
- Compute need based conservation strategies for sustainable utilization of medicinal plants.

### DSEB 6- 8 THEO : Natural resource and management

- This course study includes detailed idea about different types of Natural resources like Land, Water, Forest and Biodiversity.
- It also includes study of resource management practices along with efforts taken till date to conserve resources.

The main goal of this course is to make students aware how they can do sustainable utilization of the

resources.

- DSE B General (Semester 6, Economic Botany).

At the end of this course students will be able to

- Discuss Centre of origin of cultivated plants and their importance with reference to Vavilov's work.
- Explain different food crops and beverages viz. Rice, Legumes and Tea in terms of morphology, processing and uses.
- List scientific names, families, part used and uses of different economically important plants.

MATHEMATICS

## Course outcome of B.Sc. Mathematics Honours Course

Semester	Course	Course Outcome
I	CC1 (Calculus, Geometry &Vector Analysis)	<p>Calculus, geometry and vector analysis are the fundamental concepts of Mathematics. The knowledge of calculus will help the students to tracing a curve and analyse its different properties. With help of these course the students can find out the arc length of a plane curve, volume and surface area of the solid obtained by revolution of an arc or plane area about an axis. Also, this course has various applications in business, economics and life sciences.</p> <p>In unit-II, we solve problems on tangents, normal, chords of a conic in two-dimensional analytical geometry (both Cartesian and polar form) and understand the concept of three-dimension analytical geometry (cartesian as well as spherical coordinate system) and will be able to solve problems related to those topics within this course.</p> <p>After completion of the vector analysis course, the students will be able to solve different problems related to vector equation. Also, students can get the idea of vector functions along with limit, continuity, differentiability and integrability property of vector function of one variable. It has wide application in geometry, mechanics, physics etc.</p>
I	CC2 (Algebra)	<p>In Unit-I, students can get some idea about complex numbers and some functions such as exponential functions, logarithmic functions, hyperbolic functions of complex variables. Students can use De Moivre's theorem to find the sum of a trigonometric series and to solve some problems of real functions. This topic gives complete idea to solve cubic, biquadratic and polynomial equations of higher order.</p> <p>Unit-II also informs about the fundamental concept like sets, relations and mappings. This unit also gives the notion of number theory. It will be very helpful for students who will read number theory in future study.</p> <p>After careful study of this Unit-III, the students will be able to define rank and inverse of a matrix and characterize invertible matrices, understand row reduction of matrices and define row echelon matrices. They can apply the method of row reduction to find the inverse of a matrix and solution of linear systems of equations that are found in different branches of science and engineering.</p>
II	CC3(Real Analysis)	<p>In unit-I, we give idea of real numbers and its properties and idea of countability of sets and examples of countable and uncountable sets. Then we develop concept of bounded and unbounded sets in <math>\mathbb{R}</math>. Students will learn about order completeness axiom, Archimedean property of <math>\mathbb{R}</math> and density property of rational and irrational numbers in <math>\mathbb{R}</math>. Concept of neighborhood of a point, interior point, limit point and isolated point of a set and sequence of real numbers. Further, we study open sets, closed sets and their properties, Bolzano Weierstrass theorem for set and sequence, Sandwich rule, Nested interval theorem for sequence of closed bounded intervals. Cauchy general principle of convergence, Cauchy's first and second limit theorems and their</p>

		<p>applications.</p> <p>After knowing the sequence, students will learn about the concepts of the series of real variable. They will be able to find out the sum of different types of the series by using different tests like comparison test, ratio test, Cauchy's n-th root test, Kummer's Test, Gauss test, Leibniz test etc.</p>
II	CC4 (Group Theory)	<p>The idea of group theory and simple properties. Students can use group theory to understand how the problems in number theory can be solved. Students can gain knowledge about symmetric group, dihedral group, group of congruence classes modulo some integers etc. The ideas of cyclic group, quotient group, normal subgroup, homomorphism, isomorphism and related theorems.</p>
III	CC5 (Theory of Real Functions)	<p>In real analysis, we study limit, continuity, uniform continuity of a function (<math>\epsilon</math>-<math>\delta</math> approach), sequential criterion, properties of continuous and uniform continuous function and related theorems. We discuss several types of discontinuity of a function. Then we learn differentiability of a function at a point and relation between continuity and differentiability of a function and the theorems. We also study concept of limit and continuity of a function at a point and sequential criterion for limit and continuity of a function. Continuity of a function on a set and important properties such as neighborhood properties, boundedness properties, intermediate value theorem of continuous functions, discontinuity of functions and two kinds of discontinuity of bounded functions. Students can know the property that a monotone function can have at most countably many points of discontinuity and the property that a monotone bijective function from an interval to an interval is continuous and its inverse is also continuous. Also, they can learn uniform continuity of a function on a set and some theorems such as 'Functions continuous on a closed and bounded interval are uniformly continuous', 'A necessary and sufficient condition under which a continuous function on a bounded open interval I will be uniformly continuous on I' and 'Lipschitz condition is a sufficient condition for uniform continuity' etc.</p>
III	CC6 (Ring Theory and Linear Algebra 1)	<p>The course of unit-I enables the students to acquire knowledge about various topics under ring theory like ideal, prime and maximal ideal, isomorphism theorems, congruence on ring. Also, they can get the knowledge of correspondence between the set of ideals and the set of all congruences on a ring.</p> <p>In unit-II, students can gather the knowledge of vector space, subspaces, bases, dimension and some other properties. Students can gain skills on geometry of subspace of different vector spaces, relation between linear transformations and matrix, and gain ability to compute eigen values and eigen vectors of linear transformations.</p>
III	CC7 Ordinary Differential Equation & multivariate calculus	<p>In this topic, students can learn about the ideas of formulating differential equations in case of mechanical problems. Also, the idea of solving higher order linear differential equations using different methods such as variation of parameters, integrating factors are being taught. Students can also gather knowledge about nonlinear differential equations of Clairaut's form and singular solutions.</p> <p>The concept of function of several variables are taught. The notion of simultaneous limit, iterated limit and partial derivative are taught. The method of determining extreme values of function of two and three variables are taught. Students can apply this idea in advanced topics in analysis and algebra.</p>
III	SEC A - C-	<p>The C-programming language is a powerful middle-level language. It is very</p>

	Programming	<p>fast, portable, structured. It has some header files:stdio.h, math.h, string.h,stdlib.h, time.h etc and library functions: fclose(f), feof(f), fgetc(f), fgets(s,i,f), fopen(s1,s2),fputc(c,f), fputs(s,f), fread(s,i1,i2,f), free(p), fseek(f,l,i), ftell(f), fwrite(s,i1,i2,f), getc(f), getchar(), gets(),printf(), putc(c,f), putchar©, puts(s), rewind(f), scanf()). One can solve real-life examples of engineering, medicine, sciences by C programming language using C header files and library functions.</p> <p>Further, C programming language has many real-world applications such as operating systems, development of new languages, embedded systems, computer games, graphic user interface (GUI), web browsers, advance computations and graphics, database software, enterprise software, medical and engineering, language compiler design, device drivers are written in C, smartphones are running on C kernel, Vi text editor written in C, many assembler are converting the code of assembly language into machine code, networking devices and so on.</p> <p>Many real problems are written by the if statement, if-else statement, Nesting if statement, switch statement, break and continue statement, while statement, do-while statement, for statement. Many problems can be simplywritten by one-dimension, two-dimension and multidimensional arrays, user-defined function, function call, nesting of functions, recurrence of function.</p>
IV	CC8 Riemann Integration & Series of funtions	<p>The Riemann integration gives students the ideas to find the areas of curves. Students can recognize whether a function is integrable or not. Students also learn about a zero set and its relation with integrability of a function. They can develop the ideas of improper integrations and they learn how to find the values of improper integral and gain the idea to test a function whether it is convergence or not. They also learn some special functions such as Beta-function,Gamma-function.</p> <p>On completion of unit –II, student can learn about the concept of sequence of functions with two types of its convergency, pointwise and uniform. With help of these convergency one can be able to check some properties of any sequence of functions like continuity, differentiability, integrability etc. After getting the idea of sequence of functions, the concepts of series of functions with its convergency has been taught. Also, they can get the knowledge about some special series of functions like power series, Fourier series which has many applications in different branches in mathematics, physics etc.</p>
IV	CC9 Partial differential equation & multivariate calculus	<p>After completing the unit-I, the students can learn the concept and theory of linear and nonlinear partial differential equations of first order and different methods of solving such equations like Lagrange’s method and Charpit’s method. They can also derive second order partial differential equations e.g., heat equation, wave equation and Laplace equation and classify second order linear partial differential equations and reduce them to canonical forms. Cauchy problem of PDE’s and allied theory, method of separation of variables to solve vibration heat conduction problems are taught.</p> <p>In this unit-II, the students can get the idea of double and triple integral, differentiation under the integral sign and line integral. They can know the important theorems, like Stokes Theorem, Green’s Theorem and Gauss Divergence Theorem. Students will be able to use this learning in various discipline like advanced mechanics, Astro-physics and quantum mechanics etc.</p>

