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Darjeeling Government College
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Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

NAAC – CRITERIA 2

SUB CRITERIA – 2.6

Student Performance and Learning Outcomes

2.6.1 Programme Outcomes (POs) and Course Outcomes (COs) for all Programmes offered by the institution

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Arts

SUBJECT: BENGALI HONOURS UNDERGRADUATE 2018-19

UG PO CO MAPPING 2018-19

PAPER CODE	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7
1.1		✓				✓	✓
1.2				✓		✓	✓
2.3	✓			✓		✓	✓
2.4			✓		✓	✓	
3.5	✓			✓			✓
3.6		✓			✓		
3.7	✓	✓	✓		✓	✓	
4.8				✓		✓	
4.9			✓			✓	✓
4.10	✓		✓		✓		
5.11		✓		✓		✓	✓
5.12	✓	✓	✓		✓	✓	
6.13	✓	✓	✓		✓	✓	
6.14	✓	✓		✓			✓

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PROGRAMME OUTCOME

PO1. Critical Thinking: Take informed actions after identifying the assumptions that frame thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (Intellectual, Organization and personal) from different perspectives.

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PO6. Environment and Sustainability: understand the issues of Environmental contexts and sustainable development.

PO7. Self –Directed and life-long learning: Acquire the ability to engage in independent and life-long learning in the broadest contexts socio-technological changes.

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Arts

SUBJECT: BENGALI HONOURS UNDERGRADUATE 2018-19

PROGRAMME SPECIFIC OUTCOME

The prospects of the undergraduate programme in Bengali Honours are spelled out as follows-

- Involving in literary progress, reasoning with deep understanding.
- Structuring the meaningful arguments and liberal mindset.
- Realizing the basics of literature and properly criticize it by methods and theories.
- Philosophically viewing knowledge with pace of thought process.
- Giving an idea of Cultural Revolution, language, literature, heritage, history and eco-politics.
- Higher studies in university or other reputed institutions.
- Studies in the field of Advertising, Media, Journalism, Print Media and Publishing Houses and opportunities for employment in these areas.
- Suitable job orientation as junior research associate, in college libraries and universities.
- Eligibility through School Service Commission Examinations and other sources as teaching faculty in schools at the Primary, Secondary and Higher Secondary levels.
- Scope of social, community and rural engagement through involvement with government institutions and NGOs.

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Arts

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COURSE OUTCOME

Paper Name	Course Outcomes
CC-1-1: History of Bengali Literature (up to 1800 A.D.)	• To make students familiar with the various stream of the history of Bengali literature from the very beginning up to 1800 A.D.
CC-1-2: Poetry of Medieval Age	• To enable the students to understand the trajectory of evolution of Bengali society, religion and culture besides enjoying literature.
CC-2-3: History of Bengali Literature (Modern Age)	• To provide a detailed and comprehensive knowledge about the development of Bengali Literature and Culture spanning the 19th and 20th Centuries. • To enable the students to develop historical perceptions, create a strong understanding about history historical analysis of literature-change sin Bengali literature under the colonial influence, enhance their interest in reading Society, culture, literature, and history of the Bengali people and lay a strong foundation for studying the future course of Bengali literature.
CC-2-4: Linguistics	• Primary data on linguistics. • An elaborate idea on Bengali language and linguistics**.**
CC-3-5: Mangalakabya & Biographic Literature	• To help students acquire a sound foundation in the knowledge interested in socio-economic and cultural history of medieval period of Bengal. • Provides an understanding of the historiography and connection of the king`s patronizing authority and influence on genre formation.
CC-3-6: Rhythm & Rhetoric	• Students will take short lessons in rhythm and rhetoric as one of the elements of poetry construction and take lessons from this course. • Enables the understanding of different opinions related to diction, syntax and language of a literary genre, history of construction the literary theories in Poetics.
CC-3-7: Poet & Poetry of Nineteenth Century	• A conception about modern poet and poetics and developments of the Bengali poetry.
CC-4-8: Drama (19th & 20th Century)	• Enjoy the text of drama. • Perception of stage and play.
CC-4-9: Novel (19th & 20th Century)	• To enable the students to analysis of a novel as a relatively long work of narrative fiction in prose and imparting a more mature understanding to the students about the challenging issues of the contemporary such as conflicts of interests between the society and the individual.
CC-4-10: Poetry (19th & 20th Century)	• Through this course, the students will be able to understand the different episodes of the new era that came in our poetry by coming in contact with the colonial modernity.
CC-5-11: Novel of both part of 20th Century	• Through this course, the students will try to get acquainted with the complexity, the position of women in Bengali family life, thoughts about environment and various tendencies of human struggle.
CC-5-12: Bengali Short Story	• To enable learn about the origin of the Bengali short story and its developments afterwards. • To build an idea about pre independent and post independent short story and also about society reflected in these stories.

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CC-6-13: History of Sanskrit, English & Hindi Literature	• After getting an overview of Bengali literature, the student will get an initial introduction to the history of Sanskrit, English and Hindi literature and in that light his assessment of Bengali literature will become more transparent.
CC-6-14: Structure of Literature	• Different stylistics of literature. • Develop the sense of literary-essence.

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COURSE OUTCOME: (SEC)

PAPER NAME	COURSE OUTCOME
BNG-H-SEC-3-1 Fundamentals of Bengali Grammar	• It will give student an idea about the history of Bengali Grammar. • From here will get the knowledge of Bengali Grammar.
BNG-H-SEC-4-2 Practical Bengali	• Learning to do things needed in real life. • Learning to write necessary documents.

COURSE OUTCOME: (DSE)

PAPER NAME	COURSE OUTCOME
BNG-H-DSE-A-5-1 Selected Essays of the Nineteenth and Twentieth Centuries	• Introduction of Bengali thought and consciousness • Teaching the identity of the culture and tradition of Bengal
BNG-H-DSE-A-5-2 Origin and Development of Bengali Short Story	• An Introduction to the birth of Bengali Short Stories • Study of Social image of Bengal through short stories
BNG-H-DSE-A-6-3 Letters and Autobiography	• Teaching by letter of Swami Vivekananda • Social study by autobiography
BNG-H-DSE-A-6-4 Folk Culture and Folk literature	• **S**tudents are taught traditional education by folk culture • It may create and understanding of rural Bengal and its cultural heritage.

COURSE OUTCOME: (AECC)

PAPER NAME	COURSE OUTCOMES
BNG-H/P-AECC-2 Selected Poetry, Short Story, Essay, Translation into Bengali, IPA	• Students will have the preparation about short stories, poems, essays through MCQ learning process.

ARTS
SUBJECT: BENGALI GENERIC ELECTIVE UNDERGRADUATE 2018-19
COURSE OUTCOME

Paper Name	Course Outcomes
GE-1: 1.History of Bengali Language (Modern Age)	• To get elaborate knowledge about history of modern Bengali literature and its development.
2.Linguistics, Origin of Bengali Language, its revolution.	• To get in depth knowledge in Linguistics and in history of Bengali Language.
3.Linguistics	• To get in depth knowledge in Linguistics and in history of Bengali Language.

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GE-2: 4.Chanda	• To get in depth knowledge in Chanda.
5.Alamkar	• To get elaborate knowledge about Alamkar as well as Bengali Language.
6.Lokosahitto-Rabindranath Tagore	• To enable the students to achieve the essence of folklore of Bengal.
7.Folk-literature: definition	• It may create and understanding of rural Bengal and its cultural heritage.

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Arts

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1.1		✓				✓	✓
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ARTS
SUBJECT: BENGALI GENERAL UNDERGRADUATE 2018-19
PROGRAMME SPECIFIC OUTCOME:

- Structuring a meaningful arguments and liberal mindset.
- Realizing the basics of literature and properly criticize it by methods and theories.
- Philosophically viewing knowledge with pace of thought process.
- Giving an idea of Cultural Revolution, language, literature, heritage, history, and eco-politics.

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DEPARTMENT OF HISTORY DARJEELING GOVERNMENT COLLEGE
(2018-2023)

PROGRAMME OUTCOME:

PO1: CRITICAL THINKING: Students are able to identify issues and problems in the past and to analyze the interests, values, perspectives, and points of view of all of those involved. They examine the events of the past and think about what led up to them.

PO2: EFFECTIVE COMMUNICATION: Students are always more interactive in classrooms .This interaction always lead to better clarity in understanding the subjects being taught. This, in turn leads to much better grades and eventual success in academics.

PO3: SOCIAL INTERACTION: Interacting with other students has proven to be quite effective in assisting the learner to organize their thoughts, reflect on their understanding, and find gaps in their reasoning.

PO4: EFFECTIVE CITIZENSHIP: The students acquire knowledge to understand and respect our common humanity and diversity, and can provide the conceptual means to make sense of their lives.

PO5: ETHICS: Ethics help students to raise the question of whether and how we are able to learn from the past, what we value as good and bad in the past and how these insights might affect our present andfuture judgements.

PO6: ENVIRONMENT AND SUSTAINABILITY: Acquiring knowledge to preserve resources like clean air,water and wildlife for future generations.

PO7: SELF DIRECTED AND LIFE –LEARNING ACTIVITIES : Students learn to use what they know, their experiences and the knowledge that they have gained in the past, present to create something new. It allows them to engage in activities that are relevant, interesting and fun. This has led to greater retention of information.

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Phone / Fax : (0354) 2254078
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COURSE OUTCOMES:

CORE SUBJECT - SEMESTER 1:

	Course Outcome
CC 1:History of India- I (From earliest time to 300 A.D)	Students of will acquire knowledge regarding the primitive life and cultural status of the people of ancient India. They can gather knowledge about the society, culture, religion and political history of ancient India. They will learn about the origin of the Indian empire, trade and urbanizations of ancient civilization, like Harappan civilization, Vedic civilizations, later Vedic civilizations etc. How to develop Palaeolithic, Neolithic and Chalcolithic cultures in pre-Harappan period.

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CC2:Social Formations and Cultural Patternsof the Ancient World-I	Students will acquire knowledge about the evolution of human Society & howthe society of agricultural and animal husbandry had begun in Ancient Times. They will also learn how the human society had transformed from Nomadic to civilized society in ancient history of the World. They will acquire knowledge about the origin, features, nature and class composition of ancient Greek and Polis society. They will be able to compare several societies of the world.
CC III: History of India II (From 300 AD to 750 AD)	Students will know how Indian feudalism developed and evolution of the political structures of early – medieval, north and south India. They will alsolearn about transformation of Indian culture, society, religion and agrarian structures.
CC IV: Social Formation and Cultural Patternsof the Medieval World	Students will learn about the religion, culture, literature and philosophy of the ancient Roman civilization. They will also acquire knowledge about howthe crises of the Roman Empire had made and transitioned to Principate. They will acquire knowledge about the economic, social and religious developments during the medieval European society. They will learn aboutthe socio – economic and political condition of the feudal organization of production, town's formation, trade and commerce, technological developments and crisis of feudalism in Europe.
CC V: History of India III (From 750 – 1206 C.E.)	Students will achieve knowledge about development of Indian feudalism and evolution of the political structures of early – medieval north and south India.They will learn about transformation of Indian culture, society, religion andagrarian structures under the Islamic power of medieval India. They will achieve knowledge about the religious and cultural changing scenarios after the advent of Islam in India. They will gather knowledge about how the Sultanate of Delhi was established in 1206.
CC VI: Rise of Modern West – I	Students of history will learn about the rise of the modern west world and transition of the society and economy from feudalism to capitalism. They willlearn about rise of Renaissance in Italy and spread of humanism in Europe and results of the European Reformation in the 16th century and Shift of economic balance from the Mediterranean to the Atlantic, Commercial Revolution, Influx of American silver and the Price Revolution. They will gather knowledge towards the emergence of European state system like Spain, France, and England etc.

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CC VII: History of India IV (From 1206 – 1550 AD)	Students of history will learn about the foundation, expansion, consolidation and downfall of the Sultanate of Delhi. They will learn about the emergence of provincial dynasties & Consolidation of regional identities like, Bahamanis, Vijayanagar and Bengal. They will also acquire knowledge about the changingscenarios of the urban and rural societies after consolidation of the rule ofthe Sultanate of Delhi. They will learn about the activities of Delhi Sultanate i.e., revenue systems monetization, market regulations, growth of urban centers, trade and commerce, Indian Ocean trade etc.
CC VIII: Rise ofthe Modern	Students will learn about the European crisis of economic, social and politicaldimensions as well as the English Revolution, major issues like political and intellectual currents in 17th century. They will learn about the rise of modern

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West II	science in relation to European society by the Renaissance and the European politics in the 18th century like parliamentary monarchy, patterns of Absolutism in Europe and prelude to the Industrial Revolution in England and other European countries.
Course IX: History of IndiaV (From 1550 –1605 AD)	Students will learn about the knowledge towards the Turkey's invasion & Struggle for Empire in North-Western India and foundation of the Mughal Rule in India. Students will learn about the Mughal-Indian society, economyand culture after consolidation of the Mughal rule India.
CC X: History of India VI (From 1605 – 1750 AD)	Students will learn about the Mughal Indian society, economy and culture after consolidation of the Mughal rule in India. They will learn about how theRegional Powers had been raised in different parts of India after downfall of the Mughal Empire of Delhi. They will have the knowledge that the downfallof the Mughal Empire was only due to lack of unity among the Mughal courtiers which resulted in rise provincial kingdoms in Bengal, Hyderabad,Ayodhya, Mysore and Maratha in Western India.
CC XI: History of Modern Europe I (1780 – 1939)	Students will learn about the French Revolution and its impact on European countries; the fact that unity and power strengthen people was reflected in the French revolution in 1789, industrialization and it's role in socio economic transformation of Europe. They will know about the politics of super power among the European countries. How the sense regarding the nationalism and unification had developed among the European countries oneve of the 2nd world war. Students of history will learn about how the world was divided after First World War among the super powers. They will also learn how the aggressive foreign policy of Italy and Germany influenced the European countries andcompelled them to form allied powers of the world. Gradually, the 2nd world war had occurred and the League of Nations was established as an aftermath of the war which affected the world politics. Ultimately, the world became divided into two super powers .i.e. USSR and associate countries on one handand USA and their associate powers on the other.

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CC XII: History of India VII (From 1750 – 1857 AD)	Students of history will learn how regional powers in India rose after the downfall of the Mughal Empire. They will understand about the colonial nature of state during 200 years of rule of the British power in this land. Theywill gather knowledge about Sepoy Mutiny and how the Indian society, politics, religion and economy had changed during the Company's rule in India.
CC XIII: Historyof India VIII (From 1857 – 1950 AD)	They will be aware about the circumstances in which the Indian Nationalismrose among the Indian people for freedom. They will acquire knowledge about the freedom struggle and partition of India and aftermath.

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CC XIV: History of Modern Europe II (1780 –1939)	Students will learn how the aggressive foreign policy of Italy and Germany influenced the European countries and compelled to form allied powers of the world. Gradually, the 2nd world war occurred and the League of Nationswas established which affected the world politics.

DISCIPLINE SPECIFIC ELECTIVE COURSE

SEMESTER 5 P1 History of Modern East Asia – I China (c.1840 – 1949)	After finishing this course, students will develop an adequate knowledge of nineteenth and early twentieth century China. • CO 2- This course will give a clearconcept about Nationalism, self strengthening movement and popular revolts of China.
P4 History of Modern East Asia – II Japan (c.1868 – 1945)	After finishing this course, students will develop an adequate knowledge of history of Japan. This course will provide insights on Japan's Meiji Restoration, imperialism,and many other political developments
SEMESTER 6 History of North Bengal- I	Students will have a detailed knowledge of Ancient North Bengal after thecompletion of this course.They will have adequate knowledge on the social,economic and political condition of ancient North Bengal.
History of North Bengal- II	Students will learn to assess the significance of history of North Bengal and the participation of its people when the Nationalist Movement spread in their regions.