IV	CC10 (Mechanics)	<p>This course of mechanics gives the idea of coplanar forces, force system in space, equilibrium in the presence of sliding friction force, virtual work, stability of equilibrium, kinematics of a particle, Newton laws of motion and law of gravitation, dynamics of a particle, planar motion and three dimensional motion of a particle and dynamics of many particles system, the linear momentum principle, the angular momentum principle, the energy principle are taught. Students will be able to use this learning in various discipline like Applied Mathematics, advanced mechanics, fluid mechanics, astro-physics, quantum mechanics, etc.</p>
IV	SEC-B Mathematical Logic	<p>In this unit-I basic idea of truth table, negation, conjunction and disjunction are taught. Students can learn about conditional, implication, converse, contrapositive and inverse propositions. Formal language, object and meta language and formal logic are taught.</p> <p>In this unit-II the students can learn the formal theory for propositional calculus. They can know derivation, proof, theorem, deduction theorem, conjunctive and disjunctive normal form, tautology, adequate system of connectives and applications to switching circuits. Also, they can be acquainted with logical consequence, Leindebaum Lemma, soundness and completeness theorem.</p> <p>In this unit-III, students can learn first order language, symbolizing ordinary sentences to first order formulae, free and bound variables, logical validity and formal theory of predicate calculus. They also can learn first order theory of equality and Prenex normal form. In future the students can use the idea in computer science like design of computing machines, artificial intelligence and definitions of data structures for programming languages etc.</p>
V	CC11(Probability & Statistics)	<p>In the probability course, students are given the introduction to the idea of a random experiment and introduce "probability" as a quantification of uncertainty by means of the doublet (Sample space, sigma-algebra). Students can learn the following issues:</p> <ul style="list-style-type: none"> <li>• To study the classical definition / approach to probability thereby solving finite sample spaces with equally likely outcomes problems using combinatorial approach.</li> <li>• Define conditional probability, understand Bayes theorem and use it to solve real life problems.</li> <li>• To give an acquaintance with the axiomatic development of probability theory by A.N.Kolmogorov [i.e., introduce probability as a particular type of (totally) finite measure] and develop an induced probability space by introducing random variable as a measurable function.</li> <li>• To introduce the idea of distribution function of a random variable and study probability distributions of some discrete and continuous random variates. Learning continuity and differentiability of functions with more than one variable and knowing the derivative as a linear transformation.</li> <li>• Understand the concepts of mathematical expectation and characteristic function of random variables and the common characteristics associated with it</li> <li>• Understand the concepts of covariance, correlation coefficient, marginal and conditional distributions and also the concepts of</li> </ul>



		<p>regression lines and curves of two variables</p> <ul style="list-style-type: none"> <li>• Understand the Markov and Chebyshev's inequality and the concept of convergence of a sequence of random variables in probabilistic sense</li> <li>• Understand the weak and strong law of large numbers and the central limit theorem for independent and identically distributed random variables with finite variance</li> <li>• Learning the Inverse Function theorem and Implicit Function theorem and their geometric application.</li> <li>• Learning about the extremum of more than one variable function.</li> </ul> <p>In statistics, students learn about three central tendencies, mean, median mode, standard deviation, skewness, kurtosis. Also, they get the idea of sampling techniques, different sampling distributions such as normal distribution chi-square distribution and t-distribution. They also learn about estimation techniques and the theory of testing hypotheses. The notion of critical regions using Neyman-Pearson lemma is also taught. This helps students to apply in various real -life situations.</p>
V	CC12 (Group theory & linear Algebra II)	<p>On completion of the course of unit I, a student will be able to know the concept of automorphism of group, inner automorphisms with relation between the group of all automorphisms and the group of all inner automorphisms. They can also find out the quotient group which is isomorphic with the group of all inner automorphisms. They can extend group structure to finite permutation group and can generate group with given specific conditions. Also, they can prove Sylow's Theorems and can apply Sylow's theorems to solve different problems in group theory.</p> <p>On vector space that will allow them to appreciate Linear algebra as a tool for learning geometry of higher dimensional spaces through the language of Algebra. In linear algebra of this core course students can gain the knowledge of inner products, norms, Gram-Schmidt orthogonalization process, orthogonal complement, Bessel's inequality, linear operator, dual space, dual basis and transpose of a linear transformation. They can also learn how to diagonalize a symmetric matrix, how to test for critical points of a function of several variables. How to find eigenspace, eigenvalues of a linear operator.</p>
V	DSE-A(1) Advanced Algebra	<p>After completion of this course successfully, the students will acquire the knowledge of a group action, Cayley's theorems, Index theorem, class equation, and its consequences, Cauchy's theorem etc. They can prove Sylow's theorems and can apply Sylow's theorems to solve different problems in group theory.</p> <p>Also, in ring theory students will acquire the knowledge of integral domain, irreducible elements, primes, principal ideal domain, unique factorization domain, Euclidean domain and their internal relations. Also, they can solve different problems by applying various tests for irreducibility of a polynomial over a given field.</p>
V	DSE-A(1) Bio Mathematics	<p>On completion of this topic, the students can gain knowledge on application of dynamical systems on the basis of topic taught in CC7 in SEM-III, formation of mathematical models in population biology moreover they can understand the complex behavior of the model by studying stability and bifurcation theory. They can compare the distinctive feature of discrete and continuous model developed through experimental data.</p>

V	DSE-B(1) Linear Programming & Game Theory	<p>Linear programming problem (LPP) is a part of <i>Operation Research</i> (OR) which is started during the World War Two in 1939. Now, it is used in real life problems. Some real problems can be defined by LPP such as (i) manufacturing (ii) marketing (iii) finance/ bank (investment) (iv) advertisement (v) agriculture, (vi) energy (vii) health (viii) tele-communication and so on. Moreover, LPP is used in microeconomics and management system for (i) planning, (ii) production, (iii) transportation, (iv) assignment (v) inventory (vi) networking (vii) technology and some other fields to maximize the profit or minimize the cost of production scheme.</p> <p>One can find the optimum (maximum or minimum) value of a real-life problem. Therefore, students have to formulate every real problem in LPP and then it can be solved by Graphical method, Simplex method, two phase method and Duality theory. The Transportation and Assignment problems can be solved by Hungarian method. On the other hand, Traveling Salesman problems can be solved by Hungarian method and simplex method. Therefore, simplex method is a well-known simplest method in LPP but laborious. The Hungarian method has been used in Transportation and Assignment and Traveling Salesman problems to avoid many calculations in simplex tables. In addition, a relation between the customer and the salesman is occurred and it will be understood by Duality theory. If a salesman is planning for achieving maximum profit, then the customer is planning for paying minimum cost.</p> <p>If many strategies are occurred in a game between two persons, then the game problem can be written in a rectangular matrix. The Optimal strategy of the players and the corresponding optimum value of the game can be obtained by saddle point (pure strategy, maximin, minimax principle), concept of dominance, modified dominance, algebraic method (mixed strategies), graphical method. Moreover, every game problem can be written in LPP and it can be solved by simplex method.</p>
VI	CC13 (Metric Space & Complex Analysis)	<p>Here we study metric space, it is a set where a distance is defined between elements of a set. The metric space method has been employed for decades in various application for example, internet search engines, image classification etc.</p> <p>In metric space, we generalize the concepts which we study in real analysis previously, like continuity, differentiability.</p>
VI	CC14 (Numerical Methods)	<p>In real life, most of the mathematical models cannot be solved analytically. Then, one can apply the numerical techniques for finding solutions or investigating the nature of real problems. Many mathematical problems and the associated inverse problems can be defined by algebraic equations, transcendental equation, differential equation, integral equation and their combination. The mathematical and inverse problems are used in (i) natural sciences, (ii) Social sciences, (iii) engineering, (iv) medicine, (v) industrial mathematics, (vi) physics, chemistry and so on.</p> <p>One can predict the values of a mathematical problem with the help of some known points by numerical interpolation formulas such as Lagrange interpolation, Newton forward, backward difference interpolation, Newton divided difference, Stirling's, Bessel's formula and Hermite interpolation. The nature of the mathematical problem (<math>y=f(x)</math>) is defined by the differentiation of <math>y</math> and it is obtained by finite differences method.</p> <p>Some mathematical problem can be defined by algebraic equations and they can be solved by (i) direct methods: Gaussian elimination, Gauss Jordan methods, Pivoting strategies; (ii) iterative methods: Gauss Jacobi method,</p>

		<p>Gauss Seidel method, LU decomposition method (Crout's LU decomposition method) and (iii) matrix inversion: Gaussian elimination and LU decomposition method.</p> <p>The transcendental and polynomial equations can be solved by (i) Bisection method, (ii) Secant method, (iii) Regula-Falsi method, (iv) fixed point iteration, (v) Newton-Raphson method (vi) Modified Newton-Raphson method for multiple roots, Complex roots. Numerical solution of system of nonlinear equations can be solved by the Newton's method.</p> <p>X-ray beam propagation can be defined by an ordinary differential equation and it can be solved by (i) successive approximations that is Picard method, (ii) Euler's method, (iii) the modified Euler method, (iv) Runge-Kutta methods of orders two and four order. The differential equation has many applications in sciences.</p> <p>Moreover, area and volume of bounded area can be defined by definite integral and one can find the volume or area (i) Newton Cotes formula, (ii) Trapezoidal rule, (iii) Simpson's 1/3-rd rule, (iv) Weddle's rule, (v) Boole's Rule, (vi) midpoint rule and (vii) Gaussian quadrature formula.</p> <p>Any finite dimensional space can be spanned by a matrix and its nature depends on eigen values. One can find the dominant eigen value and the corresponding eigen vector by Power method.</p>
VI	DSE A(2) Differential Geometry	<p>In unit-I, the students can learn the basic ideas of transformations laws, properties of tensors and covariant differentiation.</p> <p>In unit-II, the students can learn plane curves, space curves and parametrized curves. They can learn curvature of plane curves and space curves. Moreover, they will be acquainted with Serret-Frenet formula.</p> <p>In unit-III, the students can gain knowledge about developable related to space curves and curves on surface. Normal properties of geodesics are taught. They can Gauss-Bonnet theorem. After completion of this topic, the students are able use the idea in computer vision for analyzing shapes and in image processing for analyzing data on non-flat surfaces.</p>
VI	DSE- B(2) Point Set Topology	<p>In this course, student will learn topology as a generalization of metric space. Student will start the course with basic idea of topological spaces with examples, basis, sub-basis for a topological space, product topology, metric topology etc. They also study about some topological invariant properties and metric invariant properties. Concepts of separation axioms, connectedness, components, compactness, sequentially compactness etc. have been taught in this course. From this course, one can also learn about Heine Borel theorem on <math>\mathbb{R}^n</math> and some properties of real valued function on connected and compact spaces.</p>