SKILL ENHANCEMENT COURSE.

SEMESTER 3 Understanding Heritage	Students learn about their heritage ,and everything involved with it.
SEMESTER 4 Understanding Popular Culture	Students minds are enriched with their country's popular Culture,festivals,rituals ,theatre,cinema and internet's impact on the people of the globalised world.

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SEMESTER 1 GE 1 - History Of India From Earliest Times To 300 CE	After completing this course students will be able to understand the different developments of ancient India .Students will get clear idea of sources of ancient India, developments of Vedic period, details of the Harappan civilisation, principles ofBuddhism and Jainism, history of 16 Mahajanapadas.
SEMESTER 2 GE 2. History Of	After completing this course students will have clear ideas of Early medieval India .Polity, society, culture and history of South India as well as Arab conquest of Sindh

India. 300 Ce - 1206 CE	will be clarified in the course
SEMESTER 3 GE 3- History Of India . 1206 – 1707 CE	After completing this course, students will develop an adequate knowledge of Delhisultanate rule, its dynastic history, the socio-cultural developments. Students will also be able to assess the significance of history of the Mughal period.
SEMESTER 4 GE 4 History Of India 1707-1950	Students will be able to understand the debates regarding the 18th century. CO 2-Students will learn the feature of Indian nationalism, socio- religious reform movements, Gandhian movements and Indian Independence.

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GENERIC ELECTIVE – History-(HISG)

DISCIPLINE SPECIFIC ELECTIVE

SEMESTER-5 Some Aspects of European History:C 1780-1945	The students will be able to comprehend features of revolutionary actions in different parts of Europe in eighteenth to twentieth century. Students will developknowledge about political currents in Europe between two World Wars.
SEMESTER 6 Society And Economy Of Modern Europe:15th-18th C	On completion of this course, students will be able to identify key developments inEurope during the 17th and 18th centuries . Students will be able to explain the political and intellectual trends of this time period and modern scientific advancements.

PROGRAMME SPECIFIC OUTCOME:

PSO 1 : Apply appropriate approach and enhance quality lecturing.

PSO 2: Present the topic in a way that can open the horizon of the knowledge.

PSO 3: Will become familiar with the different aspects of history with its various interpretation.

PSO 4: Acquires the ability to synthesize, separate and characterise each segment with their owndimensions.

PSO 5: Achieve the skills required to succeed in graduate schools, in archival fields, and so on.

PSO 6: Understand the importance of field work. Without field work, Historical understanding indiversified fields cannot be completed.

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DEPARTMENT OF ECONOMICS DARJEELING GOVERNMENT COLLEGE
HONOURS & GENERAL

UG PO-CO MAPPING (2018-2023)

UG-CBCS CURRICULUM (UNDER THE UNIVERSITY OF NORTH BENGAL)

Program Outcomes

PO1.Critical Thinking: - Understand the basic theories and their applications, apply economic analysis to current events, and comprehend andcritically evaluate different government policies.

PO2.Effective Communication - Communicate effectively in written, oral and graphical form about specific economic issues.

PO3.Social Interaction-Discuss different issues, consider the views of others, mediate disagreements, and help reach conclusions in groupsettings.

PO4. Effective Citizenship - Demonstrate concern regarding national development and equity, act with an informed awareness of issues, andvolunteer in civic life.

PO5. Ethics - Recognize different value systems, understand the moral dimensions of different economic decisions, and take responsibility foryour own decisions.

PO6. Environment and Sustainability - Understand issues regarding the environment-economy interface, resource management, and sustainabledevelopment.

PO7. Self-directed and Life-long Learning - Acquire the ability to engage in independent and life-long learning in the broad context of socio-economic changes.

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(0354) 2254019
Email : dgc.principal@gmail.com

Program Specific Outcomes

PSO1. Ability to understand the economic concepts of market behavior, basic macroeconomic conditions, and international economics.PSO2. Understanding of the basic functioning of the national and global economy, and the interaction thereof.

PSO3. Ability to apply economic theories and methodologies in analyzing economic issues.

PSO4.Ability to analyze historical and current events from an economic perspective.

PSO5.Ability to perform basic data analysis using appropriate tools like empirically testable hypotheses, regression analysis, data formulation,etc.

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course outcomes

year	course Name	course code	course outcomes
sem I	Introductory Microeconomics	DSC101	Introduction to the subject matter of Economics.
			Familiarization with price determination and market system
			Understanding about optimization technique
	Mathematical Methods for Economics-I	DSC102	Familiarization with basic mathematical concepts, Methods in like sets operation and functions.
			Understanding about single variable optimization, and matrix algebra.
			Introduction to Game Theory.
sem II	Introductory Macroeconomics	DSC203	Introduction to macroeconomic foundations of Macroeconomics the idea of national income and thefundamental theories regarding how it is determined.
			An idea about the basic concepts of money market and investment.
	Mathematical Methods for Economics-II	DSC204	Introduction to functions of several variables.
			An idea about constrained optimization with equality and inequality constraints, and LPP.
			Knowledge about difference and differential equations.

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			Understanding of economic applications of these quantitative methods
semIII	Intermediate Microeconomics -I	DSC305	Introduction with the concepts of consumer behavior, production, and cost.
			Learning about market structure in perfect competition and input markets.
	Intermediate Macroeconomics -I	DSC306	Understanding of the income determination process in the economy with the interaction of commodity andmoney markets, and the concepts of inflation and unemployment.
	Statistical Methods for Economics-I	DSC307	Sound knowledge of the Keynesian and Classical theories and develop a comprehensive idea about the moneymarket and banking system.
			Introduction to basic statistical tools for Economics like descriptive statistics.
	Business Project Formulation & Entrepreneurship Development	SEC-302	Procedure for setting up a business Project and its formulation
			To have an idea about Entrepreneurship and its Entrepreneurial Environment
	Intermediate Microeconomics-II	DSC408	Introduction to the theories of imperfect market structure for both product market and input market
			An idea about general equilibrium and welfare

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semIV	Intermediate Macroeconomics-II	DSC409	Acquaintance with the macroeconomic foundations, and the basic tenets of classical and New Keynesiantheories.
			The idea of the economic growth models
	Statistics and Econometrics	DSC410	introduction to statistical tools for Economics like probability, sampling, and inference.
			Acquaintance with econometric models, treatment of such models through linear simple and multipleregression, and statistical inference in regression models.

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	Tourism Management	SEC-404	To learn the economics behind Tourism.
			Acquaintance with the Tourism resources in West Bengal
sem V	Indian Economy	DSC511	An idea about the performance of the Indian economy since independence concerning economic growth anddevelopment, population, and human development.
			Introduction to different kinds of reforms in various sectors that took place under the policy of economicreforms.
			Development of the ability to perform a literature survey and critical evaluation of different economic policymeasures undertaken in India
	Development Economics	DSC512	Introduction to the meaning of development and dual economy models.
			Conceptualization of poverty and inequality and their measurement.
			An idea about the role of population growth in economic development.
			An idea of alternative development strategies and political institutions
	Economic History of India (1857-1947)	DSE-702:	Idea about the impact of British rule on India and different aspects of economic policies in British India.
	Topics in Public Economics	DSE-704	An idea about market failure and the role of government.
			to know the Indian financial system
			Ability to differentiate between private and public good.

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			To know the local finance and the problems faced by them, local fiance of gram panchayat, panchayatsamiti's, zill parishads, and municipalities
semVI	International Economics	DSC613	Knowledge about international economics.
			Introduction to the building blocks of trade theory; absolute and comparative advantage, Hecksher-Ohlin-Samuelson model; trade policies and open economy macroeconomics.
	Public Economics	DSC614	to know the meaning and scope of public finance
			Acquaintance with public finance and the revenue and expenditure of the Government.
			to have an idea of taxation
	Tribal Economics	DSE-705	Introduction to the concept, feature, and importance of tribal demography
			To study the economic system and economic structure among tribals and also to know about education andhealth among tribals population
			To have an idea about tribal problems, policies, and also planning and development
	Dissertation/Project	DSE-708	To have an idea about writing a project report from the empirical data either from the primary or secondarydata

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PO-CO Mapping

Course outcome	Program outcomes						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
DSC 101	✓		✓	✓		✓	
DSC 102	✓		✓	✓	✓		
DSC 203	✓		✓	✓	✓	✓	
DSC 204	✓		✓	✓	✓	✓	
DSC 305	✓		✓	✓	✓	✓	
DSC 306	✓		✓	✓		✓	
DSC 307	✓		✓	✓			
SEC 302	✓		✓	✓	✓	✓	
DSC 408	✓		✓	✓		✓	
DSC 409	✓		✓	✓		✓	
DSC 410	✓		✓	✓			
SEC 404	✓		✓	✓	✓		
DSC 511	✓	✓	✓	✓			
DSC 512	✓	✓	✓	✓	✓		
DSE 702	✓		✓	✓	✓	✓	
DSE 704	✓	✓	✓	✓	✓	✓	
DSC 613	✓	✓	✓	✓	✓	✓	
DSC 614	✓		✓	✓		✓	
DSE 705	✓	✓			✓	✓	
DSE 708	✓	✓	✓	✓	✓	✓	✓

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(0354) 2254019
Email : dgc.principal@gmail.com

SUBJECT: ENGLISH HONOURS UNDERGRADUATE 2022-2023
MAPPING OF P.O. AND C.O. OF B.A HONOURS IN ENGLISH (CBCS SYSTEM), SESSION2022-2023.

COURSE OUTCOME	P.O.1	P.O.2	P.O.3	P.O.4	P.O.5	P.O.6	P.O.7
CC1	☐	☐	☐				
CC2	☐	☐	☐		☐	☐	☐
CC3	☐	☐	☐		☐	☐	☐
CC4	☐	☐	☐				
CC5	☐	☐	☐				☐
CC6	☐	☐	☐				☐
CC7	☐	☐	☐				☐
CC8	☐	☐	☐				☐
CC9	☐	☐	☐				☐
CC10	☐	☐	☐				☐
CC11	☐	☐	☐				☐
CC12	☐	☐	☐				☐
CC13	☐	☐	☐		☐		☐
CC14	☐	☐	☐			☐	☐
DSE1	☐	☐	☐				☐
DSE1	☐	☐	☐			☐	☐
DSE2	☐	☐	☐			☐	☐

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DSE2	□	□	□	□		□	□
SEC1	□	□	□				
SEC2	□	□	□				
AECC	□	□	□				

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COURSE OUTCOME OF B.A. HONOURS IN ENGLISH (CBCS SYSTEM), SESSION 2022-2023

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
1	CORE COURSE 1: ENGLISH LANGUAGE: OVERVIEW & USAGE; LITERARY TYPES	CC1- ENGLISH	• Ability to relate the history and usage of literary types with the features of the particular era to which they belong. • Ability to discern the various foreign influences from the texts given.
1	CORE COURSE 2: EUROPEAN CLASSICAL LITERATURE	CC2- ENGLISH	• Ability to get a comprehensive idea of classical literature. • Ability to compare and contrast the prescribed texts with other classical texts composed later.

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2	**CORE COURSE 3: INDIAN CLASSICAL LITERATURE & INDIAN WRITING IN ENGLISH**	**CC3- ENGLISH**	• **Ability to get a comprehensive idea of Indian Classical texts and**

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			compare and contrast it with other texts belonging to foreign classical literature. • **Ability to problematize the texts keeping in mind the socio-political-economic background of India with special emphasis on her colonial past.**
2	**CORE COURSE 4: BRITISH LITERATURE: OLD ENGLISH PERIOD TO 14th CENTURY**	**CC4- ENGLISH**	• **Ability to follow the evolution and impact of different genres.** • **Ability to relate it with the texts given.** • **Ability to retrospect the heroic and epic as a genre.**

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3	**CORE COURSE 5: AMERICAN LITERATURE**	**CC5- ENGLISH**	• **Ability to differentiate between the British, Indian and American approach towards literature considering the**

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			uniqueness of each of these approaches. • **Ability to problematize the texts keeping in mind the socio-political-economic situations to which the texts belonged.**
3	**CORE COURSE 6: BRITISH POETRY & DRAMA : 14th to 17th CENTURIES**	**CC6- ENGLISH**	• **Ability to follow the evolution of poetry starting from Chaucerian to the Metaphysicals.** • **Ability to discern to what extent Elizabethan and Jacobean plays follow and deviate from the classical examples of CC2.**

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3	**CORE COURSE 7: BRITISH POETRY & DRAMA: 17th and 18th CENTURIES**	**CC7- ENGLISH**	• **Ability to engage themselves critically with genres like Revenge tragedy, Mock epic, Comedy of Manners** • **Ability to**

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			engage themselves critically with the religious and secular thoughts prevalent in the 17th century as well as the new changes that appeared in the 18th century literature and society.

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4	**CORE COURSE 8: BRITISH LITERATURE: 18th CENTURY**	**CC8-ENGLISH**	• **Ability to engage themselves with the ideas of Neo-Classicism and relate the ideas suggested by this school of thought with the given texts.** • **Ability to follow the evolution of the novel and recognise different genres like the Restoration Comedy.**
4	**CORE COURSE 9: BRITISH ROMANTIC LITERATURE**	**CC9- ENGLISH**	• **Ability to express the idea and spirit of Romanticism as a**

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			movement, it's origin and growth as well as its main features from the prescribed texts.
4	**CORE COURSE 10: BRITISH LITERATURE: 19th CENTURY**	**CC10- ENGLISH**	• **Ability to relate the socio-political-economic changes as well as the new scientific theories and inventions with the literary texts produced in this century.**

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5	**CORE COURSE 11: WOMEN'S WRITING**	**CC11- ENGLISH**	• **Ability to compare and contrast the writings of women produced in different times and locations.** • **Ability to understand and express concepts like Age, Caste, Gender and Women's Rights.**
5	**CORE COURSE 12: BRITISH LITERATURE : THE EARLY 20th CENTURY**	**CC12- ENGLISH**	• **Ability to recognise the newly emerging modernist features in**

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			the prescribed texts.
6	**CORE COURSE 13: MODERN EUROPEAN DRAMA**	**CC13- ENGLISH**	• **Ability to recognise the newly emerging 'Types' in Modern drama**
6	**CORE COURSE 14: POST COLONIAL LITERATURES**	**CC14- ENGLISH**	• **Ability to realize the overshadow of the colonial past in the prescribed texts.** • **Ability to compare and contrast the colonial situations of different locations from those writings.**

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DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE)

SEMESTER 5- DSE 1A
DSE 2C
SEMESTER 6- DSE 3E
DSE 4G

5	**DSE1 TOPIC A: LITERARY THEORY AND CRITICISM**	**DSE1- ENGLISH**	**Ability to apply the concepts, literary theories and criticism in various texts.**
5	**DSE 2 TOPIC C: POPULAR LITERATURE**	**DSE2- ENGLISH**	**Ability to find implicit politics and trends working behind the given popular texts.**
6	**DSE3 TOPIC E : INDIAN LITERATURE IN ENGLISH TRANSLATIONS: POEMS AND STORIES**	**DSE3- ENGLISH**	**Ability to find the politics of translation working behind the given texts.**

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6	**DSE4 TOPIC G : PARTITION LITERATURE**	**DSE4- ENGLISH**	**Ability to relate the given texts with the books dealing with social history and history of partition literature, films and other performative arts as well as the real life stories, anecdotes they have heard from others related to the trauma of partition.**

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ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)

2	**AECC-2 ENGLISH COMMUNICATION**	**AECC2-ENGLISH (MIL)**	**Ability to communicate effectively in English using grammatically correct sentences and also the correct format.**

SKILL ENHANCEMENT COURSE (SEC)
SEMESTER 3 : SEC1
SEMESTER 4: SEC 2

3	**SEC1 GROUP B CREATIVE WRITING**	**SEC1- P1- ENGLISH**	**Ability to try their hands with original, creative writing skills.**
4	**SEC2 GROUP C BUSINESS COMMUNICATION**	**SEC1- P2- ENGLISH**	**Ability to be engaged in different types of business communication skills like writing business reports, preparing and writing minutes of a company board meeting, composing e- mails etc.**

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PROGRAM OUTCOME OF B.A. HONOURS IN ENGLISH (CBCS SYSTEM) SESSION 2022-2023

P.O.1. CRITICAL THINKING: To objectively analyze, interpret and evaluate issues and to form judgements.