## Course outcome of B.Sc. General Mathematics Course

Semester	Course Code	Course Outcome
I	CC1/GE1	<p>On completion of this course, the student will develop</p> <ul style="list-style-type: none"> <li>• The knowledge and skills of solving problems related to complex numbers, polynomials and matrices.</li> <li>• Ability to understand real number system and its properties.</li> <li>• The concept of real valued functions, its limit, continuity and differentiability</li> <li>• Skills of solving some differential equations and its applications on geometry.</li> <li>• Capacity to deal with problems related to two and three dimensionals geometry, like transformation of axes, pair of straight lines, conic sections and sphere.</li> </ul>
II	CC2/GE2	<p>On completion of this course, the students will acquire</p> <ul style="list-style-type: none"> <li>• Knowledge about infinite sequence and series, mean value theorems, Taylor's series and infinite series expansion of some functions.</li> <li>• Concept of Maximum and minimum of functions up to three variables.</li> <li>• Skills of solving homogeneous and non-homogeneous differential equations and basic partial differential equations.</li> <li>• The knowledge of vector algebra and its applications to mechanics.</li> <li>• Knowledge about integers, number theory, nature of prime numbers, congruence relation on integers.</li> <li>• Ability to use congruence relations on ISBN, UPC, or credit card no. and error detecting.</li> <li>• Some concepts of Boolean algebra and logic gates.</li> </ul>
III	CC3/GE3	<p>On completion of this course, the students will get</p> <ul style="list-style-type: none"> <li>• Concept of improper integrals and its convergence and divergence.</li> <li>• Some working knowledge on using multiple integrals to calculate volume and surface area.</li> <li>• Concepts of numerical methods and its application to solve interpolation, differential equations, integration and root finding problems.</li> <li>• Skills to solve LPP problems, transportation and assignment problems.</li> </ul>
III	SEC-A	<p>On completion of this course, the students will acquire knowledge on</p> <ul style="list-style-type: none"> <li>• History of computer, compiler, high level language, importance of C-programming, etc.</li> <li>• Create some programming using C-language.</li> <li>• Doing C-programming using array, various types of loops, User-defined functions, etc.</li> </ul>
IV	CC4/GE4	<p>On completion of this course, the students will acquire knowledge about</p> <ul style="list-style-type: none"> <li>• Group theory, ring, field.</li> <li>• Quadratic form, Eigen value and Eigen vectors of matrices.</li> <li>• Historical development of computers, machine languages, algorithms, flow charts, high level languages like FORTRAN, C, C++, PASCAL, etc.</li> <li>• Solving problems of probability and statistics.</li> <li>• Mean, median, mode, dispersions, hypothesis and frequency distribution.</li> </ul>
IV	SEC-B	<p>On completion of this course, the students will acquire</p> <ul style="list-style-type: none"> <li>• Knowledge on various propositions of mathematical logic and truth table.</li> <li>• Concepts on normal forms and some applications on switching circuits.</li> <li>• Skills on symbolizing ordinary sentences, concepts on logical validity, replacement theorem, completeness theorem, first order theories, etc.</li> </ul>
V	DSE-A1 (Particle	<p>On completion of this course, the students will acquire knowledge about</p> <ul style="list-style-type: none"> <li>• Motion of particle in straight lines, SHM, oscillation.</li> </ul>

	Dynamics)	<ul style="list-style-type: none"> <li>• Velocity, acceleration, creating equation of motion.</li> <li>• Force, work, power, energy, Newton's laws of motion.</li> <li>• Motion of a particle in two dimensions, central orbit, Kepler's laws of motion.</li> </ul>
V	DSE-A2 (Graph Theory)	<p>On completion of this course, the students will know about</p> <ul style="list-style-type: none"> <li>• Basic properties and examples of graphs, complete graphs, isomorphism of graphs.</li> <li>• Path, circuits and cycles and process of solving some problems related to those topics.</li> <li>• Solving process of travelling salesman's problem by graph theory.</li> <li>• Definition and properties of Trees, planar graphs, Kuratowski's graph.</li> </ul>
VI	DSE-B1 (Advanced calculus)	<p>On completion of this course, the students will</p> <ul style="list-style-type: none"> <li>• Acquire concepts of convergence of sequence and series of functions.</li> <li>• Get knowledge about power series, and its radius of convergence, and could solve problems related to this topic.</li> <li>• Be able to solve problems about Fourier series.</li> <li>• Get knowledge about Laplace transformation, and its application to solve ordinary differential equations.</li> </ul>

ZOOLOGY

**Course Outcome (CO)**

**Zoology Honours**

**Subject Code: ZOOA**

<b>Paper &amp; Code</b>	<b>Course Outcomes</b>
<b>Non-Chordates I (Protista to Coelomate) Theory ZOOA-CC1-1-TH</b>	<i>On successful completion of the course, students will be able to:</i> CO1: Learn the basic definitions of systematics, taxonomy and classification. CO2: Know about the classification, characteristics and examples of Protozoa, Porifera, Cnidaria and Helminth groups. CO3: Understand some basic life processes of the above non-chordates.
<b>Non-Chordates I Lab ZOOA-CC1-1-P</b>	CO1: Identify with proper reasons the animals learnt in the theory paper.
<b>Molecular Biology ZOOA-CC1-2-TH</b>	CO1: Know about the salient features of nucleic acid. CO2: Understand replication, transcription, translation, post transcriptional and post translational modifications, gene regulation and DNA repair mechanisms. CO3: Learn about various techniques related to molecular biology.
<b>Molecular Biology Lab ZOOA-CC1-2-P</b>	CO1: Perform molecular biology techniques like isolation and quantification of genomic DNA and agarose gel electrophoresis. CO2: Understand the staining processes of DNA and RNA.
<b>Non-Chordate II (Coelomate Phyla) Theory ZOOA-CC2-3-TH</b>	CO1: Know about the classification, characteristics and examples of the coelomate invertebrates. CO2: Understand some basis of life processes of the coelomate invertebrates.
<b>Non-Chordate II Lab ZOOA-CC2-3-P</b>	CO1: Identify with appropriate reasons the coelomate invertebrates. CO2: Knowing the anatomy of some basic systems of Cockroach.
<b>Cell Biology Theory ZOOA-CC2-4-TH</b>	CO1: Know about the ultra-structures and functions of plasma membrane, nucleus and all cytoplasmic organelles in details. CO2: Understand cell cycle and its regulation. CO3: Understand the concept of cancer. CO3: Learn about some basic cell signaling pathways.
<b>Cell Biology Lab ZOOA-CC2-4-P</b>	CO1: Prepare slides for study of mitosis and meiosis and identify their various stages. CO2: Study cell viability.
<b>Chordata Theory ZOOA-CC3-5-TH</b>	CO1: Knowing the general characteristics and classification of Phylum Chordata. CO2: Understand the classification, structure, function and biology of chordates belonging to different sub-phyla and classes. CO3: Learn about some unique phenomena like metamorphosis, parental care, migration, echolocation, etc. observed in the different vertebrate classes.
<b>Chordata Lab</b>	CO1: Identify various chordates with proper reasons.

<b>ZOOA-CC3-5-P</b>	CO2: Learn the anatomy of some basic systems of Tilapia.
<b>Animal Physiology: Controlling &amp; Co-ordinating System Theory ZOOA-CC3-6-TH</b>	CO1: Gain knowledge about the various types of tissues and their functions. CO2: Understand the physiology of the muscular, nervous, reproductive and endocrine systems.
<b>Animal Physiology: Controlling &amp; Co-ordinating System Lab ZOOA-CC3-6-P</b>	CO1: Learn about the basics of histology and tissue staining. CO2: Identify histological slides of various mammalian organs
<b>Fundamental of Biochemistry Theory ZOOA-CC3-7-TH</b>	CO1: Understand the structure, types and importance of the basic bio-molecules CO2: Understand carbohydrates, lipids, proteins and nucleic acid metabolism, oxidative phosphorylation and redox reactions. CO3: Learn about the classification and properties of enzymes, and kinetics of enzyme action.
<b>Fundamental of Biochemistry Lab ZOOA-CC3-7-P</b>	CO1: Learn to test for the presence of carbohydrates, proteins, lipids, urea and uric acid. CO2: Estimate the concentration of total protein in a sample.
<b>Comparative Anatomy of Vertebrate Theory ZOOA-CC4-8-TH</b>	CO1: Able to learn about the anatomy of integumentary, digestive, respiratory, circulatory, urinogenital, nervous and skeletal systems among the vertebrate classes in a comparative fashion.
<b>Comparative Anatomy of Vertebrate Lab ZOOA-CC4-8-P</b>	CO1: Identify with reasons the skulls and disarticulated skeleton of toad, pigeon and guinea pig. CO2: Learn to compare the structure of heart and brain among the different classes of vertebrates.
<b>Animal Physiology: Life Sustaining System Theory ZOOA-CC4-9-TH</b>	CO1: Understand the detailed physiology of digestion, respiration, circulation, excretion and thermoregulation.
<b>Animal Physiology: Life Sustaining System Lab ZOOA-CC4-9-P</b>	CO1: Determine blood group and haemoglobin content. CO2: Identify various blood cells of human and cockroach. CO3: Determine blood pressure. CO4: Identify the types of scales in fishes.
<b>Immunology Theory ZOOA-CC4-10-TH</b>	CO1: Gain basic knowledge about immune cells, immunoglobulins, antigens, MHC molecules, complement systems and cytokines. CO2: Distinguish between innate and adaptive immunity CO3: Understand various types of hypersensitivities. CO5: Know about vaccines and vaccination.
<b>Immunology Lab ZOOA-CC4-10-P</b>	CO1: Demonstrate and identify of the different lymphoid organs. CO2: Gather basic knowledge of ELISA
<b>Ecology Theory ZOOA-CC5-11-TH</b>	CO1: Understand the various features and aspects of population ecology, community ecology and ecosystem ecology. CO2: Understand biodiversity, conservation and their importance.