P.O.2. EFFECTIVE COMMUNICATION: The ability to improve four basic skills of speaking, listening, reading and writing clearly in person and also through electronic media in English and in at least one other Indian language.

P.O.3. SOCIAL INTERPRETATION: The capacity to elicit views of others, mediate disagreements and help reach amicable conclusions in group situations.

P.O.4. EFFECTIVE CITIZENSHIP: Ability to build an empathetic social concern and equity centered national development and the ability to cut with an informal awareness of issues and participate in civic life through volunteering.

P.O.5. ETHICS: Recognize different value systems including one's own self, understand the moral dimensions of one's decisions and accept responsibility for the same.

P.O.6. ENVIRONMENT AND SUSTAINABILITY: Ability to understand the issues of environmental contexts and sustainable development and act accordingly.

P.O.7. SELF DIRECTED AND LIFE LONG LEARNING: Increasing the ability to engage in independent and life-long learning in the broader context of socio- technological changes.

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PROGRAMME SPECIFIC OUTCOME OF B.A HONOURS IN ENGLISH (CBCS SYSTEM) , SESSION 2022-2023

P.S.O.1. Ability to be familiar with texts and authors from within and outside the syllabus.

P.S.O.2 Ability to impart their literary consciousness to others.

P.S.O.3. Ability to judge a work of literature keeping in consideration the genealogical, thematic and historical aspects.

P.S.O.4. Ability to take initiative in publishing the literary endeavors in wall magazines, news-letters, journals etc.

P.S.O.5. Ability to relate literature with other performing arts.

P.S.O.6. Ability to relate, compare and contrast literature written in other languages.

P.S.O.7. Ability to relate literature with other branches of knowledge like philosophy, history, political science etc.

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DARJEELING GOVERNMENT COLLEGE DEPARTMENT OF POLITICAL SCIENCE
UG-CBCS CURRICULUM (UNDER THE UNIVERSITY OF NORTH BENGAL)

COURSE OUTCOME: B.A POLITICAL SCIENCE HONOURS

PAPER NAME	COURSE OUTCOMES
SEMESTER I	
CC1: UNDERSTANDING POLITICAL SCIENCE	• A clear understanding of the meaning of Politics. • Familiarization with the various approaches to the studyof Political Science. • To analyse and explain the basic political theories andconcepts. • To analyse and understand Political Theory.
CC2: PERSPECTIVES OFPUBLIC ADMINISTRATION	• To analyse the different approaches to PublicAdministration. • To interpret the various dimensions of governance andunderstand the relationship between policy decisions and its effects on society.
SEMESTER II	
CC3: INDIAN GOVERNMENT ANDPOLITICS	• A conceptual knowledge of the various structures of theIndian Government. • To examine the power, functions and role of the Constitutional machinery of the Indian government.

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CC4: WESTERN POLITICAL THOUGHT	• To trace the evolution of Western Political Thought. • To understand the contribution of the great political thinkers who paved the way for most important theoriesof Political science. • A holistic knowledge about the Western Political Thought and theories and their empirical significance onthe present world order.
SEMESTER III	
CC5: COMPARATIVE POLITICS	• To develop critical analyses of the different forms of government and Politics. • To learn the importance of comparing governments ofvarious nations for better understanding of world Politics. • To explore different approaches and use empirical methods and tools of investigation for better learningpurposes.
CC6:PUBLIC POLICY AND ADMINISTRATION IN INDIA	• To understand and learn the different aspects of Indian administration.
CC7: NATIONALISM IN INDIA	• To understand the various theories of Nationalism. • Gradual changes leading to social, religious reforms

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	movements and nationalism up to 1919. • Gandhian nationalism after 1919, Ideologies and practices of communalism, independence and partition.
GE301: READING GANDHI	• To make the students understand about the various noble ideas as espoused by Gandhi.
SEC 301: PUBLIC OPINION AND SURVEY RESEARCH	• Analytically discuss the role of Public Opinion in a democratic political system. • Introduction to Survey Sampling, Interview techniques as part of Research.
SEMESTER IV	
CC8: INTRODUCTION TO INTERNATIONAL RELATIONS	• To understand the various theories of International Relations. • To understand world politics and how the State system works. • To explore the various contemporary ideas and events that shape International Relations.
CC9 : POLITICAL SOCIOLOGY	• To understand the inter-relationship between the state and Society. • To make students aware how various social developments/issues have an impact on political outcomes.
CC10: POLITICAL THEORY: CONCEPTS AND DEBATES	• To analyse and explain the basic political theories and concepts. • To analyse and understand Political Theory.
GE 402 :FEMINISM: THEORY AND PRACTICE	• To impart knowledge on the various theories and waves of Feminism. • To understand and inculcate the spirit of humanity and an all-inclusive gender neutral society. • To understand the development of Feminism in the context of India.
SEC 402 : DEMOCRATIC AND LEGAL AWARENESS	• To understand the overall the legal system in India. • Awareness of the system and procedure relating to Criminal justice.
SEMESTER V	
CC11: UNDERSTANDING GLOBAL POLITICS	• To understand world politics and how the State system works. • Developing a sound knowledge of India's relations with some of the major powers of the world.

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CC12: INDIAN POLITICAL THOUGHT	• To trace the evolution of Indian Political Thought from ancient to Modern India. • To understand the contributions made by the great Indian thinkers whose thinking shaped and transformed India.
DSE 501 A:PARTY SYSTEM IN INDIA	• To evaluate the working of the Indian party system • To understand the Organization, Ideology Policies and Nature of National Political Parties, Some major Political Parties and Regional Parties.

DSE 502 A :ELECTORAL PROCESS AND WORKING OF PARLIAMENTARY DEMOCRACY	• Familiarization with the electoral process and the importance of regionalism in India. • To develop an analytical and critical understanding of the various social movements that influence Indian Politics. • To study the working of Parliamentary Democracy in India after independence.
SEMESTER VI	
CC13: INDIA'S FOREIGN POLICY IN A GLOBALISED WORLD	• To learn about how India's Foreign Policy has evolved from a post-colonial state to an aspiring global power. • To understand India's role in the contemporary multipolar world and her relations with major powers as well as with South Asia.
CC14: POLITICAL IDEOLOGIES	• Critical analysis of some of the dominant ideologies that helped to transform man's thinking process. • Discussion on some of the major theories of Democracy.
DSE 603 A: INDIA AND HER NEIGHBOURS	• To realistically view and explain Indian Foreign policy with respect to other nations. • To examine India and her relation with her neighbouring countries.
DSE 604A:GRASSROOT DEMOCRACY IN INDIA	• Inculcate the principles of democracy through decentralization of power. • To trace the evolution of local self-government institutions in India.

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(0354) 2254019
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DEPARTMENT OF POLITICAL SCIENCE

PROGRAMME OUTCOME: B.A POLITICAL SCIENCE HONOURS

PO	SUMMARY	DESCRIPTION
PO1	CRITICAL THINKING	Builds efficiency in critical thinking which includes the ability to examine different sides of an issue. Acquiring theability to analyse and predict political phenomenon based onthe study of existing social, economic and political determinants and past experiences by using various methods and tools of investigation.
PO2	EFFECTIVE COMMUNICATION	Learns to communicate knowledge to diverse audiencesthrough group assignments and presentations. Ability to analysethe relationship between policy decisions and its effects on society.
PO3	SOCIAL INTERACTION	An understanding of the legalsystem, the legislative procedures and practices in India.
PO4	EFFECTIVE CITIZENSHIP	Inculcate the spirit of a lawabiding citizen with sound knowledge of the Indian Constitution.
PO5	ETHICS	Recognize different value systems, understand the moral dimensions of one's decisionswith the help of reasoning.

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PO6	**ENVIRONMENT AND SUSTAINIBILTY**	Addressing the need for Environment Protection and sustainable development alongwith an all-inclusive society based on humanity.
PO7	**SELF-DIRECTED AND LIFE LONGLEARNING**	Enabling the students to voice their thoughts and opinions on various issues of political and social importance. Demonstrate skills and awareness to facilitate the development of society.

PROGRAMME SPECIFIC OUTCOMES: B.A HONS POLITICAL SCIENCE

PSO1: Understanding politics helps to create consciousness and awareness about the national and international politics. Students can critically evaluate the social, economic and political variables that determine the Indian society in particular and global society at large.

PSO2: Analysing the Indian Constitution, major legislations, reforms and understanding the legal system, the administrative structure, public policies and processes.

PSO3: Developing a sound knowledge of India's foreign relations with her neighbours and other major powers.

PSO4: Understanding the various political theories and thoughts of the Indian and Western philosophers that have shaped the current global scenario**.**

PSO5: Acquiring skills to use the various methods and tools of investigation in social research.

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PO AND CO MAPPING
POLITICAL SCIENCE HONOURS

PO1 CRITICAL THINKING	**PO2 EFFECTIVE COMMUNICATION**	**PO3 SOCIAL INTERACTION**	**PO4 EFFECTIVE CITIZENSHIP**	**P05 ETHICS**	**PO6 ENVIRONMENT AND SUSTAINABILITY**	**PO7 SELF-DIRECTED AND LIFE LONG LEARNING**
CO1	CO8	CO3	CO3	CO7	CO6	CO2
CO4	CO11	COSEC301	CO9	COGE301	CO13	CO5
COSEC301	CO501A	CO11	COGE402		DSE603A	COSEC301
CO10	CO5O2A	CO501A	CO501A			COSEC402
CO14	CO13	CO502A	CO502A			CO12
	DSE603A	CO13	DSE604A			CO501A
	DSE 604A	DSE603A				CO502A
		DSE604A				DSE604A

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Programme Outcome Report (Geography)

PO1. Critical Thinking	PO2. Effective communication	PO3. Social interaction	PO4. Effective citizenship	PO5. Ethics	PO6. Environmental awareness	PO7. Laboratory skills	PO8. Self-directed and lifelong learning

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CO1	CO1	CO3	CO3	CO1	CO1	CO1	CO1
CO2	CO2	CO4	CO4	CO2	CO2	CO2	CO2
CO3	CO3	CO6	CO5	CO3	CO3	CO4	CO3
CO4	CO4	CO7	CO6	CO4	CO4	CO5	CO4
CO5	CO5	CO9	CO7	CO5	CO5	CO6	CO5
CO7	CO6	CO10	CO9	CO6	CO7	CO8	CO6
CO8	CO7	CO11	CO10	CO7	CO8	CO10	CO7
CO10	CO8	CO12	CO11	CO8	CO9	CO11	CO8
CO11	CO9	CO13	CO12	CO9	CO10	CO12	CO9
CO12	CO10	CO14	CO13	CO10	CO11	CO13	CO10
CO13	CO11	CO15	CO14	CO11	CO12	CO15	CO11
CO14	CO12	CO16	CO15	CO12	CO13	CO16	CO12
CO15	CO13	CO17	CO16	CO13	CO14	CO20	CO13
CO16	CO14	CO18	CO17	CO14	CO15	CO22	CO14
CO17	CO15	CO19	CO18	CO15	CO16	CO23	CO15
CO18	CO16	CO20	CO19	CO16	CO17	CO25	CO16
CO19	CO17	CO21	CO20	CO17	CO18		CO17
CO20	CO18	CO22	CO21	CO18	CO19		CO18
CO21	CO19	CO24	CO22	CO19	CO20		CO19
CO22	CO20	CO25	CO24	CO20	CO22		CO20
CO23	CO22		CO25	CO22	CO24		CO21
CO24	CO24		CO26	CO23	CO25		CO22
CO25	CO26			CO24	CO26		CO23
CO26				CO25			CO24
				CO26			CO25
							CO26

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Course outcomes (CO): Geography

Semester	Paper	Unit	Course	Outcome
Semester-I	GEO-H-CC-1-01 (TH & PR)	Geotectonic Course	CO1	CO1.1. Understand the earth tectonic and structural structural evolution with reference to geological timescale
				CO1.2. Knowledge about earth's interior and different types of folds and faults with associated drainage landforms
				CO1.3. Concept of Plate tectonic and mountain building
				CO1.4. Understand the concept and application of scale and its construction; and drawing of map projections with classification, properties and uses
	GEO-H-CC-1-02 (TH & PR)	Geomorphology Course	CO2	CO2.1. Understand the Fundamental concepts of Geomorphology and geomorphic processes
				CO2.2. Understand the Evolution of erosional and depositional landforms of different topography.
				CO2.3. Concept of slope forms and processes with slope development theories
				CO2.4. Know about Topographical Map and understand the morphometry with Interpretation of plateau/mountain area and learn the megascopic identification of rocks and minerals
Semester II	GEO H-CCH L-201	Human Geography	CO3	CO3.1. Learn about the concept, scope and content of human geography
				CO3.2. Gain knowledge about the space, society, and cultural regions; and spatial distribution of race, language, religion and caste systems in India and World.
				CO3.3. Build up an idea about population growth, spatial distribution of population, and population composition
				CO3.4. Understand the concept of population-resource relationship, and the spatial pattern of population resource regions in world.
				CO3.5. Computation and presentation of diagrammatic data
				CO3.6. Presentation and interpretation of Thematic Mapping Techniques related to population distribution.