<b>Ecology Lab</b> <b>ZOOA-CC5-11-P</b>	CO1: Identify planktons and estimate various water chemistry parameters like pH, salinity, dissolved oxygen and free CO <sub>2</sub> . CO2: Determine population density and calculate the diversity index. CO3: Prepare a report on the work done on a Field visit.
<b>Principles of Genetics Theory</b> <b>ZOOA-CC5-12-TH</b>	CO1: Understand basic concepts of genetics and laws of inheritance. CO2: Learn the fundamentals of linkage, crossing over, mutations, sex determination, transposable genetic elements, complementation in bacteria.
<b>Principles of Genetics Lab</b> <b>ZOOA-CC5-12-P</b>	CO1: Understand and carry out chi-square analyses for checking genetic ratios. CO2: Identify different chromosomal aberrations in man and <i>Drosophila</i> . CO2: Analyze pedigree of some inherited traits.
<b>Developmental Biology Theory</b> <b>ZOOA-CC6-13-TH</b>	CO1: Learn the various aspects of early, late and post embryonic developments. CO2: Know about <i>in vitro</i> fertilization and various aspects of stem cell biology including applications of stem cell therapy.
<b>Developmental Biology Lab</b> <b>ZOOA-CC6-13-P</b>	CO1: Identify the developmental stages of <i>Drosophila</i> and chick embryo, as well as different invertebrate larvae. CO2: Familiarize with the types of placenta.
<b>Evolutionary Biology Theory</b> <b>ZOOA-CC6-14-TH</b>	CO1: Understand the origin of life and the various theories of Evolution. CO2: Know about population genetics, concept of speciation, extinctions and phylogenetic trees. CO3: Learn the geological time scale and human evolution.
<b>Evolutionary Biology Lab</b> <b>ZOOA-CC6-14-P</b>	CO1: Study fossils. CO2: Construct and interpret phylogenetic trees. CO3: Distinguish between homologous and analogous organs.
<b>Parasitology Theory</b> <b>ZOOA-DSE(A)-5-1-TH</b>	CO1: Gain knowledge about the basics of parasitology, role of vectors, host-parasite interactions etc. CO2: Acquire knowledge about the life cycles, epidemiology, pathology, diagnosis, symptoms and treatments of various parasites. CO3: Learn the role of arthropods in spread of diseases.
<b>Parasitology Lab</b> <b>ZOOA-DSE(A)-5-1-P</b>	CO1: Identify the life cycle stages of some common human parasites. CO2: Study and identify parasites of fish, poultry bird and goat.
<b>Endocrinology Theory</b> <b>ZOOA-DSE(B)-5-1-TH</b>	CO1: Learn the fundamental concepts of the organs of the endocrine system, the types of hormones, their mechanisms of action and functions. CO2: Understand the concept of glucose and calcium homeostasis.
<b>Endocrinology Lab</b> <b>ZOOA-DSE(B)-5-1-P</b>	CO1: Identify the various endocrine glands. CO2: Gather hands-on knowledge of tissue fixation, microtomy and staining of endocrine glands.
<b>Animal Cell Biotechnology Theory</b> <b>ZOOA-DSE(A)-6-1-TH</b>	CO1: Acquire knowledge of the basic principles, preparations and maintenance protocols required for animal cell culture. CO2: Understand the techniques of gene manipulation and principles



	underlying fermentation process.
<b>Animal Cell Biotechnology Lab</b> <b>ZOOA-DSE(A)-6-1-P</b>	CO1: Familiarize with the various tools and techniques of biotechnology. CO2: Learn how to prepare culture media and sterilize materials used for cell culture. CO3: Learn the process of isolation of genomic and plasmid DNA.
<b>Animal Biotechnology Theory</b> <b>ZOOA-DSE(A)-6-2-TH</b>	CO1: Understand the organization of <i>E. coli</i> and <i>Drosophila</i> genome. CO2: Understand the techniques of gene manipulation, cell culture and cloning. CO3: Understand the concept of genetically modified organisms. CO4: Gather fundamental knowledge on gene therapy.
<b>Animal Biotechnology Lab</b> <b>ZOOA-DSE(A)-6-2-P</b>	CO1: Become familiar with the tools and techniques of biotechnology. CO2: Learn the process of isolation of genomic and plasmid DNA.
<b>Animal Behaviour &amp; Chronobiology Theory</b> <b>ZOOA-DSE(B)-6-1-TH</b>	CO1: Learn about the patterns of behaviours, social and cooperative behaviours, kinship theories. CO2: Understand biological rhythms and the biological clock.
<b>Animal Behaviour &amp; Chronobiology Lab</b> <b>ZOOA-DSE(B)-6-1-P</b>	CO1: Identify nests of birds and insects and study their nesting habits. CO2: Study behavioural activities of animals while visiting a field.
<b>Sericulture</b> <b>ZOOA-SEC(A)-3-2-TH</b>	CO1: Acquire basic knowledge of sericulture, types and biology of silkworm, mulberry cultivation and silk worm rearing. CO2: Know about the pests and diseases associated with silk worm and mulberry. CO3: Understand the importance of sericulture as an industry.
<b>Aquarium Fish Keeping</b> <b>ZOOA-SEC(A)-4-1-TH</b>	CO1: Understand the scope of Aquarium fish keeping as an industry. CO2: Acquire knowledge of the biology, food and feeding of various fresh water and marine aquarium fishes.
<b>Medical Diagnosis</b> <b>ZOOA-SEC(A)-4-2-TH</b>	CO1: Learn about the diagnostic methods for blood and urine analysis. CO2: Understand the pathology of infectious and non-infectious diseases and get the concept of tumours. CO3: Gather knowledge of clinical biochemistry and microbiology. CO4: Fundamental knowledge of various medical imaging techniques.

**Course Outcome (CO)**

**Zoology General**

**Subject Code: ZOOG**

<b>Paper &amp; Code</b>	<b>Course Outcomes</b>
	<i>On successful completion of the course, students will be able to:</i>

<b>Animal Diversity Theory</b> <b>ZOOG-CC1-1-TH</b>	CO1: Learn about the classification, characteristics and examples of non-chordates and chordates. CO2: Understand some basis of life processes of some animals.
<b>Animal Diversity Lab</b> <b>ZOOG-CC1-1-P</b>	CO1: Identify with reasons some non-chordates and chordates. CO2: Discriminate poisonous and non-poisonous snakes with the help of identification key. CO3: Learn the anatomy of some basic systems of Cockroach.
<b>Comparative Anatomy &amp; Developmental Biology Theory</b> <b>ZOOG-CC2-2-TH</b>	CO1: Learn about the anatomy of integumentary, digestive, respiratory, circulatory and urinogenital systems among the vertebrate groups in a comparative fashion. CO2: Understand the various aspects of early and late embryonic developments.
<b>Comparative Anatomy &amp; Developmental Biology Lab</b> <b>ZOOG-CC2-2-P</b>	CO1: Identify with reasons the skulls and disarticulated skeleton of pigeon and guinea pig. CO2: Identify the developmental stages of chick embryo and different invertebrate larvae. CO3: Familiarize with the types of placenta.
<b>Physiology and Biochemistry Theory</b> <b>ZOOG-CC3-3-TH</b>	CO1: Knowl about important aspects of nerves and muscles, digestion, respiration, excretion, reproduction, cardio-vascular and the endocrine systems. CO2: Understand several important metabolic pathways and the concept of enzymes.
<b>Physiology and Biochemistry Lab</b> <b>ZOOG-CC3-3-P</b>	CO1: Identify histological sections of important organs. CO2: Test for the presence of carbohydrates in a sample.
<b>Genetics and Evolutionary Biology Theory</b> <b>ZOOG-CC4-4-TH</b>	CO1: Understand the basic concepts of genetics and laws of inheritance. CO2: Learn the fundamentals of linkage, crossing over, mutations, and sex determination. CO3: Understand the basics of the origin of life, theories of Evolution, isolation and speciation.
<b>Genetics and Evolutionary Biology Lab</b> <b>ZOOG-CC4-4-P</b>	CO1: Understand and carry out chi-square analyses for checking Mendelian ratios. CO2: Identify different chromosomal aberrations in man CO3: Understand the phylogeny of horse.
<b>Applied Zoology Theory</b> <b>ZOOG-DSE(A)-5-1-TH</b>	CO1: Acquire knowledge about parasites and know the life cycles, and pathogenicity of various parasites. CO2: Learn about the biology and control measures of pests. CO3: Understand various aspects of animal husbandry, poultry and fish farming. CO3: Understand the epidemiology of some diseases.
<b>Applied Zoology Lab</b> <b>ZOOG-DSE(A)-5-1-P</b>	CO1: Identify the life cycle stages of some common human parasites and vectors. CO2: Identify insects of economic importance.
<b>Ecology &amp; Wild life</b>	CO1: Understand the various features and aspects of population