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				CO4.1. Know the details about concept, origin, and growth of rural and urban settlements.
	GEOH-CCHL-202	Settlement Geography	CO4	CO4.2. Understand the Types, patterns and morphology of rural settlements.
				CO4.3. Idea about the trends and patterns of world urbanization
				CO4.4. Knowledge about the urban morphology and land use pattern
				CO4.5. Interactions of different types of levelling and surveying instruments like

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				Prismatic Compass (closed traverse, DumpyLevel, Theodolite (transit), and know its application.
				CO4.6. Preparation and interpretation of the geological sections.
SemesterIII	GEO-H-CC-3-05 (TH & PR)	Climatology	CO5	CO5.1. Understanding of Atmospheric composition and structure; know about insolation and temperature, pressure and planetary wind system
				CO5.2. Develop the concept about Atmosphericmoisture, cyclones and climatic regions with classification
				CO5.3. Learn to use Meteorological instruments likeRecording of Maximum and Minimum thermometer, Hygrometer, Fortin's barometer
				CO5.4. Able to Interpret the Indian daily weather report; and to represent climatic data by climographs and hythergraphs
	GEO-H-CC-3-06 (TH & PR)	Statistical Methods Ingeography	CO6	CO6.1. Understand the Significance of statistics inGeography and learn about the use of data in Geography and also gain knowledge of sources ofdata and scales of measurement
				CO6.2. Build an idea of Sampling and develop the theoretical concept of probability and normaldistribution
				CO6.3. Acquire the knowledge of frequency distribution table and able to calculate the measures of Central Tendency and Measures of Dispersion
				CO6.4. Learn about the Association and Correlationof different variables and understand the Simple Linear Regression with scatter diagram and linearregression line
	GEO-H-CC-3-07 (TH & PR)	Geography Of India	CO7	CO7.1 Know about the characteristics and classification of physical aspects of India.
				CO7.2. Gain knowledge regarding Indian economieslike Mineral and power resources, agricultural production and distribution and industrial development (Automobile and Information Technology)
				CO7.3. Develop the knowledge of spatial distribution of population by race, caste, religion, language and tribes; more over, know the Regionalization of India.
				CO7.4. Able to plot Monthly temperature and rainfall graphs with Indian data and Decadal growthrate of population and learn about Measures of Inequality

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	GEO-SEC-A-3-01-TH	Remote Sensing	CO8	CO8.1. Develop the concept of Remote Sensing, itsprinciples and Photogrammetry, EMR, satellites (Landsat and IRS);sensors.
				CO8.2 Understand the Visual Satellite Image Interpretation and know about the Application of Remote Sensing in Land use/Land cover mapping
	GEO-SEC-	Rural Development	CO9	CO9.1. Understand the concept of Rural Development and Paradigms of rural development

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	A-3-01-TH			
				CO9.2. Know about the Major Rural Development Programmes in India and Rural Governance
Semester IV	GEOH-CCHL-401	Economic Geography	CO10	CO10.1. Know the concept of economic activity, factors affecting location of economic activity with special reference to agriculture, Industry.
				CO10.2. Understand the primary activities like subsistence and commercial agriculture, and lumbering.
				CO10.3. Learn about the secondary activities like manufacturing Industries and Special Economic Zones with reference to India.
				CO10.4. Gain the knowledge about the tertiary activities like transport, International trade.
				CO10.5. Computation and interpretation of the connectivity and accessibility of transport network.
				CO10.6. Representation of state wise variation in occupational structure and work participation rate using thematic mapping techniques.
	GEOH-CCHL-402	Regional Planning And Development	CO11	CO11.1. Know the definition and types of region, and the evolution of regional planning and its need.
				CO11.2. Understand the choice of a region for planning, characteristics and delineation of planning region, and regionalization of India for planning.
				CO11.3. Study about the different theories and models for regional planning.
				CO11.4. Gain knowledge about the Indicators of Human development.
				CO11.5. Delineation and interpretation of formal regions and functional regions.
				CO11.6. Measurement and interpretation of inequality analysis.
				CO12.1. Know about the components, objectives, types and stages of research in Geography.

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	GEO H-CCH L-403	Field Work And Research Methodology	CO12	CO12.2. It gives the idea of role of field work in geographical studies.
				CO12.3. Understanding different field techniques and its merits, demerits and selection of the appropriate like observation technique, questionnaires, schedules, interview.
				CO12.4. Learn about different research problems, research design and hypothesis.
				CO12.5. Preparation of questionnaire/ and

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				schedule on rural/urban; physical/cultural aspects
				CO12.6. Know about the uses of field tools, and data collection techniques for physical or socio-economic surveys based on the above questionnaire/schedules.
				CO12.7. Know how to design the field report and also its aims, objectives, interpretation and report writing techniques.
	GEO H-SECT-405	Geographical Information System	CO13	CO13.1. Know about the definition and components of Geographical Information System(GIS).
				CO13.2. Understand the Principles and uses of Global Positioning System (GPS).
				CO13.3. Learn about the types of GIS data structures and data analysis.
				CO13.4. Gain the knowledge of the application of GIS.
	GEO H-SECT-405	Tourism Management	CO14	CO14.1. Know the concepts, and geographical elements of tourism.
				CO14.2. Learn about the types of tourism like Heritage tourism, Cultural tourism, Medical tourism, Home stay tourism and Eco-tourism.
				CO14.3. Understand the recent trends of tourism, case studies of Himalayas with special reference to North Bengal and coastal areas with special reference to South Bengal.
				CO14.4. Gain the knowledge of National Tourism Policy of India,2007.
	GEO-H-CC-5-11 (TH & PR)	Environmental Geography	CO15	CO15.1. Knowledge of Environmental Geography and Human-environment relationships and adaptation in different biomes
				CO15.2. Know about Concept, structure and functions and problems in tropical and temperate ecosystems and Environmental programmes and policies
				CO15.3. Understand the perception survey on environmental problems and able to make a Project on environmental problems

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Semester V	GEO-H-CC-5-12 (TH & PR)	Remote Sensing And Gis	CO16	CO16.1. Know about Remote Sensing and GIS; Understand the Aerial Photography and Satellite Remote Sensing.
				CO16.2. Understand the GIS Data Structures; Learn the Interpretation and know the application of Remote Sensing and GIS
				CO16.3. Learn to interpret Air photo (using pocket stereoscope); and manual interpretation satellite imagery; and learn to Process Satellite image using GIS software.
	GEO-H-	Population Geography	CO17	CO17.1. Know about the Nature and scope of Population Geography and sources of population

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	DSE-5-01 (TH & PR) OR GEO-H-DSE-5-01 (TH & PR)			data with special reference to India
				CO17.2. Understand the Theories of population and Population dynamics along with Population composition and characteristics
				CO17.3. Practical use of Population projection by arithmetic method; Learn to do Population density mapping for India and Analysis of work participation rate
		Resource Geography	CO18	CO18.1. Know the Concept of Resource Geography; Distribution, utilization, problems and management of land, water, forests and energy resources
				CO18.2. Knowledge on Appraisal and conservation of natural resources and sustainable resource development
				CO18.3. Able to Prepare land use /land cover map and Compute Human Development Index
	GEO-H-DSE-5-02 (TH & PR) OR GEO-H-DSE-5-02 (TH & PR)	Urban Geography	CO19	CO19.1. Knowledge on nature and scope of Urban geography and Patterns of urbanisation in developed and developing countries
				CO19.2. Know about the Functional classification of cities and Urban Issues related to problems of housing, slums, civic amenities
				CO19.3. Able to calculate the Rank-size rule and understand State-wise variation and trends of urbanization
		Agricultural Geography	CO20	CO20.1. Idea on nature and scope of Agricultural Geography and Physical, technological and institutional determinants of Agriculture.
				CO20.2. Know about Agricultural Regions of India and Agricultural revolutions in India; and understand Agricultural Systems of the world and Agricultural land use model
				CO20.3. Able to measure agricultural efficiency, crop concentration and crop diversification.
				CO21.1. Learn about the evolution of geographical ideas during the ancient period in Western world and India
				CO21.2. Understand the evolution of geographical ideas during the medieval period in Western world and India

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Semester VI	GEO-H-CC-6-13-TH & PR	Evolution Of Geographical Thoughts	CO21	CO21.3. Know the modern evolution of geographical thinking in Germany, France, Britain, United States of America.
				CO21.4. Assess the differences between Environmental Determinism and Possibilism, and Systematic and Regional geography.
				CO21.5. Presentation and interpretation of the quantitative techniques in geography like Chi-square, standard score.
				CO21.6. Computation and representation of crop combination after Weaver, Rafiulla and Doi.

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	GEO-H-CC-6-14-TH & PR	Disaster Management	CO22	CO22.1. Know the concept and classification of hazards and disasters.
				CO22.2. Study about the risk perception and vulnerability assessment.
				CO22.3. Understand the factors, consequences and management of earthquake, flood, riverbank erosion and landslide.
				CO22.4. Knowledge about the human induced disaster like fire hazard and industrial accidents.
				CO22.5. Presentation on the project report about the flood, landslide, or earthquake based on field study.
	GEO-H-DSE-6-03-TH & PR	Advanced Cartography	CO23	CO23.1. Know the nature, scope and history of cartography
				CO23.2. Know about the principle, application, and components of instruments like Dumpy Level and Transit Theodolite.
				CO23.3. Learn about the properties, advantages, limitations and derivation of Polar Zenithal Equal Area, Polar Zenithal Equidistant, Cubic Development of Gnomonic Projection; Simple Conical Projection with two standard parallels; International Projection, Universal Transverse Mercator's Projection.
				CO23.4. Understand the concept, principles and components of Remote Sensing and GIS.
				CO23.5. Observe and taking readings from Dumpy Level and transit Theodolite, and finally plot the contour mapping and determine the height and distance of an object
				CO23.6. Construction of Polar Zenithal Equal Area, Polar Zenithal Equidistant, Simple Conical Projection with two standard parallels, and International Projection.
				CO24.1. Understand the concepts, nature and scope of Political Geography.
				CO24.2. Know about the concept of nation, state and nation state, frontiers and boundaries, geopolitics, and Heartland and Rimland.

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	GEO-H-DSE-6-03-TH & PR	Political Geography	CO24	CO24.3. Learn about the water sharing disputes, conflicts related to forest rights in India.
				CO24.4. Gain the knowledge about the politics of displacement like issues of relief, compensation and rehabilitation with special reference to dams in India
				CO24.5. Preparation and interpretation of spatial distribution maps of India related to gender, caste, and religion.
				CO24.6. Preparation of questionnaire on socio-

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				economic status of rural and urban centres of India.
	GEO-H-DSE-6-04-TH & PR	Hydrology And Oceanography	CO25	CO25.1. Learn about concept and factors of the hydrological cycle, systems approach in hydrology, human impact on the hydrological cycle, precipitation, interception, evaporation, evapo-transpiration, infiltration, ground-water, runoff, overland flow, and hydrological input and output.
				CO25.2. Study about the characteristics of river basins, basin surface run-off, measurement of river discharge, and spatial pattern of floods and droughts.
				CO25.3. Know the detail accounts on bottom floor topography of oceans, and distribution and determinants of ocean salinity and temperature.
				CO25.4. Understand the types and origin of coral reefs, types of marine deposits, and distribution of ocean resources.
				CO25.5. Assess the morphometric analysis of any river basin from topographical map like stream frequency, drainage texture, circulatory ratio, elongation ratio, etc.
				CO25.6. Calculation and interpretation of discharge by area velocity methods.
	GEO-H-DSE-6-04-TH & PR	Social Geography	CO26	CO26.1. Study about the concept, origin, nature and scope of social geography.
				CO26.2. Know about the types, causes and consequences of migration in India and World, and technological and occupational change of the people of India.
				CO26.3. Understand the spatial distribution of caste, class, religion, race and gender.
				CO26.4. Learn about the concept and components of welfare and wellbeing, and distribution of slums.
				CO26.5. Presentation and interpretation of Flowchart to show migration trends.

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				CO26.6. Apply suitable cartographic techniques for identifying the spatial distribution of caste, religion and gender in India.

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Programmes Specific Outcome (PSO): Geography (H)

The students of Geography (Hons.) will acquire their theoretical, computational and experimental knowledge about the different branches of Geography like Physical Geography, Human Geography, Environmental Geography, Geography of India, Geography of Thought, Practical Geography, Computer application in Geography, etc. by studying this programme. They will attain the quantitative and predictive understanding of Geography in different physical and human phenomena. This programme also opens up the career paths to select in many related and sub-related areas like academics, research, GIS based map consultant, hydrologist GIS and water resource modelling consultant, etc.

After completion of the programme, the graduates will be capable of-

PSO1: Acquiring the knowledge about the different core branches of Geography like Physical Geography, Human Geography, Practical Geography, Environmental Geography, etc.

PSO2: Developing the ability to use skills in Geography and its related domains of practical knowledge for formulating and tackling Geography-related problems.

PSO3: Acquiring their understanding skills about the different experiments of different branches of Geography by designing as well as conducting several experiments in different problems to solve the problem by proper interpretation and analysis of the experimental results and drawing the conclusions by the supporting data.

PSO4: Developing several experiment related tools e.g. statistical techniques for representation of data, summaries, various graph and diagram, and data analysis.

PSO5: Accumulating their knowledge and skills about the applications of GIS and remote sensing techniques for sketch out the problems and explore the spatio-variation, which can help the planners and policy makers to solve the problem.

PSO6: Attaining a level of proficiency and intellectually in predicting the geographical phenomena by using spatial, computational and remote sensing knowledge and abilities about the applications of computer programming and GIS techniques for solving different problems of Geography as well as global problems.

PSO7: Comprehending and cultivating an understanding of the influence of Geography on

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the modern society and livelihood patterns with the means of sustainable development.

PSO8: Attaining the quantitative and qualitative understanding of Geography in different theoretical and practical phenomena.

PSO9: Theoretical knowledge and abilities on different GIS and remote sensing software as well as statistical software, etc. that helps them in their higher studies in Geography.

PSO10: Demonstrating professional behaviour such as being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behaviour such as fabricating, falsifying or misrepresenting data or committing plagiarism and the ability to identify the potential ethical issues in work-related situations.

PSO11: Developing knowledge and abilities on the use of different measurement instruments and as well as workshops skills.

PSO12: Developing communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature.

PSO13: Opening the career paths to select a career in many related and sub-related areas like academics, research, GIS based map consultant, hydrologist GIS and water resource modelling consultant etc.

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Programmes Specific Outcome (PSO): Geography (Gen)

The students of Geography (Gen or DSC) will acquire their theoretical and practical basic knowledge about the different branches of Geography like Physical Geography, Human Geography, Environmental Geography, Geography of India, Soil and Biogeography, Economic Geography, Urban Geography, Remote Sensing, Computer Basics, etc. by studying programme. This programme also opens up the career paths to select in many related and sub-related areas like academics, research, computer and space related work etc.

After completion of the programme, the graduates will be capable of-

PSO1: Acquiring the knowledge about the different core branches of Geography like Physical Geography, Environmental Geography, Human Geography, Maps and Diagrams, etc.

PSO2: Developing the ability to use skills in Geography and its related domains of practical field for tackling Geography-related problems.

PSO3: Acquiring their understanding skills about the different practical work of different branches of Geography by the proper solve, interpretation, analysis of the results, and drawing the conclusions by the supporting data.

PSO4: Accumulating their knowledge and skills about the applications of techniques for solving different problems of different branches of Geography, beside the theoretical and practical skills.

PSO5: Comprehending and cultivating a basic understanding of the influence of Geography on the modern society and it's application on our society.

PSO6: Attaining the quantitative and predictive understanding of Geography in different practical and theoretical phenomena.

PSO7: Demonstrating professional behaviour such as being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behaviour such as fabricating, falsifying or misrepresenting data or committing plagiarism and the ability to identify the potential ethical issues in work-related situations.

PSO8: Developing proficiency and skill on the set up of different practical instruments and computer basics knowledge.

PSO9: Opening the career paths to select a career in many related and sub-related areas like academics, research, soil and environment related work, space related work, Govt and private

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sector job in different field, etc.

UNIVERSITY OF NORTH BENGAL

CBCS SYLLABUS FOR B.SC ZOOLOGY HONOURS

DEPARTMENT OF ZOOLOGY

DARJEELING GOVERNMENT COLLEGE

Semester	**Course Outcomes:**	
	Core T1- (NON-CHORDATES I)	
SEMESTER-I	CO 1. (Basics of Animal Classification)	Describe general taxonomic rules on Animal Classification.
	CO 2. (Protista & Metazoa)	• Classify Phylum Protozoa to Echinodermata with taxonomic keys. • Knowledge about pseudopodial, flagellar and ciliary locomotion. • Develops idea about life cycle and pathogenicity of Plasmodium sp. and Entamoeba sp. • Students gain knowledge about basic concepts of evolution of symmerty and segmentation in Metazoa
	CO 3. (Porifera)	• Classify Phylum Porifera with examples. • Detailed knowledge o cell types spicules and asconoid, syconoid and leuconoid canal system in sponges
	CO 4. (Cnidaria)	• Classify Phylum Cnidaria with examples. • Comprehensive knowledge about Metagenesis, polymorphism. • Knowledge about Coral reefs, function and conservation.
	CO 5. (Ctenophora)	Describe general characteristics of Ctenophora.
	CO 6. (Platyhelminthes)	• Classify Phylum Platyhelminthes with taxonomic keys. • Knowledge about life cycle of Fasciola sp. and Taenia sp.

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	CO 7. (Nematoda)	• Classify Phylum Nematoda with taxonomic keys. • Knowledge about life cycle of Ascaris sp. and Wuchereria sp. • Comprehensive knowledge about parasitic adaptations in helminthes.
		•
	Core P1- (NON-CHORDATES I Lab)	
	CO	• Students will be able to identify with reasons and

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		classify organisms belonging to Phylum Protozoa, Porifera Cnidaria, Platyhelminthes and Nematoda. • Students will be trained stain and prepare whole mounts of unicellular organisms. • They will be able to use the light microscope for viewing of unicellular organisms under different magnifications.
	Core T2- (ECOLOGY)	
	CO 1. (Introduction to Ecology)	• Students will gain knowledge about different contributors in the field of ecology. • Students will be introduced to the concept of Biosphere and some physical factors such as light and temperature.
	CO 2. (Population)	Understand the various features and aspects of population ecology..
	CO 3. (Community)	• Understand the various features and aspects of community ecology such as species diversity, abundance dominance, richness. • Knowledge about Ecological succession. a
	CO 4. (Ecosystem)	• Understand the various features and aspects of natural and human modified ecosystem ecology. • They will have the knowledge about energy flow in an ecosystem. • They will acquire knowledge about nutrien and biogeochemical cycle.
	CO 5. (Applied Ecology)	• Student will be learning the various issues related to wildlife conservation. • Students will gain knowledge about Wild life protection act (1972) and also learn about management and strategies for tiger conservation.
	Core P2- (ECOLOGY Lab)	

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	CO	• Students will be able to study experimentally the different physico-chemical parameters of an aquatic body. • They will have the required knowledge to calculate Diversity of a community. • They will be able to plot survivorship curves of biological populations. • They will learn about insitu conversation, behaviour and diversity through a field visit.
SEMESTER-II	**Core T3- (NON-CHORDATES II)**	
	CO 1. (Introduction)	Knowledge about evolution of coelom and metamerism.
	CO 2. (Annelida)	• Classify Phylum Annelida with taxonomic keys upto Class level. • Knowledge about excretion, metamerism and

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		locomotion in Nereis sp.
	CO 3. (Arthropoda)	• Classify Phylum Platyhelminthes with taxonomic keys upto Class level. • Knowledge about vision in insecta, respiration and metamorphosis in Lepidopterans.
	CO 4. (Onycophora)	Knowledge about evolutionary significance and affinities of Peripatus sp.
	CO 5. (Mollusca)	• Classify Phylum Mollusca with taxonomic keys upto Class level. • Knowledge about nervous system, torsion and detorsion in Gastropoda. • Comprehensive knowledge about respiration in Pila sp and significance of trocophore larva.
	CO 6. (Echinodermata)	• Classify Phylum Echinodermata with taxonomic keys upto Class level. • Knowledge about water-vascular system, larval forms and affinities with Chordates.
	CO 7. (Hemichordata)	• Students will learn about the general characteristics of Hemichordata. • Relationship with non-chordates and Chordates.
	Core P3- (NON-CHORDATES II lab)	
	CO	• Students will be able to identify with reasons and classify organisms belonging to Phylum Annelida, Arthropoda, Mollusca, Echinodermata and Sub-Phylum Hemichordata. • They will have an experential learning on the digestive system, septal nephridia pharyngeal nephridia.
	Core T4- (CELL BOLOGY)	
	CO 1. (Overview of Cells)	Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, Viruses, Viriod, Prion and Mycoplasma.

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	CO 2. (Plasma Membrane)	Stidents will gain knowledge about: • Ultrastructure and composition of plasma membrane • Fluid mosaic Model • active passive and facilitated transport. • Cell junctions
	CO 3. (Cytoplasmic Organelles I)	Students will gain knowledge about Cytoplasmic Orgnelles • Endoplasmic Reticulum • Golgi Apparatus • Lysosomes
	CO 4. (Cytoplasmic Organelles II)	• Students will gain knowledge about Mitochondria viz. Replication, Endosymbiotic hypothesis of its origin, mitochondrial respiratory chain and chemi-osmotic hypothesis of ATP production • Students will gain knowledge about the structure and

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		function of Perixomes and Centrosomes.
	CO 5. (Cytoskeleton)	The students should be able to differentiate the molecular structure of microtubules and microfilaments and explain the structure of skeletal framework.
	CO 6. (Nucleus)	The students should be able to explain the ultra structure of nucleus, nuclear encelope and nucleolus in relation to the importance of the organelle as the central coordinating centre of a cell.
	CO 7. (Cell Division)	• They will be able to describe Cancer through Concept of oncogenes and tumor suppressor genes. • The students will gain knowledge to understand the different types of cell division i.e., mitosis and meoiosis and its significance in vegetative and reproductive cells
	CO 8. (Cell Signalling)	The students will be able to explain and write on the. Cell signalling and transduction pathways
	Core P4- (CELL BOLOGY Lab)	
	CO	
SEMESTER-III	**Core T5- (CHORDATES)**	
	CO 1. (Introduction to Chordates)	Students will be able to understand the main characteristic features of Phylum Chordata and general characteristic features upto Class level.
	CO 2. (Protochordata)	• Students will be able to describe the general characters of Sub-Phylum Urochordata and Cephalochordata and their classification upto Class level. • students will be able to write about Retrogressive metamorphosis in Ascidia sp. And filter feeding in Branchiostoma sp.
	CO 3. (Origin of Chordata)	• Understand how the chordates originated through Dipleurula concept and Echinoderm theories of origin.

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	CO 4. (Agnatha)	• Learn about characteristic features of cyclostomes upto order level. • The students will also know about the process of metamorphosis in Lamprey and the zoological importance of ammocoete larva
	CO 5. (Pisces)	• Students will be familiarized with two major classes of fishes, the Chondrichthyes and Osteichthyes. • The students will learn the process of migration and parental care in fishes and the diversity in the structure of swim bladder in fishes.
	CO 6. (Amphibia)	• Students will learn to classify Amphibia upto living orders along with parental care, metamorphosis, neoteny and paedogenesis.

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	CO 7. (Reptilia)	• Students will be able to classify Class Reptilia up to living orders • They will also gain a deeper insight into the biting mechanism of snakes and the poison apparatus
	CO 8. (Aves)	• Develop idea about the characters and classification of Aves . • Understand the mechanism of migration in birds, their exoskeletal structures and double respiration. • The students will understand the aerodynamics and principles of flight
	CO 9. (Mammals)	• The students will learn to classify Mammals up to living orders, the exoskeletal structures, adaptive radiation and echolocation in bats,
	CO 10. (Zoogeography)	• Students will gain a comprehensive knowledge about The Continental Drift theory, and animal distribution globally with a detailed understanding of Zoogeographical Realms.
	Core T6- (Animal Physiology: Controlling and Co-ordinating Systems)	
	CO1. (Tissues)	• Students will learn about the structure and function of different kinds of tissues.
	CO2. (Bone & Cartilage)	• Students will be able to write about the Structure and structural types of bones and cartilage and about the process of ossification.
	CO3. (Nervous System)	• Students will learn the role of the nervous system in coordinating an animal's response to environment and organ system of human body. • The basic structure and function of a neuron, the structure and function of a synapse and neurotransmitter chemicals. • Students will be able to understand the origin and propagation of nerve impulse in myelinated and non-myelinated nerve fibre. • Types of reflex with examples.
	CO4. (Muscular System)	• Students will gather a detailed knowledge about different types of muscles and also understand the molecular and chemical basis of muscular contraction.

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	CO5. (Reproductive System)	• Students will understand the organs for reproduction and the roles of hormones in reproduction.
	CO6. (Endocrine System)	• Detailed knowledge on hormones and histology and function of Pituitary, Thyroid, Pancreas and Adrenal.
	Core P6- (Animal Physiology: Controlling and Co-ordinating Systems Lab)	
		•
	Core T7- (Genetics)	

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	CO1. (Mendelian Genetics & its extension)	• Students will understand the basic principles of Mendelian inheritance and the extension of Mendelian genetics.
	CO2. (Linkage, Crossingover & Chromosomal mapping)	• Students will be able to explain the process of linkage and crossing over and apply the principles in measuring recombination frequency.
	CO3. (Mutations)	• Students will gain knowledge on different types of gene mutations and chromosomal aberrations their molecular basis.
	CO4. (Sex Determination)	• Students will be able to write the different mechanisms of sex determination through their knowledge on specific examples of sex-determination in Drosophila sp . And Humans
	CO5. (Extra-chromosomal Inheritance)	• The concept of extra-chromosomal inheritance will be understood through examples of antibiotic resistance, kappa particle and shell spiralling.
	CO6. (Recombination in Bacteria & Viruses)	• Students will learn conjugation, transformation and transduction and will be able to differeitiate and describe the recombination processes.
	Core P7- (Genetics Lab)	
		•
	SEC T1- Apiculture	
	CO1. (Biology of Bees)	• Students will learn about the Biology, Classification and Social organization of Honey Bees. • They will be able to name the different classes of honeybees and have a preliminary knowledge regarding Apiculture.
	CO2. (Rearing of Bees)	• Students will have a comprehensive knowlege about selection of honey bee, different rearing equipments, different kinds of beehives and methods of honey extraction.

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	CO3. (Diseases and enemies)	• Students will be able to understand and treat/control/prevent different diseases of honey bees based on the symptoms.
	CO4. (Bee Economy)	• Students will gain knowledge on different products of apiculture industry such as honey, beeswax propolis etc.
	CO5. (Entrepreneurship in Apiculture)	• Modern methods of beekeeping will be taught in detail and the students will also be given an insight into the beekeeping industry.

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	Core P8- (Comparative anatomy of vertebrates)	
	CO1. (Integumentary system)	• Students will learn about integumentary system in mammals and birds and will be able to write about their derivatives in the two classes.
	CO2. (Skeletal System)	• Students will get an overview of axial and appendicular skeleton; Jaw suspension; Visceral arch
	CO3. (Digestive System)	• Students will learn about comparative anatomy of stomach in birds and mammals and dentition in mammal
	CO4. (Respiratory system)	• Students will be able to describe the respiratory organs in fish, amphibian, birds and mammals
	CO5. (Circulatory system)	• Students will get a comprehensive idea about the general plan of circulation and knowledge about comparative account of heart and aortic arches
	CO6. (Urinogenital system)	• Students will be introduced to the urinogenital system, succession of kidney and evolution of urinogenital ducts
	CO7. (Nervous system)	• Students will be able to describe the brains in different vertebrate groups and cranial nerves in mammals
	CO8. (Sense organs)	• Students will learn about sense organs in animals and the different classification of receptors
	CORE P9 (Animal Physiology: Life Sustaining Systems)	
	CO1. (Physiology of Digestion)	• Students will learn about structural organisation and functions of Gastrointestinal tract and Associated glands. • They will develop an understanding about mechanical and chemical digestion and absorption of Carbohydrates, Lipids, and Proteins.

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	CO2. (Physiology of Respiration)	• Students will learn about mechanism of Respiration in vertebrates with comprehensive knowledge about transport of Oxygen and Carbon dioxide in blood and types of respiratory pigments.
	CO3. Physiology of Circulation	Students will gain knowledge about: • Components of Blood and their functions; Structure and functions of haemoglobin • Haemostasis; Blood clotting system, Fibrinolytic system • Haemopoiesis; Basic steps and its regulation

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		• Blood groups; ABO and Rh factor
	CO4. Physiology of Heart	Students will be able to understand the following aspects on the physiology of heart: • Structure of mammalian heart with special reference to human, Coronary Circulation, Structure and • working of conducting myocardial fibres, Origin and conduction of cardiac impulses • Cardiac Cycle and cardiac output • Blood pressure and its regulation
	CO5. Thermoregulation & Osmoregulation	• Students will gain knowledge about osmoregulatory organs and mechanism of osmoregulation in vertebrates. • They will learn about the classification and mechanisms of thermoregulation in vertebrates.
	CO6. Renal Physiology	• Students will develop knowledge about structure of Kidney and nephron. They will understand in detail the mechanism of urine formation •
	Core P10 - Fundamentals of Biochemistry	
	CO1. Carbohydrates	• Students will gain comprehensive knowledge about Monosaccharides, Disaccharides, Polysaccharides • They will study Carbohydrate metabolism through Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis
	CO2. Lipids	• Students will be able to understand the structure and Significance of physiologically important saturated and unsaturated fatty acids, Triacylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpinoids. • They will learn about Lipid metabolism in detail.

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	CO3. Proteins	• Students will learn about Structure, Classification, General and Electro chemical properties of α-amino acids; • They will be able to understand the different levels of organization of Proteins (primary, secondary, tertiary, quaternary). • Students will be about to undersstand and write about Protein metabolism.
	CO4. Nucleic Acids	• Effort will be made to make the students understand the structure of Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids • They will be able to understand the different types of DNA and RNA.
	CO5. Enzymes	• Students will be able to understand the nomenclature and classification of enzymes. • They will be able to understand the mechanism of enzyme action, and different types of enzyme

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		inhibitions. • Students will be introduced to the concept of Enzyme kinetics;.
	CO6. Oxidative Phosphorylation	• The concept of mitochondrial respiratory chain and ATP synthesis will be clear to the students.
	SEC Paper 2 (Group A)– Sericulture	
	CO1. Introduction	• Students will be introduced to Sericulture. • They will learn about types of silkworms on the basis of their geographic origin and food preference.
	CO2. Biology of Silkworm	• Students will learn about the Life cycle of Bombyx mori and will be able to describe the structure of silk gland and secretion of silk .
	CO3. Rearing of Silkworms	Students will get an overall idea about selection of mulberry, rearing house and rearing appliances. Disinfectants, Spinning, harvesting and storage of cocoons
	CO4. Pests and Diseases	• Students will learn about different pests of silkworm • They will learn about the Pathogenesis of Protozoan, viral, fungal and bacterial silkworm diseases and their Control and Prevention.
	CO5. Entrepreneurship in Sericulture	• Students will get an overall idea about Sericulture industry in different states, employment, potential in • mulberry and non-mulberry sericulture.
	CC 11 - Molecular Biology	
	Unit 1: Nucleic Acids	• Salient features of DNA and RNA • Watson and Crick Model of DNA, • Clover leaf model of tRNA •

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	Unit 2: DNA Replication	• Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous • ReplicationRNA priming, Inhibitors of replication •
	Unit 3: Transcription	• Mechanism of Transcription in prokaryotes Inhibitors of transcription •
	Unit 4: Translation	• Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly in prokaryotes, • fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in • initiation, elongation and termination of polypeptide

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		chain; Genetic code, Degeneracy of the genetic • code and Wobble Hypothesis; Inhibitors of protein synthesis •
	Unit 5: Gene Regulation	• Regulation of Transcription in prokaryotes: lac operon and trp operon; •
	Unit 6: DNA Repair Mechanisms	• Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision • repair, SOS repair •
	Unit 7: Molecular Techniques	• Basic Principles of PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing •
	CC 12 – Immunology	
	Unit 1: Overview of Immune System	• Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the • Immune system •
	Unit 2: Innate and Adaptive Immunity	• Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity • (Cell mediated and humoral). Structure of B and T cell Receptor and its signalling, T cell development & selection •
	Unit 3: Antigens	• Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing • immunogenicity, B and T-Cell epitopes •
	Unit 4: Immunoglobulins	• Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions, • Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production •