<b>Biology Theory</b> <b>ZOOG-DSE(B)-6-2-TH</b>	ecology, community ecology and ecosystem ecology. CO2: Understand conservation and its importance.
<b>Ecology &amp; Wild life</b> <b>Biology Lab</b> <b>ZOOG-DSE(B)-6-2-P</b>	CO1: Gain knowledge of some basic equipment needed for wildlife studies. CO2: Identify animals through pug marks, scats, nests, etc. CO3: Learn to identify planktons and estimate various water chemistry parameters like pH, temperature, salinity, dissolved oxygen and free CO <sub>2</sub> .
<b>Apiculture</b> <b>ZOOG-SEC(A)-3-1-TH</b>	CO1: Know the basics of the life cycle of honey bees, their social organization and rearing. CO2: Acquire knowledge about diseases and enemies of the bees. CO2: Know about the important products of the apiculture industry as well as various other aspects of the industry.
<b>Aquarium Fish Keeping</b> <b>ZOOG-SEC(B)-4-2-TH</b>	CO1: Understand the scope of Aquarium fish keeping as an industry. CO2: Gain basic knowledge of the biology, food and feeding of various fresh water and marine aquarium fishes.
<b>Sericulture</b> <b>ZOOG-SEC(A)-5-3-TH</b>	CO1: Acquire basic knowledge of sericulture, types and biology of silkworm, mulberry cultivation and silk worm rearing CO2: Learn about the pests and diseases associated with silk worm and mulberry. CO3: Understand the importance of sericulture as an industry.
<b>Medical Diagnosis</b> <b>ZOOG-SEC(B)-6-4-TH</b>	CO1: Acquire knowledge regarding the diagnostic methods for blood and urine analysis, clinical biochemistry and microbiology. CO2: Understand the pathology of infectious and non-infectious diseases and the concept of tumours. CO3: Get a basic knowledge on X-ray imaging.

## COMMERCE

### Course Objectives of B.Com (Accounting and Finance)

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**Bachelor of Commerce (B.Com)** programs with a specialization in Accountancy and Finance typically aim to provide students with a strong foundation in both accounting principles and financial management. Here are main course objectives:

1. **Developing Financial Expertise:** One of the primary objectives of B.Com in Accounting and Finance is to develop students' understanding of financial concepts, principles, and practices. This includes gaining a deep comprehension of financial statements, financial analysis, budgeting, taxation, and various financial instruments.
2. **Enhancing Accounting Skills:** The program aims to equip students with a comprehensive understanding of accounting principles and practices. This involves learning about different types of accounting, preparing and interpreting financial statements, and understanding accounting regulations and standards.
3. **Building Business Acumen:** This programme often emphasizes developing a broader business perspective. The objective is to enable students to integrate their financial and accounting knowledge into the larger context of business decision-making.
4. **Preparing for Professional Roles:** Many students pursuing B.Com in Accounting and Finance intend to enter the world of finance and accounting professionally. Therefore, the programme aims to prepare students for roles such as financial analysts, auditors, tax consultants, investment analysts, and financial managers. This involves not only building theoretical knowledge but also practical skills and ethical considerations relevant to these professions.

Programme Specific Outcomes
<b>SEMESTER - I</b>
<b>Financial Accountancy – I (CC 1.1 CH), Credit Hours = 6</b> <ol style="list-style-type: none"><li>1. <b>Understanding Accounting Principles</b>, concepts, and conventions, including the accounting equation, accrual basis of accounting, double-entry system, and historical cost concept.</li><li>2. Apply knowledge of accounting principles <b>to prepare Financial Statements</b> including the income statement, balance sheet, and cash flow statement.</li><li>3. <b>Analysing Financial Data:</b> Use financial statements to perform basic financial analysis, including calculating key financial ratios and interpreting these ratios.</li><li>4. <b>Applying Indian Accounting Standards</b> and guidelines while preparing financial statements. Understand the importance of Generally Accepted Accounting Principles (GAAP) or International Financial Reporting Standards (IFRS), depending on the context.</li><li>5. Develop an awareness of ethical issues in financial accounting, and maintaining</li></ol>

confidentiality.

**Principles of Management (CC 1.2 CHG), Credit Hours = 6**

1. **Understanding fundamental Management Concepts**, theories, and principles.
2. Learn to apply various management techniques and tools in different organizational contexts through case studies and simulate
3. ions.
4. Develop communication and leadership skills essential for effective management.
5. Explore the dynamics of working in teams and learn about employee motivation, job satisfaction, and the role of management in creating a positive work environment.
6. Recognize the ethical dilemmas and social responsibilities that managers face in today's business world. Discuss the importance of ethical decision-making, corporate social responsibility, and sustainable management practices.

**Business Laws (CC1.1CHG), Credit Hours = 6**

1. Develop a comprehensive understanding of the legal framework that governs business activities, including the Indian Contract Act, Sale of Goods Act, Companies Act, and other relevant laws.
2. **Application of Legal Concepts** and principles to practical business scenarios.
3. Identify potential legal risks that businesses may face and develop strategies to manage and mitigate those risks.
4. Gain knowledge about company formation, governance, and dissolution. Understand the responsibilities of directors, shareholders, and other stakeholders within the legal framework of a company.
5. Explore the ethical dimensions of business decisions and their alignment with legal requirements.

**Microeconomics – I (GE 1.1 CHG), Credit Hours = 3**

1. **Understanding microeconomic concepts**, including supply and demand, elasticity, consumer behaviour, and production theory.
2. Study utility theory and consumer behaviour, including concepts like marginal utility, indifference curves, and budget constraints.
3. Learn to analyze production costs, both short-run and long-run, and understand how they influence firms' output and pricing decisions.
4. Explore different market structures such as perfect competition, monopoly, monopolistic competition, and oligopoly.

**Business Statistics (GE 1.1 CHG), Credit Hours = 3**

1. **Understanding Statistical Concepts**, including measures of central tendency, measures of dispersion, etc.
2. Learn data analysis techniques, such as descriptive statistics and graphical representation of data.
3. Explore simple and multiple regression analysis as a tool for understanding relationships between variables and use regression analysis for forecasting and

decision-making in business contexts.

4. Gain proficiency in hypothesis testing techniques and statistical inference. Learn how to draw conclusions about population parameters based on sample data.

## **SEMESTER - II**

### **E-Commerce (GE 2.1 CHG), Credit Hours = 6**

1. **Understanding E-Commerce Fundamental** concepts, models, and components of electronic commerce.
2. Learn about the technological infrastructure of e-commerce, including online payment systems, and security protocols.
3. Explore various e-commerce business models, such as B2B (business-to-business), B2C (business-to-consumer), C2C (consumer-to-consumer), and others.
4. Study digital marketing strategies and techniques specific to e-commerce, including search engine optimization (SEO), social media marketing, and email campaigns.
5. Examine legal and ethical considerations in e-commerce, including privacy concerns, data security, intellectual property rights, etc.

### **Company Law (CC2.1 CHG), Credit Hours = 6**

1. Develop a comprehensive understanding of the Indian Companies Act and its significance in regulating the formation, operation, and management of companies in India.
2. Learn about the process of company incorporation, including the requirements for registering different types of companies such as private, public, and one-person companies.
3. Study the provisions related to corporate governance, board of directors, and management of companies under the Indian Companies Act.
4. Explore the regulations related to share capital, issuance of securities, and share transfer mechanisms.
5. Examine the provisions governing mergers, acquisitions, amalgamations, and winding up of companies.

### **Marketing Management and Human Resource Management (CC 2.2 CHG), Credit Hours = 6**

1. Develop a comprehensive understanding of fundamental marketing concepts, including the marketing mix, market segmentation, targeting, and positioning.
2. Study product lifecycle management, brand development, and strategies for creating and managing successful brands.
3. Explore various communication tools such as advertising, sales promotion, public relations, and digital marketing.
4. Develop a foundational understanding of human resource management, its role, and its significance in organizational success.
5. Learn about the process of attracting, recruiting, and selecting qualified candidates for various job roles. Understand the importance of aligning recruitment strategies with organizational goals. Gain insights into performance appraisal techniques, feedback mechanisms, and performance improvement strategies.

**Cost and Management Accounting – I (CC 2.1CH), Credit Hours = 6**

1. Develop a comprehensive understanding of various cost concepts, such as fixed costs, variable costs, direct costs, and indirect costs.
2. Learn to classify costs based on different criteria such as nature, function, and behavior.
3. Study different costing methods such as job costing, process costing, and activity-based costing.
4. Explore the concept of cost-volume-profit (CVP) analysis that aids in decision-making and determining break-even points.
5. Learn about budgeting processes and techniques besides variance analysis to compare actual performance with budgeted expectations.

**SEMESTER - III**

**Information Technology & Its Application in Business (SEC 3.1CHG), Credit Hours = 4**

1. Develop a foundational understanding of information technology (IT) concepts, components, and systems.
2. Develop proficiency in using spreadsheet software, word processing software, presentation software, and other tools for business communication and analysis.
3. Study the fundamentals of database management systems (DBMS) and their application in business operations.
4. Explore the role of Internet in facilitating online transactions.
5. Learn about information security principles and practices to safeguard sensitive business data from unauthorized access, and cyber threats.

**Business Mathematics & Statistics (GE 3.1CHG), Credit Hours = 6**

1. Develop a solid foundation in mathematical concepts relevant to business applications and use them to solve real-world business problems.
2. Gain proficiency in calculating measures of central tendency, dispersion, and probability distributions to make informed decisions.
3. Study correlation and regression analysis to understand the relationships between variables and predict outcomes.
4. Understand how to identify trends, seasonal patterns, and irregular variations in business data.
5. Learn how to apply quantitative techniques to solve problems related to production, marketing, finance, and other business functions.