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	Unit 5: Major Histocompatibility Complex	• Structure and functions of MHC molecules. •
	Unit 6: Cytokines	• Types, properties and functions of cytokines. •
	Unit 7: Complement System	• Components and pathways of complement activation (Classical & alternative). •

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	Unit 8: Hypersensitivity	• Gell and Coombs' classification and brief description of various types of hypersensitivities. •
	Unit 9: Immunology of disease	• Malaria •
	Unit 10: Vaccines	• Various types of vaccines. Active & passive immunization (Artificial and natural). •
	DSE Paper 1 (Group B) –Endocrinology •	
	Unit 1: Introduction to Endocrinology	• General idea of Endocrine systems, Classification, Characteristic and Transport of Hormones, • Neurosecretions and Neurohormones •
	Unit 2: Epiphysis, Hypothalamo-hypophysial Axis	• Structure of pineal gland, Secretions and their functions in biological rhythms and reproduction. • Structure and functions of hypothalamus and Hypothalamic nuclei, Regulation of neuroendocrine • glands, Feedback mechanisms • Structure of pituitary gland, Hormones and their functions, Hypothalamo-hypophysial portal system, • Disorders of pituitary gland. •
	Unit 3: Peripheral Endocrine Glands	• Structure, Hormones, Functions and Regulation of Thyroid gland, Parathyroid, Adrenal, Pancreas, • Ovary and Testis • Hormones in Calcium and glucose homeostasis, Disorders of endocrine glands •

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	Unit 4: Regulation of Hormone Action	• Mechanism of action of steroidal, non-steroidal hormones with receptors • Bioassays of hormones using RIA & ELISA • Estrous cycle in rat and menstrual cycle in human • Multifaceted role of Vasopressin & Oxytocin. Hormonal regulation of parturition. •
	• **DSE Paper 2 (Group A) -Animal Behaviour and Chronobiology**	
	Unit 1: Introduction to Animal Behaviour	• Origin and history of Ethology, Brief contributions of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko • Tinbergen, Proximate and ultimate causes of behaviour, Methods and recording of a behaviour •
	Unit 2: Patterns of	• Stereotyped Behaviours (Orientation, Reflexes);

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	Behaviour	Individual Behavioural patterns; Instinct vs. Learnt • Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting. •
	Unit 3: Social and Sexual Behaviour	• Social Behaviour: Concept of Society; Communication: Chemical communications in insects and the senses • Altruism; Reciprocal altruism and Kin selection Insects' society with Honey bee as example; Foraging in • honey bee and advantages of the waggle dance. • Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male • rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care. •
	Unit 4: Introduction to Chronobiology	• ief historical developments in chronobiology; Biological oscillation: the concept of Average, • amplitude, phase and period • Adaptive significance of biological clocks •
	Unit 5: Biological Rhythm	• Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; • Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic • zeitgebers; Circannual rhythms; Photoperiod and regulation of seasonal reproduction of vertebrates; • Role of melatonin. •

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Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

CBCS SYLLABUS FOR M.SC ZOOLOGY
POST GRADUATE DEPARTMENT OF ZOOLOGY
DARJEELING GOVERNMENT COLLEGE

FIRST SEMESTER:

DZOOCCT0101N : Functional biology of Non-chordates and Chordates

Course objectives: This course aims to teach the students the fundamental zoology of non-chordates and chordates. The different topics like nutrition, digestion, respiration and excretion of non-chordates will provide an overall idea about non-chordate biology. This course focuses on understanding the evolutionary approaches of nervous system and larval forms of invertebrates. Nervous system, urogenital system, circulatory system and integument of chordates will give a comprehensive idea about functional aspects of chordate biology.

Course learning outcomes:

❖ Students will learn about feeding pattern, digestion, respiration and excretion of non-chordates.

❖ Students will understand about the evolutionary pattern of nervous system and larval life forms of invertebrates.

❖ Students will gain knowledge regarding integument, nervous system and sense organs of chordates.

❖ Students will gather knowledge about the evolution of aortic arches, portal system and urogenital system in vertebrates.

DZOOCCT0102N : Ecology and Biodiversity

Course objectives: This course aims to create awareness amongst students about the basic concepts pertaining to ecology and biodiversity. This course will focus on growth and regulation of population, competition and co-existence and metapopulation. This course will open a new horizon for understanding agroecology and ecological restoration. This course will be helpful in understanding the basic concepts of biodiversity along with biodiversity indices and agrobiodiversity.

Course learning outcomes:

❖ Students will gain knowledge about population growth and regulation, competition and co-existence within and among populations as well as metapopulation.

❖ Students will learn about agroecology and how ecology can be restored.

❖ Students will learn to evaluate biodiversity indices and know about basics of biodiversity.

❖ Students will understand global pattern of biodiversity and also importance of agrobiodiversity.

DZOOCCT0103N : Developmental Biology and Endocrinology

Course objectives: This course has been designed to give an idea to the students regarding basics of developmental biology, starting from gametogenesis to fertilization to development of an embryo.

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This course also aims to impart knowledge about regenerative biology and HOX gene and their regulation. This course surfaces information about hormones and neuroendocrine regulation. It also covers a detailed concept regarding endocrine glands.

Course learning outcomes:

❖ Students will come to know about spermatogenesis, oogenesis, fertilization events and developmental events in detail.

❖ Students will learn about regenerative biology and implications of HOX gene.

❖ Students will get to know about hormones---their regulation, classification, chemical nature, mode of action as well as neuroendocrine regulation.

❖ Students will gather information about detailed structure and functions of the important endocrine glands of the body.

DZOOCCP0104N : Non-chordates and Chordates

Course objectives: This course is directed towards identification of non-chordates and chordates specimen (upto subclasses/order) with characters and examples. The students will get hands-on training for locating different organs and systems in-situ of non-chordate and chordate specimens (earthworm/ cockroach/ carp/ *Gallus*).

Course learning outcomes:

❖ Students will learn to identify non-chordate and chordate specimens based on taxonomic characters.

❖ Students will gain knowledge about dissection of nervous system, nephridium, spermatheca and setae of earthworm, corpora allata and corpora cardiaca of cockroach.

❖ Students will get trained regarding dissection of pituitary gland, swim bladder, Weberian ossicles and scales of carp, cranial nerves of *Gallus.*

DZOOCCP0105N : Ecology, Biodiversity and Developmental Biology

Course objectives: This course is directed to give a hands-on training to the students regarding ecology, biodiversity and developmental biology. Students will go to field, observe and collect data and study different species diversity indices based on those data. They will get to know about ecological importance of some common animals and also developmental stages of chick embryo and toad embryo.

Course learning outcomes:

❖ Students will gather knowledge about different types of species diversity indices.

❖ Students will learn how to estimate BOD of any water sample and the importance of BOD.

❖ Students will understand about the different developmental stages of chick embryo and toad embryo and their significance.

DZOOCCP0106N : Seminar Presentation

This is to evaluate the knowledge, presentation technique, communication skill, presence of mind and overall smartness of a student. Students need to produce atleast three seminar topics as per their

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choice. From those topics any one will be selected as per their preference for presentation. 10 minutes will be allotted for presentation and 10 minutes for interaction with audience.

DZOOCCP0107N : Review of a Scientific Paper

Students will be provided with peer reviewed scientific paper of which the students will be asked to make their observations. The students will be assessed based on their study observations.

- Students will be exposed to world of research work through the review of scientific paper.
- Student will learn the pattern of presenting a scientific paper, referencing, cross referencing, *etc.*
- Students will learn to analyse a scientific paper.

DZOODET0101A : Insect Biology

Course objectives: This course has been designed to provide a basic knowledge regarding insect characters and classification (upto Order) with examples of major orders, which form the basis of entomology. This course allows to learn about morphology, anatomy and physiology of insects along with the role of insects as pests and vectors.

Course learning outcomes:

- Students will study about characters and classification (upto Order with examples) of insects.
- Students will get to know about integument, nervous system, circulatory system, excretory system, reproductive system and endocrine system in insects.
- Students will know about insect pest status and their controlling measures.
- Students will learn facts about insect vectors, their role in disease transmission and their management.

DZOODET0101B : Aquaculture

Course objectives: This course has been designed to provide a basic knowledge regarding fish characters and classification (upto Order) with examples of major orders, which form the basis of aquaculture. This course allows to learn about different types of fish culture, fish behaviour, techniques of fisheries and economic aspects of aquaculture.

Course learning outcomes:

- Students will study about characters and classification (upto Order with examples) of insects.
- Students will learn about fundamental concepts of aquaculture with emphasis on types of carps and types of fish culture.
- Students will get to know about prawn and pearl culture and economic importance of these cultures.
- Students will learn the topics of osmoregulation in migratory fishes, hypophysation and fish processing.

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DZOODET0101C : Climate Change Biology

Course objectives: This course has been incorporated in the syllabus to give the students an idea about the changing pattern of global climate and its impact on the ecology and environment. This course will allow students to know about the current scenarios regarding greenhouse effect, ozone layer depletion, global warming, REDD, IPCC, climate change impact on physical environment.

Course learning outcomes:

❖ Students will study about greenhouse effect, ozone layer depletion, global warming in detail.

❖ Students will get introduced to the concepts of REDD, IPCC and climate change conservation policies.

❖ Students will come to know about ecological impact of El nino, La nina and Southern oscillation.

❖ Students will learn how climate change is creating impact on ecosystem processes and how to save the physical environment from these impacts.

DZOODET0101D : Cellular organization, communication and signaling

Course objectives: This course has been designed to impart basic and advanced concepts of cellular organization, cell communication and signaling via cell surface receptors. It covers topics such as cytoskeleton, transport across biomembranes, cell communication, cell adhesion, cell surface receptors and signaling pathways.

Course learning outcomes:

❖ Students will learn about how cells are organized and cellular integrity is maintained.

❖ Students will come to know how cells adhere and communicate with each other.

❖ Students will be able to understand about different types of signaling pathways and the role of cell surface receptors.

DZOODET0101E : Parasitology and Medical Entomology

Course objectives: A broad and multi-disciplinary approach to the complex and dynamic lifecycle, ecology, physiology, biochemistry, immunology, pathology and molecular biology of the covered parasites (including parasitic arthropod with medical importance). This course offers an overview of the biological and epidemiological bases of important parasitic diseases and an understanding of the impact of parasitic diseases on human and veterinary animals.

Course learning outcomes:

❖ Students will learn life-cycle, ecology, physiology, biochemistry, immunology, pathology and molecular biology of the covered parasites.

❖ Students will gain knowledge about the arthropod with medical importance, disease transmission and vector biology including vector management.

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DZOODET0101F : Ornamental Fish Culture

Course objectives: Ornamental fish culture is an important component of the aquaculture industry. The ornamental fish trade is a foreign exchange earner, besides being a source of employment. It has a significant role in the economy of our country. Ornamental fish culture has been serving as a viable recreation, especially for the hobbyists from time immemorial. Apart from giving pleasure, this hobby relaxes the mind (relief from stress and anxiety).

Course learning outcomes:

- ❖ Students will learn about construction and decoration of aquarium tanks, maintenance ofaquarium in detail.
- ❖ Students will gather knowledge about ornamental fishes---their taxonomy, feeding, growth, reproduction, life cycle, diseases and disease management.
- ❖ Students will come to know about the concepts of ornamental fish breeding and rearing as wellas management practices.
- ❖ Students will get an idea about trading of ornamental fishes and how this can be used for self-employment purposes.

DZOOAUT0101N : Functional English

Course objectives:

- ❖ Learn how to write an essay, précis, summary, abstract, note, notice, memo, agenda, minutes,report and paper.
- ❖ Understand different types of writing.
- ❖ Learn how to prepare a powerpoint presentation and present a topic/paper/dissertation work.
- ❖ Get an idea about group discussion and interview.
- ❖ Improving writing skills, presentation skills and communication skills.

Course learning outcomes:

Students will be able to use Functional English in their day-to-day life.

SECOND SEMESTER:

DZOOCCT0201N : Cell Biology and Biochemistry

Course objectives: This course has been designed to impart basic and advanced concepts of cell biology and biochemistry. Cell Biology covers topics such as biomembranes, cytoskeleton, cell cycle, genetic code, cancer and cell death. Biochemistry focuses on topics such as biomolecules and biomolecular interaction, enzymology, bioenergetics and biotransformation.

Course learning outcomes:

- ❖ Students will gain knowledge about biomembranes, cytoskeleton and genetic code in detail.
- ❖ Students will learn about cell cycle, cancer biology and cell death mechanisms that are requiredfor research purposes.
- ❖ Students will acquire knowledge about biomolecules and biomolecular interactions, withemphasis on protein structure, folding, function and enzymology.
- ❖ Students will come to know about bioenergetics and role of CytP450 in biotransformation.

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DZOOCCT0202N : Taxonomy and Biostatistics

Course objectives: This course is directed towards learning about fundamental concepts of taxonomy and biostatistics. The main aim of taxonomy is to identify, characterize, classify and give specific names to all the living organisms according to their characteristics and descent. Biostatistics is a statistical tool through which students will be able to perform statistical analyses and derive statistical inferences. They will also understand the general principles underlying the most common statistical tests and where to apply the tests.

Course learning outcomes:

❖ Students will learn about recent trends in taxonomy, numerical taxonomy and phylogenetic trees.

❖ Students will gather a detailed knowledge about dimension of speciation and taxonomic characters.

❖ Students will be able to perform statistical tests related to central tendency, probability distribution, regression and correlation.

❖ Students will be able to compute t-test, chi-square test and Analysis of Variance.

DZOOCCT0203N : Parasitology and Immunology

Course objectives: A broad and multi-disciplinary approach to the complex and dynamic relationships between parasites and their hosts. Studies include aspects of the host immune response to parasites; chronicity of infection and its significance; host pathology; evasion of host responses by parasites; diagnosis, vaccination; chemotherapy and drug resistance; genetic resistance to parasitic infection; relevance of parasitic infections to society.

Course learning outcomes:

❖ Students will learn the impacts of parasitic diseases on human and non-human communities.

❖ Students will gain knowledge regarding components of immunity, immune responses and applied immunology.

❖ Students can evaluate the complexity of the parasite/host relationship (parasite evasion mechanisms vs host defensive mechanisms).

DZOOCCP0204N : Cell Biology and Biochemistry

Course objectives: This course is meant to impart knowledge to the students regarding pedigree analyses, sex chromatin preparation and identification of mutant varieties of *Drosophila* sp. The course will help students to get hands-on training on colorimetric/ spectrophotometric methods (used to quantify glucose/ proteins/ DNA).

Course learning outcomes:

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❖ Students will learn how to analyse pedigrees, prepare sex chromatin and identify mutant varieties of *Drosophila* sp.

❖ Students will be able to estimate glucose, proteins, DNA (by colorimetry /spectrophotometry method) and sugars (by Somogyi-Nelson method).

DZOOCCP0205N : Taxonomy, Biostatistics and Parasitology

Course objectives: This course is directed towards identifying invertebrate and vertebrate specimens based on taxonomic key preparation. Students will be able to compute problems related to biostatistics. The course will focus on the study of gut parasites of insects, amphibian and mammals.

Course learning outcomes:

❖ Students will learn to prepare taxonomic key of invertebrate and vertebrate specimens.