**Financial Accounting – II (CC 3.1CH), Credit Hours = 6**

1. Develop insights into more complex financial transactions, consolidations, and reporting standards such as Ind AS and IFRS.
2. **Accounting for Special Transactions like** partnerships, joint ventures, and branches.
3. Explore accounting procedures related amalgamations, mergers, acquisitions, and reorganizations.
4. Learn to prepare cash flow statements. Understand the different categories of cash flows and their significance.

5. Gain skills in analyzing and interpreting financial statements to assess a company's financial performance, liquidity, solvency, and profitability.

### **Indian Financial System (CC 3.2CH), Credit Hours = 6**

1. Develop a comprehensive understanding of the structure and components of the Indian financial system.
2. Study the different types of financial markets in India, including the money market, capital market, and foreign exchange market.
3. Learn about various financial instruments and products available in the Indian financial system, such as stocks, bonds, derivatives, and mutual funds.
4. Explore the regulatory framework and the roles of Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), and Insurance Regulatory and Development Authority of India (IRDAI).
5. Study efforts to promote financial inclusion and expand access to financial services across different segments of the population.

## **SEMESTER - IV**

### **Microeconomics-II & Indian Economy (GE 4.1 CHG), Credit Hours = 6**

1. Develop a comprehensive understanding of the structure and functioning of the Indian economy. Gain insights into the key sectors, economic policies, and trends that shape the country's economic landscape.
2. Study important macroeconomic indicators such as GDP, inflation rate, unemployment rate, and balance of payments.
3. Learn about significant economic reforms and policies that have been implemented in India, including liberalization, privatization, and globalization.
4. Gain insights into the social and developmental challenges that India faces, such as poverty, inequality, and sustainable development.

### **Entrepreneurship Development and Business Ethics (CC 4.1 CHG), Credit Hours = 6**

1. Develop a comprehensive understanding of entrepreneurship, its significance in economic growth, and its role in fostering innovation, job creation, and wealth generation.
2. Study the stages of the entrepreneurial process, from idea generation to business planning, resource acquisition, and implementation.
3. Learn how to create a comprehensive business plan and operational plan for a new venture.
4. Explore ethical considerations in business decision-making and social responsibility.

### **Taxation – I (CC 4.1 CHG), Credit Hours = 6**

1. Develop a solid understanding of the basic principles of taxation, including the concepts of tax incidence, tax liability, tax evasion, and tax avoidance.
2. Learn classification of income, computation of taxable income, and understand various types of income sources.
3. Study the deductions and exemptions available under the income tax laws.



4. Learn about filing income tax returns, the assessment process, and the role of the income tax authorities.
5. Explore tax planning strategies that individuals and businesses can employ to minimize their tax liabilities within the legal framework.

**Cost and Management Accounting – II (CC 4.2 CH), Credit Hours = 6**

1. Develop proficiency in advanced costing methods, including activity-based costing (ABC), target costing, and life cycle costing.
2. Learn about cost management techniques such as cost control, cost reduction, and cost optimization.
3. Study performance measurement tools and techniques such as balanced scorecards and key performance indicators (KPIs).
4. Explore the role of management accounting in strategic decision-making.
5. Gain advanced skills in budgeting and forecasting techniques.

**SEMESTER - V**

**Auditing & Assurance (CC 5.1 CH), Credit Hours = 6**

1. **Understanding Auditing Concepts** and its principles including the role of auditors, audit objectives, and the importance of ethical conduct in auditing.
2. Learn the process of audit planning, including risk assessment, materiality determination, and audit program development.
3. Gain insights into the importance of proper documentation of audit work, findings, and conclusions.
4. Explore the evaluation of internal controls within an organization.
5. Learn how auditors communicate their findings through audit reports. Understand the different types of audit reports and the concept of reasonable assurance in providing confidence to stakeholders.

**Taxation – II (CC 5.2 CH), Credit Hours = 6**

1. Develop an in-depth understanding of advanced concepts including capital gains tax, wealth tax, and other specialized provisions of the Income Tax Act.
2. Study the computation of taxable income, deductions, and exemptions available to corporate entities.
3. Study advanced topics such as Goods and Services Tax (GST) and Customs duties.
4. Explore advanced tax planning strategies within the legal framework.

**Economics – II and Advanced Business Mathematics (DSE 5.1 A), Credit Hours = 6**

1. Develop a deeper understanding of microeconomic theories and concepts, including consumer theory, producer theory, market structures, and strategic behaviour.
2. Study advanced macroeconomic theories, including theories of income determination, inflation, and unemployment.
3. Gain insights into theories of economic growth and development.
4. Apply advanced calculus concepts to solve business-related problems, including optimization, marginal analysis, and revenue and cost functions.

5. Explore probability distributions such as normal distribution, binomial distribution, and Poisson distribution.

**Corporate Accounting (CC 5.2 CH), Credit Hours = 6**

1. Develop a comprehensive understanding of corporate financial statements, including the balance sheet, income statement, statement of cash flows, and statement of changes in equity.
2. Study the accounting principles related to the issuance, forfeiture, re-issue, and redemption of share capital.
3. Understand how to consolidate financial statements and allocate the purchase consideration.
4. Study the application of financial reporting standards, including Indian Accounting Standards (Ind AS) or International Financial Reporting Standards (IFRS), in preparing corporate financial statements.

**SEMESTER - VI**

**Computerised Accounting and e-Filing of tax returns (SEC 6.1 CHG), Credit Hours = 4**

1. Develop a comprehensive understanding of computerised accounting systems and their role in automating financial record-keeping processes.
2. Learn to operate popular accounting software used in businesses for financial transactions.
3. Gain hands-on experience in entering financial transactions into computerised accounting software.
4. Understand how to extract and analyze financial data for decision-making.
5. Study the process of electronic filing (e-filing) of various tax and regulatory documents with relevant government authorities.

**Financial Reporting and Financial Statement Analysis (DSE 6.1 A), Credit Hours = 6**

1. Develop a comprehensive understanding of financial statements, including the balance sheet, income statement, statement of cash flows, and statement of changes in equity.
2. Learn how to calculate and interpret various financial ratios, such as liquidity ratios, solvency ratios, profitability ratios, and efficiency ratios.
3. Study the techniques of trend analysis and comparison of financial statements across different periods and companies.
4. Explore the preparation and analysis of common-size financial statements.
5. Gain insights into forecasting future financial performance based on historical data and trend analysis.

**Financial Management (DSE 6.2 A), Credit Hours = 6**

1. Develop a comprehensive understanding of the principles of financial management and their application in making effective financial decisions.
2. Study the techniques for evaluating investment projects and capital expenditures.
3. Explore the concepts of capital structure and the sources of capital, including equity,

debt, and retained earnings.

4. Understand the components of working capital, its financing, and strategies to optimize it.
5. Study the relationship between risk and return in financial decision-making.

**Project Work (CC 6.1 CH), Credit Hours = 6**

1. Apply theoretical knowledge gained throughout the B.Com programme to real-world scenarios and practical projects.
2. Develop research skills by identifying, collecting, and analyzing relevant information related to a chosen project topic.
3. Develop critical thinking and problem-solving skills in the context of your chosen project.
4. Develop effective communication skills by presenting your project findings and outcomes to an audience. Learn to convey complex information in a clear and concise manner.

## WOMEN'S STUDIES

### Course Outcome (CO) of Women's Studies General Course (CBCS)

Women's Studies is an interdisciplinary field of academic study that focuses on the experience, contributions and social issues related to Women & Gender.

It emerged as a response to the need for a more inclusive and comprehensive understanding of Gender roles, inequalities and the role of Women in society. It is basically programs typically explore topics such as Feminism, Gender Identity, Sexuality, Women History and the intersection of Gender with race, class and other social factors. This field aims to promote Gender Equality and Challenge traditional gender norms and Stereotypes.

Women's Studies emerged as an academic subject in response to the Feminist Movement and the growing recognition of the need to address gender related issues within academia.

Today Women's Studies continues to evolve, adapting to changing societal norms and ongoing discussion about Gender & Equality.

Students who study Women's Studies, can be benefited in several ways and their outcome can be both personal and professional. Here are some potential outcomes for students of Women's Studies

Semester	Course	Paper Code	Course Title	CO
1	I	WOSG— CC1/GE1	Women & Society	<p>The course aims to provide students with an understanding</p> <ol style="list-style-type: none"> <li>1. Early Activism — The roots of Women's Studies can be traced back to the activism of the late 19th and 20th Centuries, when Women began advocating for their rights, including the right to the education and equal opportunities.</li> <li>2. Academic recognition — Women's Studies gained legitimacy with in academia, with scholars conducting research, publishing books and contributing to various field.</li> <li>3. Intersectionality</li> </ol> <p>Students learn about the intersection of Gender with other factors, like race, class, sexuality and ability. The intersectional perspective helps students appreciate the complexity of social issues and the unique challenges faced by individuals.</p>
2	II	WOSG- CC2/GE2	Feminist Theory and Movement	<ol style="list-style-type: none"> <li>1. To understand the structure of gender, quality and power from a critical perspective. It seeks to understand and challenge the social, political and economic inequalities that women and gender minorities have historically faced.</li> <li>2. Feminist theory encompasses various schools of thought, including liberal feminism Radical feminism Marxist feminism, Intersectional</li> </ol>

				feminism each with its own approach to analyzing and addressing gender-based inequalities.
3	III	WOSG-CC3/GE3	Gender Issues in India	<ol style="list-style-type: none"> <li>1. Students understand that in India, like many other countries faces a range of Gender issues.</li> <li>2. Despite of challenges many women and gender minorities in India are breaking barriers and achieving success in various fields. Efforts to empower and uplift marginalized communities are gradually making a difference.</li> </ol>
4	IV	WOSG-CC4/GE4	Women's rights and politics	<ol style="list-style-type: none"> <li>1. Women's rights and politics are closely intertwined. Politics plays a significant role in shaping policies and legislation that impact Women's rights, equal pay and gender-based violence.</li> <li>2. Understand that advocacy, activism and representation of women in politics are vital for advancing gender equality and addressing these issues.</li> <li>3. Students will know Women's rights movements have historically influenced political change and continue to be a driving force for progress in this area.</li> </ol>
5	V	WOSG-CC5/GE5	Community development and gender	<ol style="list-style-type: none"> <li>1. The course will help students to understand gender plays a crucial role in community development. These are: Gender equity, empowerment, education, health care, cultural sensitivity.</li> <li>2. Incorporating gender perspectives and addressing gender related challenges are essential components of successful and sustainable community development efforts.</li> <li>3. The course will help students for collecting gender -disaggregated data helps identify disparities and track progress toward gender inclusive development goals.</li> </ol>
6	VI	WOSG-CC6/GE6	Feminist Research Methodology	<ol style="list-style-type: none"> <li>1. Students will learn Feminist research methodology is an approach to research that is grounded in feminist theory and aims to challenge and transform traditional research practices that often perpetuate gender inequalities.</li> <li>2. Some key elements and principles of feminist research methodology, (i) Intersectionality (ii) centering marginalized</li> </ol>

				<p>voice (iii) qualitative research (iv) social change and activism (v) challenging gender stereotypes.</p> <p>3. Feminist research methodology is diverse and can take various forms depending on the research questions and goals.</p>
4	IV	WOSG-SEC	Mental Health and basic helping skills	<p>1. Students address mental health challenges can lead to improvements in the acquisition and application of fundamental skills.</p> <p>2. Students will learn If someone is struggling with their mental health, seeking support from mental health professionals, counsellors or therapists can be a crucial stage in enhancing their overall wellbeing and capacity to learn and utilize basic skills effectively.</p>

**ECONOMICS HONOURS / GENERAL: COURSE OUTCOMES (COs)**

PROGRAMME CODE ECO A	PROGRAMME NAME: BSC ECONOMICS HONOURS	
COURSE CODE	COURSE NAME	COURSE OUTCOMES (COs)
<b>Semester –I (July to December)</b>		
<p><b>Economics Core Course –I (ECO-A-CC-1-1-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Introductory Microeconomics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Exploring the subject matter of economics helps us understanding the basic economic problems and main principles of microeconomics.</li> <li>• <b>CO2:</b> Theories of demand-supply-functioning of market teach us the basics of price determination in a market economy. Market adjustments, sensitivity and elasticity add to further understanding in this regard. Government intervention helps one grasping the role of Government with respect to market and also market operation with or without Government.</li> <li>• <b>CO3:</b> Theories of consumer behaviour using Utilitarian Approach- Cardinal first and then Ordinal- help us understanding the derivation of a consumer’s demand for commodities.</li> </ul>
<p><b>Economics Core Course –II (ECO-A-CC-1-2-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Mathematical Methods for Economics-I</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Provides us with the basic concepts of set theory, limit, continuity functions etc. required for understanding the technique of single variable optimization.</li> <li>• <b>CO2:</b> Concepts of integration of function, matrix algebra and game theory enhance the power of comprehending mathematical methods to a greater extent.</li> </ul>

### Semester -II (January to June)

<p><b>Economics Core Course - III</b> <b>(ECO-A-CC-2-3-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p><b>Introductory Macroeconomics</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> The course results in a comprehensive understanding of macroeconomic fundamentals, including national income accounting, the Keynesian model, classical macroeconomics, and macroeconomic foundations, fostering skills in economic analysis and understanding India's national income dynamics.</li> </ul>
<p><b>Economics Core Course - IV</b> <b>(ECO-A-CC-2-4.TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p><b>Mathematical Methods for Economics-II</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> Helps us understanding the functions of several variables and using these functions into economic application. It provides a framework for predicting future values based on previous observation which are very crucial in economic data analysis.</li> <li>• <b>C02:</b> Enriches the understanding of multivariate optimization using both classical and mathematical optimization (Linear and Non-linear Programming)</li> <li>• <b>C03:</b> Analyses of difference and differential equations help us comprehending dynamic optimization for discrete and continuous frameworks respectively.</li> </ul>

### Semester -III (July to December)

<p><b>Economics Core Course - V</b> <b>(ECO-A-CC-3-5-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p><b>Intermediate Microeconomics-I</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> Revealed preference approach and choice under uncertainty completes our understanding of consumer behavior. Application of such behavior in the construction of price indices makes us familiar with the real-life situation in this regard.</li> <li>• <b>C02:</b> Production and cost structure of an individual firm helps us understanding its decision-making rules in production process, price determination and profit-making behavior.</li> <li>• <b>C03:</b> Concept of perfect competition in commodity market helps comprehending how markets allocate resources and how</li> </ul>
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		<p>the market forces determine the price of commodities. Concepts of consumer and producer surplus, welfare and efficiency of competitive equilibrium, Government intervention and dead weight loss make the understanding of the firm and the perfect market structure complete.</p> <ul style="list-style-type: none"> <li>• <b>CO4:</b> Input market in Perfect Competition basically is devoted to understanding price determination of an input using theory of marginal productivity of distribution. Specifically functioning of land and labour markets is analyzed at length in this regard.</li> </ul>
<p><b>Economics Core Course – VI</b> <b>(ECO-A-CC-3-6-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6 Credit)</b></p>	<p><b>Intermediate Macroeconomics-I</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> It equips us with advanced knowledge of short-run income determination using the IS-LM model and complete Keynesian framework.</li> <li>• <b>CO2:</b> It enables us analysing monetary and fiscal policies, inflation, unemployment, expectations, and government budgetary operations, fostering skills in macroeconomic analysis and policy evaluation within a dynamic economic context.</li> </ul>
<p><b>Economics Core Course – VII</b> <b>(ECO-A-CC-3-7-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6 Credit)</b></p>	<p><b>Statistical Methods for Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Collection and presentation of data provide the basic building blocks for understanding the subject statistics.</li> <li>• <b>CO2:</b> Frequency distribution followed by analyses of univariate and bivariate data helps us understanding the descriptive statistics.</li> <li>• <b>CO3:</b> Elementary probability theory and probability distribution on the other hand provide the basic requisites for understanding inductive statistics. For a fuller treatment in this regard, concepts of sampling and statistical inference are then studied at length.</li> </ul>

<p><b>Skill Enhancement Course-I (A Group) (ECO-A-SEC-3-1A-TH) [Theory] (2 Credit)</b></p>	<p><b>Data Analysis</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The course helps us acquiring a comprehensive understanding of the insights and methodological issues of data collection from important sources including census and sample surveys. Mention may be made of Indian official statistics like CSO, NSSO, Census of India, and RBI in this regard.</li> <li>• <b>CO2:</b> It enhances the proficiency in data representation, and basic data management skills using software like STATA/R/EViews/SPSS/MS Excel.</li> </ul>
<p><b>Skill Enhancement Course-I (A Group) (ECO-A-SEC-3-1A-TH) [Theory] (2 Credit)</b></p>	<p><b>Rural Development</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The students are able to understand the fundamental concepts of rural development, rural credit, Panchayat Raj, Self Help Groups, etc.</li> <li>• <b>CO2:</b> They learn about the hurdles of rural development and about the various important government schemes promoting rural development.</li> </ul>
<p><b>Semester-IV (January to June)</b></p>		
<p><b>Economics Core Course- VIII (ECO-A-CC-4-8-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Intermediate Microeconomics-II</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Analysis of the imperfect market structure of commodity market helps us understanding how price determination gets influenced by market power of specific commodity markets.</li> <li>• <b>CO2:</b> Imperfect market structure of input markets basically is devoted to understanding monopsony and bilateral monopoly.</li> <li>• <b>CO3:</b> General equilibrium, efficiency and welfare enable us to comprehend the normative economics in detail vis-a-vis positive economics and thus help us learning the basics of implicating policies in this regard.</li> </ul>

<p><b>Economics Core Course – IX (ECO-A-CC-4-9-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Intermediate Macroeconomics-II</b></p>	<p><b>CO1:</b> The course enables student to understand the basic principles of New Classical and New Keynesian theories, consumption behaviour, demand for money, and economic growth models.</p>
<p><b>Economics Core Course –X (ECO-A-CC-4-10-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Introductory Econometrics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> It provides us with the understanding why econometrics or empirical verification of economic laws is necessary for carrying out research using real- life data in economics.</li> <li>• <b>CO2:</b> Statistical inference of Simple Linear Regression Model (SLRM) provides us with basic understanding of Classical Linear Regression Model (CLRM) and the same of Multiple Linear Regression Model (MLRM) completes the understanding in this regard.</li> <li>• <b>CO3:</b> Getting robust results to the extent possible, in the presence of heteroskedasticity and autocorrelation in case of SLRM and along with these two, multicollinearity in case of MLRM helps us tackling with econometric analysis of real-life data.</li> <li>• <b>CO4:</b> Dummy variable, forecasting and specification analysis individually and then as a whole enrich our understanding of econometrics to a considerable extent.</li> </ul>
<p><b>Skill Enhancement Course-II (B Group) (ECO-A-SEC-4-2B-TH) [Theory] (2Credit)</b></p>	<p><b>Managerial Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Demand, cost and profit analysis enables us with the in-depth knowledge of managing of firms and the various strategies for running a profitable business.</li> <li>• <b>CO2:</b> Pricing policies and practices, capital budgeting, cost of capital and inventory management individually and together enhance our knowledge in this regard to a considerable extent.</li> </ul>