❖ Students will be able to solve problems related to SD and SE, correlation, normal and binomial distribution.

❖ Students will get hands-on experience to observe, collect and identify gut parasites of insects, amphibian and mammals.

DZOOCCP0206N : Scientific Excursion

The main objective of scientific excursion is to provide first hand observation and experience to the students. A trip outside the classroom helps to bridge the relation between theoretical and practical knowledge. Students need to prepare a detailed excursion report and submit it during examination.

DZOODET0201A : Taxonomy and Anatomy of Insects

Course objectives: This course has been designed to provide a detailed knowledge regarding insect characters and classification (upto Order) with examples of major orders, which form the basis of entomology. This course allows to learn about the morphology and anatomy of insects, which will help the students in doing dissection of insects.

Course learning outcomes:

❖ Students will come to know about classification of insects (upto Order) with features and examples.

❖ Students will gather knowledge regarding external morphology of insects.

❖ Students will understand about major organs and organ systems of insects.

DZOODET0201B : Taxonomy and Physiology of Fishes

Course objectives: This course has been designed to provide a detailed knowledge regarding fish characters and classification (upto Order) with examples of major orders, which form the basis of aquaculture. This course allows to learn about different types of fishes and their physiological aspects. This course also covers the pathophysiology of fishes.

Course learning outcomes:

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❖ Students will come to know about classification of fishes (upto Order) with features and examples.

❖ Students will learn about biology of some common carps and exotic fishes.

❖ Students will get to know about respiration and endocrine function in fishes.

❖ Students will get an idea about diseases of fishes and how to cure and prevent them.

DZOODET0201C : Environmental Protection and Sustainability

Course objectives: This course aims to create awareness amongst students about basic concepts pertaining to environmental protection and sustainability. This course will try to explore about the environmental crisis and how environment can be protected keeping in view human needs. This course will be helpful to learn about strategies towards sustainability and for creating a healthy environment.

Course learning outcomes:

❖ Students will get an idea about global environment picture and different types of environmental crisis.

❖ Students will learn how to overcome the environmental crisis and protect the environment.

❖ Students will know about sustainable development—its principle, pillars, ethics and norms in detail.

❖ Students will get to know about role of law, government and society towards sustainability.

DZOODET0201D : Intracellular Protein Trafficking and Cancer Biology

Course objectives: This course is aimed at studying intracellular protein trafficking and cancer biology in depth. This course will help students to acquire advanced knowledge on cancer (a major health issue in current times) and get job at cancer hospitals and doing cancer-related projects and research.

Course learning outcomes:

❖ Students will gather knowledge about intracellular protein trafficking--- translocation of secretory protein across ER membrane, insertion of proteins into ER membrane, vesicular traffic, secretion and endocytosis.

❖ Students will learn about basic and advanced concepts of cancer--- role of oncogenes and tumor suppressor genes in cancer development, genetic rearrangements in cancerous cells, changes in the cell cycle and cell death mechanisms.

❖ Students will get an idea regarding chemical carcinogenesis, angiogenesis and therapeutic interventions of cancer.

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Email : dgc.principal@gmail.com

DZOODET0201E : Medical Protozoology

Course objectives: A broad and multi-disciplinary approach to the complex and dynamic lifecycle, ecology, physiology, biochemistry, immunology, pathology and molecular biology of the covered protozoans with medical importance. This course offers an overview of the biological and epidemiological bases of important protozoan diseases and an understanding of the impact of parasitic diseases on human and prevention and control.

Course learning outcomes:

❖ Students will learn the life-cycle, epidemiology, pathology and molecular biology of the medically important protozoans.

❖ Students will gain knowledge about the host's immunity against parasitic protozoa and immune evasion strategies of parasitic protozoa.

❖ Students will learn the chemotherapeutic targets in parasitic protozoan including classes of drugs, mechanism of action of drugs and drug resistance.

THIRD SEMESTER:

DZOOCCT0301N : Biotechnology and Biophysical Technique

Course objectives: This course aims to develop knowledge and skills among students so as to identify, analyse and solve issues related to the Biotechnology industry, Pharma industry, Research and Academia. This course also develops the skills to understand the theory and practice of biophysical techniques. It will equip the students with scientific understanding of the analytical techniques and detail interpretation of results.

Course learning outcomes:

❖ Students will come to know about tools and techniques applied in biotechnology, cloning techniques and rDNA technology.

❖ Students will get knowledge about cell culture and its applications in detail.

❖ Students will derive an idea regarding tools and applications of bioinformatics.

❖ Students will learn about principles and applications of microscopy, spectrophotometer, spectrofluorometer, cryotechnologies, electrophoresis, centrifugation and chromatography.

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DZOOCCP0302N : Biophysical and Histochemistry Techniques

Course objectives: This course has been designed to empower the students with hands-on skills about biophysical techniques and histochemistry techniques. This will help students not only in academia and research field but also to get job in pathological labs, research hospitals, Pharma companies, R&D sectors and many more.

Course learning outcomes:

❖ Students will learn about how to handle different types of microscopes.

❖ Students will get to know about chromatographic techniques and gel electrophoresis techniques.

❖ Students will develop an idea about cytochemical staining and microtechniques.

❖ Students will gather knowledge about histochemical staining and identification of different histological tissues.

DZOODET0301A : Physiology of Insects

Course objectives: This course is aimed to learn about the physiology of insects, which will help the students in doing practical, project and research related to insects.

Course learning outcomes:

❖ Students will learn about hormones of insects and hormonal control of metamorphosis.

❖ Students will know about feeding, digestion, circulation, vision and auditory systems of insects and how they function.

❖ Students will get detailed information about locomotion, behaviour, reproduction and morphogenesis related to insects.

DZOODET0301B : Environmental Entomology

Course objectives: This course has been designed to give a comprehensive knowledge regarding insect life forms, interaction of insect and environment, forest pest management, insect diversity and conservation. This will help students to get job related to entomology.

Course learning outcomes:

❖ Students will get to know about the relation between insect and their environment in detail.

❖ Students will know which insects are forest pests and how they can be controlled.

❖ Students will learn about diversity of insects and how important species can be conserved.

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DZOODET0301C : Pest and Vector Biology

Course objectives: Pest and vector biology attempts to introduce students to the insect as pest to important agricultural crops and insect vectors playing major role in transmission of diseases. This course covers concept of pest status with agricultural and medical importance, various types of insecticides, various methods of pest control, different aspects of pest management including IPM.

Course learning outcomes:

❖ Students will get to know about insects as pest, pest status, damage done by them and controlling measures.

❖ Students will learn about pest management as well as pesticides and their mode of action.

❖ Students will gather knowledge about insect vectors and their role in transmission of parasites.

❖ Students will understand the biology and medical importance of some of the common insects.

DZOODET0301D : Fish Behaviour and Reproduction

Course objectives: This course is aimed to learn about the behaviour and reproduction of fishes along with some unique characteristics of fishes based on their habitat.

Course learning outcomes:

❖ Students will learn about migratory behaviour and parental care behaviour of fishes.

❖ Students will get to know about different types of fishes based on their habitat.

❖ Students will gain knowledge about paired fins, Weberian ossicle and swim bladder of fishes.

❖ Students will acquire in-depth knowledge of reproduction and development in fishes.

DZOODET0301E : Fisheries Management

Course objectives: This course has been incorporated in the syllabus to give a comprehensive knowledge regarding fisheries, different types of fish culture practices in India, prawn culture, pearl culture and their management. This will help students to get job related to fisheries.

Course learning outcomes:

❖ Students will study about different aspects of fisheries, with emphasis on Indian fisheries.

❖ Students will get to know about monoculture, polyculture, exotic fish culture, finfish culture, prawn culture and pearl culture.

❖ Students will learn about modern techniques related to fisheries.

❖ Students will get an idea regarding marketing and management sector of fisheries.

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DZOODET0301F : Practices and Economy of Fisheries

Course objectives: This course highlights the different types of fish culture and economy related to the fisheries. Students will open up to the new avenues of modern fish culture and techniques in fisheries management, especially in India. This course will give detailed information about fish cultivation, preservation, processing, transport, marketing and accessories related to fisheries.

Course learning outcomes:

❖ Students will explore aquaculture in detail keeping in view the modern perspectives.

❖ Students will be able to understand which fish cultures are practiced in India and accordingly can plan their start-ups.

❖ Students will also come to know about fishery management and marketing practices which will help them in self-employment.

❖ Students will gather knowledge regarding maintenance of fishes, fish ponds and hatcheries and fish by-product.

DZOODET0301G : Ecosystem: The Basic Unit of Natural World

Course objectives: This course is aimed to create perception amongst students regarding basic concepts of ecosystem. This course covers in detail about structure, function, energy flow and biogeochemical cycles in ecosystem. It also explains global scenario of ecosystem and effect of anthropogenic activities on ecosystem processes.

Course learning outcomes:

❖ Students will get to know about structure, function, energy flow and biogeochemical cycles in ecosystem.

❖ Students will learn about factors associated with global biomes.

❖ Students will get to assess human impacts on ecosystem and how to protect ecosystem.

❖ Students will develop idea about dynamics of natural population and mechanism of population equilibrium.

DZOODET0301H : Environmental Resources: Issues, Management and Solution for Sustainability

Course objectives: This course is endeavoured to provide a critical look at the environmental resources and energy system. This course covers dimensions such as preserving food and water resources and preserving biodiversity. It also focuses on different types of renewable and nonrenewable energy and how to maintain a sustainable energy system in the environment.

Course learning outcomes:

❖ Students will learn about preserving and maintaining food resources, water resources and biological diversity.

❖ Students will gather knowledge about renewable and non-renewable energy and how to maintain these energy system.

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DZOODET0301I : Environmental Pollution and Prevention

Course objectives: This course aims to create awareness amongst students about the basic concepts pertaining to environmental pollution. This course will focus on environmental hazards, environmental biotechnology and environmental biomonitoring. This course will also emphasize on how to prevent environmental pollution and keep environment clean and healthy.

Course learning outcomes:

❖ Students will learn about different types of environmental pollution, effects of heavy metals, endocrine disruptors.

❖ Students will gather knowledge about bioaccumulation, biomagnification and phases of xenobiotic transformation.

❖ Students will explore about environmental bioremediation and biosensors.

❖ Students will get an idea about EIA and ERA.

DZOODET0301J : Quantitative and Human Genetics

Course objectives: This course is directed towards studying quantitative genetics and human genetics in detail. This course will help students to know about underlying causes behind genetic mutations and genetic disorders and choose profession such as Genetic Counsellor.

Course learning outcomes:

❖ Students will come to know about polygenic inheritance, heritability and QTL mapping.

❖ Students will gain idea about different types of mutations and the structural and numerical changes occurring in chromosomes during mutations.

❖ Students will gather knowledge about pedigree analysis, linkage testing, stem cell biology, Human Genome Project and Genetic Counselling.

DZOODET0301K : Genome Analysis and Mapping Strategies

Course objectives: This course is directed to impart a detailed knowledge about genome analysis and mapping. This course focuses on gene function analysis, somatic cell genetics, DNA damage, repair, recombination, transposition and genome mapping strategies. It will help students to carry out projects and research related to genetics.

Course learning outcomes:

❖ Students will learn about different types of mutagenesis and molecular mechanisms of gene silencing.

❖ Students will come to know about cell fusion, heterokaryon, DNA damage and repair mechanisms, recombination, transposition, c-value paradox.

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❖ Students will gain knowledge about strategies for different levels of genome mapping.

DZOODET0301L : Protein-nucleic acid interaction and Genetic engineering

Course objectives: This course is directed towards studying different aspects of the protein and nucleic acids and interaction between them. This course also imparts a detailed knowledge regarding modern techniques of genetic engineering. It will empower students to get employment in research institutions and diagnostic labs.

Course learning outcomes:

❖ Students will come to know about structure, stability, kinetics of proteins and nucleic acids and also about protein-nucleic acid interaction.

❖ Students will acquire knowledge about protein sequencing methods, DNA sequencing methods and genome sequencing strategies.

❖ Students will understand the techniques of genetic engineering such as molecular cloning, generation of genomic and cDNA libraries, in vitro mutagenesis, gene knock outs and much more.

❖ Students will get an idea regarding microarray-based techniques, RFLP, RAPD and AFLP techniques.

DZOODET0301M : Helminthology

Course objectives: A broad and multi-disciplinary approach to the complex and dynamic lifecycle, ecology, physiology, biochemistry, immunology, pathology and molecular biology of the parasitic helminths. This course offers an overview of the biological and epidemiological bases of important protozoan diseases and an understanding of the impact of parasitic diseases on human and prevention and control.

Course learning outcomes:

❖ Students will learn the life-cycle, epidemiology, pathology and molecular biology of the parasitic helminths.

❖ Students will gain knowledge about the host-parasite interaction and chemotherapeutic targets in parasitic helminths.

❖ Students will understand the role of nematodes in plant pathology.

DZOODET0301N : Applied Immunology

Course objectives: This course will teach the biology of the immune system and apply this knowledge to the understanding of human disease and basic immunological research. It will provide a fundamental understanding of the immune response and the application of immunological knowledge to human disease (autoimmunity, immunodeficiency, allergy, neoplasia), how the immune system can be manipulated by directed therapeutics, how changes that accompany immunologic disease can be measured in the diagnostic laboratory, how knowledge of the immune system can be extended by basic research.

Course learning outcomes:

❖ Students will learn to demonstrate detailed knowledge of how the immune system normally

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Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

responds to infection.

❖ Students will gain knowledge about immuno-regulation underlying autoimmunity, immunodeficiency, allergy and cancer.

❖ Students will learn to explain how such aberrations can be measured in the laboratory and potentially corrected by directed therapeutics.

❖ Students will learn to analyse and interpret experimental data on research in immunology.

DZOODET0301O : Parasitology

Course objectives: This course is directed towards studying different aspects of the host immune response to parasites; chronicity of infection and its significance; host pathology; evasion of host responses by parasites; diagnosis, vaccination; chemotherapy and drug resistance; genetic resistance to parasitic infection. This course also aims at biology of arthropod parasites, zoonosis and myasis.

Course learning outcomes:

❖ Students will gain knowledge about biochemistry, pathology and molecular biology of a broad spectrum of infectious organisms.

❖ Students will understand host's immunity against parasites and immune evasion strategies of parasites.

❖ Students will gain knowledge regarding biology of arthropod parasites, zoonosis and myasis.

DZOOGET0301A : Wildlife Biology

Course objectives: This course has been incorporated in the syllabus to introduce students to the concepts of wildlife, their importance and conservation. Wildlife biology adopts a broad concept of wildlife management, including all policies and actions with the purpose of conservation and sustainable use of wildlife and its habitats, in order to safeguard relationships between wildlife and human interests.

Course learning outcomes:

❖ Students will know about wildlife; importance, classification and habitats of wildlife.

❖ Students will understand about significance of wildlife conservation and different conservation aspects of wildlife (*in-situ* and *ex-situ* conservation).

❖ Students will come to know how wildlife in India is affected and what are the strategies of conservation of wildlife in India.

❖ Students will gather knowledge regarding wildlife management and special programmes running in India to save wildlife as well as their habitat.

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(0354) 2254019
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DZOOGET0301B : Ethology

Course objectives: This course has been incorporated in the syllabus to introduce students to the basic concepts of animal behaviour. Ethology is an important field as it contributes to nature and species conservation. A detailed understanding of animal behaviour and its consequences on the environment can help to improve conservation policies and strategies of endangered species. Understanding how genes and environment interact to shape any kind of behaviour is also an important underpinning of this field.