**Semester –V (July to December)**

<p><b>Economics Core Course – XI (ECO-A-CC-5-11-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p align="center"><b>International Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> International economics explores the relationship between diverse economies and investigates how they allocate the scarce resources to meet the human needs.</li> <li>• <b>CO2:</b> Absolute advantage and comparative advantage help us understanding how the country gains from trade and making specialization on the commodity.</li> <li>• <b>CO3:</b> Building blocks of trade theory helps us comprehending the distribution of income and welfare effects among trading partners.</li> <li>• <b>CO4:</b> Analysis of Hecksher-Ohlin Model helps us gaining insights about the main reason behind the countries having comparative advantage and hence specializing in production and export of the commodities in question.</li> <li>• <b>CO5:</b> Analyses of open economy macro economy and Balance of Payments (BOP) enlighten us about how a nation records all economic transactions among the residents of the rest of the world over specific periods as well as how a nation’s current account is affected by changes in prices and incomes by fixed and flexible exchange rates.</li> </ul>
<p><b>Economics Core Course – XII (ECO-A-CC-5-12-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p align="center"><b>Indian Economy</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Economic Development since Independence enables us understanding growth and development under different policy regimes along with structural changes in the post-reform period along with regional variation in this regard.</li> <li>• <b>CO2:</b> Analysis of growth and distribution is devoted to comprehending the specific issues like (a) trends in GDP and per capita GDP, (b) growth along with poverty and inequality, (c) youth unemployment and (d) policy perspectives in this regard.</li> <li>• <b>CO3:</b> Analysis of population and human development in India aims at explaining</li> </ul>

		<p>demographic trends and issues along with the status of human capital in the form of health and education and government measures in this regard.</p> <ul style="list-style-type: none"> <li>• <b>CO4:</b> Economic reforms and their impacts on the Indian economy help us understanding the current state of the economy, its opportunities and challenges vis-à-vis the pre-reform scenario.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-5-A(1)-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Economic History of India (1857-1947) (EHI)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> It introduces us to the concept of colonialism of India from the perspective of Indian economic situation during the British rule.</li> <li>• <b>CO2:</b> It helps understanding the effect of the British rule on India's economic and social development.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-5-A (1)-TH-P [Theory + Practical] (4+2=6Credit)</b></p>	<p><b>Applied Econometrics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> It enables us in forming a deep understanding of the econometric theory along with the proper usage of statistical software to carry out meaningful empirical research in economics.</li> <li>• <b>CO2:</b> It provides us with a comprehensive understanding of econometric models and their application to real-life situations utilizing software like STATA, R, E-Views etc. efficiently. In so doing, it helps us developing skills in dealing with regression diagnostics and specification properly for carrying out rigorous econometric applications and interpreting the results across various domains effectively.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-5-B(1)-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Comparative Economic Development (1850-1950) (CED)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The course delves into various strategies and policies for economic development, examining laissez-faire, Soviet industrialization, and developmental approaches in Asia, Latin America, and Africa. Through case studies, it will explore success stories and failures, fostering critical analysis of global development dynamics.</li> </ul>

**Semester -VI (January to June)**

<p><b>Economics Core Course - XIII</b> <b>(ECO-A-CC-6-13-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p align="center"><b>Public Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The students learn about various roles of the government in an economy along with the fiscal policies.</li> <li>• <b>CO2:</b> They also learn how government provides public good and balances the trade- off between equity and efficiency.</li> </ul>
<p><b>Economics Core Course - XIV</b> <b>(ECO-A-CC-6-14-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p align="center"><b>Development Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The course provides a deep understanding of economic development theories, covering income and capability approaches, poverty, inequality, dual economy models, population growth, and development strategies. It will also help in critical analysis of the correlation between political institutions and economic development, enhancing their comprehension of global development challenges and policy implications.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-6-A(2)-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p align="center"><b>Money and Financial Markets (MFM)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Upon completion, students will comprehend the concepts, functions, and mechanisms of money, banking, financial markets, and institutions, along with an understanding of monetary policy and its application in India's economy.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-6-A(2)-TH-TU) [Theory+ Practical]</b> <b>(4+2=6Credit)</b></p>	<p align="center"><b>Issues in Indian Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> Students will analyse trends, policies, and performance in the Indian economy using statistical software, primary/secondary data, and econometric techniques, culminating in a comprehensive project report.</li> </ul>
<p><b>Discipline Specific Elective (ECO-A-DSE-6-B(2)-TH-TU) [Theory + Tutorial]</b> <b>(5+1=6Credit)</b></p>	<p align="center"><b>Issues in Development Economics (IDE)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course will help gaining insights into the intricate relationship between demography and development, land, labour, and credit markets, individual and collective outcomes, environmental sustainability, and globalization and will help in analysing socioeconomic factors shaping these dynamics, emphasizing India's role in the global economy.</li> </ul>

<p><b>Discipline Specific Elective- B(2) : ECO-A-DSE-6-B(2)-TH-TU [Theory + Tutorial] (5+1=6 credit)</b></p>	<p><b>Environmental Economics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course helps in comprehending fundamentals of environmental economics, including market failures, policy design, international environmental issues, and valuation techniques.</li> <li>• <b>CO2:</b> The course helps in the analysis of interlinkages between economy and environment, evaluate efficiency, and propose effective environmental policies, drawing from theoretical principles and real-world applications.</li> </ul>
<p><b>PROGRAMME NAME/CODE B.A./B.Sc. GENERAL</b></p>	<p><b>GENERIC ELECTIVE SUBJECT NAME: ECONOMICS GENERAL GENERIC ELECTIVE SUBJECT CODE: ECOG</b></p>	
<p><b>COURSE CODE</b></p>	<p><b>COURSE NAME</b></p>	<p><b>COURSE OUTCOMES (COs)</b></p>
<p><b>Semester -I (July to December)</b></p>		
<p><b>Core Course 1(Econ)-CC-1 (ECO-G-CC-1-1-TH-TU) Generic Elective Course I (ECO-GE- 1-1-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Introductory Microeconomics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course helps in acquiring fundamental knowledge of economics, encompassing scarcity, interaction of demand and supply, market operations, and behaviour of households and firms.</li> </ul>
<p><b>Semester -II (January to June)</b></p>		
<p><b>Core Course 2(Econ)-CC-2 (ECO-G-CC-2-2-TH-TU) Generic Elective Course II (ECO-GE-2-2-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p><b>Introductory Macroeconomics</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course helps in basic understanding of macroeconomic principles: national income measurement, Keynesian and classical models, money supply dynamics, inflation, and external sector dynamics, refining skills in economic policy analysis.</li> </ul>

### Semester -III (July to December)

<p><b>Core Course 3(Econ)- CC-3 (ECO-G-CC-3-3- TH-TU) Generic Elective Course III (ECO-GE-3-3-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p style="text-align: center;"><b>Issues in Economic Development and India</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course helps in grasping concepts of economic development, poverty, and inequality and will also clarify the concepts of dual economy and development strategies namely balanced and unbalanced growth theory.</li> <li>• <b>CO2:</b> The students are introduced to the various roles of IMF, World Bank, and WTO in economic development, with a focus on India.</li> </ul>
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### Semester-IV (January to June)

<p><b>Core Course 4(Econ)- CC-4 (ECO-G-CC-4-4- TH-TU) Generic Elective Course IV (ECO-GE-4-4-TH-TU) [Theory + Tutorial] (5+1=6Credit)</b></p>	<p style="text-align: center;"><b>Indian Economic Policies</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> This course results in understanding of the impact and mechanism of the different economic policies in its various sectors namely, Agriculture, Industry and Foreign Trade.</li> </ul>
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### Semester-V (July to December)

<p><b>ECO-G-DSE-5- 1A/2A-TH TU [Theory + Tutorial] (5+1=6Credit)</b></p>	<p style="text-align: center;"><b>Money and Banking (MB)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The course results in basic understanding of the monetary market and the banking system of a particular economy in respect to the India.</li> </ul>
<p><b>ECO-G-SEC-3-1A-TH/ ECO-G-SEC-5-2A-TH [Theory] (2Credit)</b></p>	<p style="text-align: center;"><b>Elementary Rural Development (ERD)</b></p>	<ul style="list-style-type: none"> <li>• <b>CO1:</b> The course provides a thorough understanding of rural development, including decentralized planning, Panchayat roles, SHGs, and government programs like MGNREGA, PMGSY and Mid-Day Meal, fostering knowledge and skills for effective rural development initiatives.</li> </ul>



**Semester- VI (January to June)**

<p><b>ECO-G-DSE-6-1B/2B-TH-TU [Theory + Tutorial] (5+1=6Credit)</b></p>	<p align="center"><b>Public Finance (PF)</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> The course provides comprehensive understanding of fiscal functions, taxation theories, and Indian public finance issues, enabling analysis of tax systems, monetary policies, budgets, deficits, and fiscal federalism.</li> </ul>
<p><b>ECO-G-SEC-4-1B-TH/ECO-G-SEC-6-2B-TH</b></p>	<p align="center"><b>Economic Data Analysis and Report Writing (EDARW)</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> The course results in proficiency in tabular and graphical representation of statistical data, understanding descriptive statistics, and developing report writing skills for effective data analysis and communication.</li> </ul>
<p><b>ECO-G-SEC-4-1B-TH/ ECO-G-SEC-6-2B-TH [Theory] (2Credit)</b></p>	<p align="center"><b>Entrepreneurship and Development (ED)</b></p>	<ul style="list-style-type: none"> <li>• <b>C01:</b> The course results in understanding entrepreneurship's role in economic development, financial resources for ventures, growth strategies, and factors contributing to sickness in small businesses, fostering entrepreneurial knowledge.</li> </ul>