Course learning outcomes:

❖ Students will learn about innate and learnt behaviour in detail as well as ecological aspects of behaviour.

❖ Students will get acquainted with the terms such as group selection, kin selection, altruism, reciprocal altruism, inclusive fitness.

❖ Students will come to know about sexual selection, cooperation and parent-offspring conflict.

❖ Students will learn about evolution of sexual behaviour and reproductive behaviour, different kinds of mating systems, courtship and parental care.

FOURTH SEMESTER:

DZOOCCT0401N : Inheritance Biology and Evolutionary Genetics

Course objectives: This course covers different aspects of genetics, population genetics and evolution. Genetics brings knowledge regarding various genes, their inheritance patterns, their functions and genetic disorders. Population genetics discusses about the relationship between population and genetics. Evolutionary biology explains how evolutionary processes work on living organisms. All together this course teaches about the fundamental concepts of genetics, quantitative genetics, population genetics and evolutionary biology.

Course learning outcomes:

❖ Students will learn about basic concept of gene, sex determination, human karyotype, extra-chromosomal inheritance and quantitative genetics.

❖ Students will get a brief idea about gene pool, gene frequency, genotype frequency, Hardy-Weinberg law and genetic structure of population.

❖ Students will get to know how evolutionary destabilising forces affects the genetic structure of a population and will be able to measure gene frequency changes mathematically.

❖ Students will gather in-depth knowledge about gene evolution, phylogenetic evolution, molecular clock and molecular drive, micro and macroevolution, co-evolution and heterochrony.

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DZOOCCT0402N : Environmental Physiology and Neurobiology

Course objectives: The objective of this course is to introduce students to the field of environmental physiology and neurobiology. Environmental Physiology explores the basic principles of physiology of animals and how they are modified by the environment. Neurobiology covers the basics of neurons—structure, organization, function as well as the neuronal disorders.

Course learning outcomes:

- ❖ Students will accumulate knowledge about homeostasis, thermoregulation, physiological adaptations and biochemical adaptations of organisms in response to different environments.
- ❖ Students will come to know about structure and function of CNS, synaptic junction, neuromuscular junction and neuron itself.
- ❖ Students will get to know how nerve impulse is generated and propagated through neurolemma, synapse and neuromuscular junction.
- ❖ Students will learn about different aspects of some common neuronal disorders.

DZOOCCP0403N : Project/ Dissertation/ Review

As directed from department, whatever type of assignment is issued to the students, they need to study or work on that particular assignment for atleast six months and then prepare a detailed report and need to submit that report during examination.

DZOOCCP0404N : Seminar Presentation (based on Project/Dissertation/Review)

This is to evaluate the knowledge, presentation technique, communication skill, presence of mind and overall smartness of a student. Students will give presentation based on their topic of Project/Dissertation/Review. 10 minutes will be allotted for presentation and 10 minutes for interaction with audience.

DZOOCCP0405N : Comprehensive Viva

Viva-voce on overall syllabus to evaluate a student's intelligence, learning capacity, thinking ability, answering attitude and the skill to overcome unfamiliar situations.

DZOODEP0401A : Entomology Practical

Course objectives: This course has been designed to get a hands-on training experience regarding identification and morphology of insects. Students will be able to identify and collect insects from the fields and study diversity indices along with preparation of taxonomic keys and insect box.

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Course learning outcomes:

❖ Students will learn the technique of mounting of body parts of insects and study about life cycle of any pest or vector insect.

❖ Students will learn how to identify common Orders of insects and preparation of taxonomic keys (upto Order level).

❖ Students will know about insect control measures and associated instruments.

❖ Students will study about insect diversity indices and learn to prepare insect box during field trips.

DZOODEP0401B : Fisheries Practical

Course objectives: This course has been designed to get a hands-on training experience regarding morphology and anatomy of fishes. Students will be able to identify fishes from freshwater and marine habitats and learn how to prepare taxonomic keys.

Course learning outcomes:

❖ Students will be able to dissect any teleost fish; mount girdles, ossicles, scales, fins; and count fin rays.

❖ Students will be able to do identification of freshwater fishes, marine fishes and museum specimens.

❖ Students will learn how to identify common Orders of fishes and preparation of taxonomic keys (upto Order level).

DZOODEP0401C : Environmental Biology Practical

Course objectives: This course has been outlined to acquaint students with the fundamentals of environmental biology practical. This course will provide students a comprehensive knowledge regarding their environment and its associated biotic factors.

Course learning outcomes:

❖ Students will learn to analyse free CO_2, dissolved O_2, hardness, alkalinity, salinity in water sample and organic carbon in soil sample.

❖ Students will isolate bacteria from soil or water sample, gram stain them and identify the bacteria.

❖ Students will able to determine primary productivity of a water sample (using light and dark bottle method).

❖ Students will learn about diversity indices of different communities and evaluation of LC50 and probit analysis.

❖ Students will get an idea about SDS-PAGE and evaluate the effects of toxicants on tissues with the help of this technique.

DZOODEP0401D : Cytogenetics Practical

Course objectives: This course has been designed to provide a hands-on learning experience about the fundamentals of cytogenetics. The course will focus on study of chromosome karyotyping,

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DNA isolation, blotting techniques, SDS-PAGE, mitotic, meiotic and polytene chromosome preparation.

Course learning outcomes:

❖ Students will learn how to do karyotyping of chromosome and isolation of DNA.

❖ Students will be able to decipher blotting techniques and SDS-PAGE technique.

❖ Students will be able to understand how to prepare mitotic, meiotic and polytene chromosomes.

DZOODEP0401E : Parasitology Practical

Course objectives: This course is directed towards studying the different life-cycle stages of specified parasites from post-mortem examination of invertebrates and vertebrates with staining of parasites, histological studies and taxonomic identification of parasites. This course also aims at common diagnostic techniques of parasitic infection.

Course learning outcomes:

❖ Students will learn to demonstrate the common parasitic diseases and life-cycle stages of helminths and protozoa.

❖ Students will learn the staining methodologies of parasites and histological samples.

❖ Students will learn to report on observations of biological specimens such as parasites through different diagnostic techniques.

DZOOGET0401A : Conservation Biology

Course objectives: This course got a place in the syllabus so that students get to know the importance of conservation biology. Conservation Biology is a multidisciplinary science to address the loss of biological diversity. It has two major objectives—first is to evaluate human impacts on biological diversity and second is to develop policies and practices to prevent extinction of species and ecosystems.

Course learning outcomes:

❖ Students will learn the basics of conservation biology and the legal foundations and Conservation Acts in India.

❖ Students will come to know about the conservation status of Indian wildlife and Red Data Book.

❖ Students will gather knowledge about conservation ethics and sustainable use of bioresources.

❖ Students will get an idea regarding principles, practices and applications of remote sensing techniques and GIS.

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DZOOGET0401B : Elementary Human Physiology

Course objectives: The idea behind incorporation of this course in the syllabus is to make aware students regarding the basic anatomy and physiology of the human body. This course covers almost all the important organ systems of a human body and gives a detailed study about their structure and functioning. The students will get in-touch with the knowledge of their own body.

Course learning outcomes:

❖ Students will come to know about blood and circulatory system of human.

❖ Students will get a thorough knowledge of human cardiovascular (heart) and respiratory (lung) system.

❖ Students will get an idea regarding the structure and function of human nervous and muscle system.

❖ Students will gather in-depth knowledge of anatomy and role of digestive and excretory system of human.

❖ Students will learn about different aspects of human reproductive biology.

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DEPARTMENT OF CHEMISTRY
DARJEELING GOVERNMENT COLLEGE
UG HONOURS

UG PO-CO MAPPING (2018-2023)

UG-CBCS CURRICULUM (UNDER THE UNIVERSITY OF NORTHBENGAL)

Programme Outcome (PO):

PO 1 Critical Thinking: Understanding and critical interpretation of theory, facts and figures available in chemical literature.

PO 2 Effective Communication: Use of knowledge of subject , scientific reasoning in problem solving and to understand chemistry in broad area.

PO 3 Social Interaction: Ability to communicate scientific result in academia, industry and government.

PO 4 Ethics : Use of chemistry for safe handling and key issues of our environments in the field of enery, health and medicine.

PO 5 Laboratory Skills and Instrumentation: For designing of chemical experiments and instruments. Theoretical understanding of instrument and their analytical application in diverse field.

PO 6 Environmental & Sustainability: Role of chemistry in environmental protection and food water safety for global healthcare **.**

PO 7 Self oriented and lifelong learning: Acquisition of flexible knowledge and problem solving ability for writing and communication.

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(0354) 2254019
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Year	Paper	Course	Outcome
SEM-1 Honours	Inorganic Chemistry CC1 T	CO1	Atomic Structure Periodicity of Elements s, p, d, f block elements Effective nuclear charge, (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent radii (octahedral and tetrahedral) (e) Ionization enthalpy, (f) Electron gain enthalpy Chemical Bonding ionic bond, covalent bond, metallic bond, weak chemical force Oxidation-Reduction Redox equations, Standard Electrode Potential and its application to inorganic reactions. Principles involved in volumetric analysis to be carried out in class.
	Inorganic Chemistry Practical CC1 P	CO2	(A) Titrimetric Analysis (i) Calibration and use of apparatus (ii) Preparation of solutions of different Molarity/Normality of titrants (B) Acid-Base Titrations (i) Estimation of carbonate and hydroxide present together in mixture. (ii) Estimation of carbonate and bicarbonate present together in a mixture. (iii) Estimation of free alkali present in different soaps/detergents (C) Oxidation-Reduction Titrimetry (i) Estimation of Fe(II) and oxalic acid using standardized KMnO4 solution. (ii) Estimation of oxalic acid and sodium oxalate in a given mixture.
	Physical Chemistry CC2 T	CO3	Gaseous State Liquid state Solid State Ionic equilibria

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	Physical Chemistry Practical CC2 P	CO4	Surface tension measurements. (a) Determine the surface tension by drop number method. (b) Study the variation of surface tension of detergent solutions with concentration. 2. Viscosity measurement using Ostwald's viscometer. (a) Determination of viscosity of aqueous solutions of polymer / ethanol / sugar at room temperature. (b) Study the variation of viscosity of sucrose
			solution with the concentration of solute. 3. Indexing of a given powder diffraction pattern of a cubic crystalline system. 4. pH metry (a) Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures. (b) Preparation of buffer solutions of different pH (i) Sodium acetate-acetic acid (ii) Ammonium chloride-ammonium hydroxide (c) pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base. (d) Determination of dissociation constant ofa weak acid
	Organic Chemistry CC3 T	CO5	Basics of Organic Chemistry Stereochemistry Chemistry of Aliphatic Hydrocarbons Carbon-Carbon sigma bonds Carbon-Carbon pi bonds Reactions of alkenes Reactions of alkynes Cycloalkanes and Conformational Analysis Aromatic Hydrocarbons Aromaticity

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SEM 2 Honours	Organic Chemistry Practical CC3 P	CO6	Checking the calibration of the thermometer 2. Purification of organic compounds by crystallization using the following solvents: (a) Water; (b) Alcohol; (c) Alcohol-Water 3. Determination of the melting points of above compounds and unknown organic compounds 4. Effect of impurities on the melting point- mixed melting point of two unknown organiccompound. 5. Determination of boiling point of liquid compounds. (boiling point lower than and more than 100oC by distillation and capillarymethod) 6. Chromatography (a) Separation of a mixture of two aminoacids by ascending and horizontal paper chromatography
	Physical ChemistryCC4 T	CO7	Chemical Thermodynamics Systems of Variable Composition Chemical Equilibrium Solutions and Colligative Properties
	Physical Chemistry Practical CC4 P	CO8	Determination of Surface Tension of solutions

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			2. Determination of Coefficient of Viscosity of solutions 3. Determination of pH of a solution by Colour Matching. 4. Determination of heat capacity of the calorimeter 5. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 6. Calculation of the enthalpy of ionization of ethanoic acid.
SEM 3 Honours	Inorganic Chemistry CC5 T	CO9	General Principles of Metallurgy Acids and Bases Chemistry of s and p Block Elements Noble Gases Inorganic Polymers
	Inorganic Chemistry Practical CC5 P	CO10	A) Iodo / Iodimetry Titrations (i) Estimation of Cu(II) and K2Cr2O7 using sodium thiosulphate solution (Iodimetrically). (ii) Estimation of (i) arsenite and (ii) antimony in tartar-emetic iodimetrically
	Organic Chemistry CC6 T	CO11	Chemistry of Halogenated Hydrocarbons Alcohols, Phenols, Ethers and Epoxides Carbonyl Compounds Carboxylic Acids and their Derivatives Sulphur containing compounds
	Organic Chemistry Practical CC6 P	CO12	Functional group tests for alcohols, phenols, carbonyl and carboxylic acid group. 2. Organic preparations: (Any Five) (i) Acetylation of one of the following compounds: amines (aniline, o-, m-, p-toluidine and o-, m-, p-anisidine) and phenols (β-naphthol, vanillin, salicylic acid) by any one method:
	Physical ChemistryCC7 T	CO13	Phase Equilibria Chemical Kinetics Catalysis Surface chemistry

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SEM 3 Honours	Physical Chemistry Practical CC7 P	CO14	Determination of critical solution temperature and composition of the phenol-water system .Distribution of acetic / benzoic acid between water and cyclohexane. Study the kinetics of the following reactions. Verify the Freundlich and Langmuir isotherms for adsorption of acetic acid on activated charcoal
	Skill Enhancement Course SEC1 T	CO15	Drugs & Pharmaceuticals antipyretic agents, anti-inflammatory agents (Aspirin, paracetamol, ibuprofen); Antimalarials: Chloroquine (with synthesis). antibiotics (detailed study of Chloramphenicol); antibacterial and antifungal agents
			(Sulphonamides; Sulphanethoxazol, Sulphacetamide, Trimethoprim); antiviral agents (Acyclovir), Central Nervous System agents (Phenobarbital, Fermentation
	Skill Enhancement Course SEC1 P	CO16	Preparation of Aspirin and its analysis. 2. Preparation of magnesium disilicates (Antacid). 3. Preparation of methyl salicylate (oil of wintergreen). 4. Any other Practical as desired.
	Inorganic Chemistry CC8 T	CO17	Coordination Chemistry Transition Elements Lanthanoids and Actinoids Bioinorganic Chemistry

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	Physical ChemistryCC10 T	CO21	Conductance Electrochemistry Electrical and magnetic properties of atoms and molecules
	Physical Chemistry Practical CC10 P	CO22	Determination of cell constant Determination of equivalent conductance, degree of dissociation and dissociation constant of a weak acid conductometric titration potentiometric titrations
SEM4 Honours	Inorganic Chemistry Practical CC8 P	CO18	Gravimetric Analysis: (Any One) (i) Estimation of nickel (II) using Dimethylglyoxime (DMG) (ii) Estimation of copper as CuSCN Inorganic Preparations: (Any Three) Chromatography of metal ions: (Any One) Principles involved in chromatographic separations. Paper chromatographic separation of following metal ions: (i) Ni (II) and Co (II) (ii) Fe (III) and Al (III)
	Organic Chemistry CC9 T	CO19	Nitrogen Containing Functional Groups Polynuclear Hydrocarbons Heterocyclic Compounds Alkaloids Terpenes
	Organic Chemistry Practical CC9 P	CO20	Detection of extra elements. (2) Functional group test for nitro, amine and amide groups. (3) Qualitative analysis of unknown organic compounds containing simple functional groups (alcohols, carboxylic acids, phenols and carbonyl compounds)

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	Skill Enhancement Course SEC2 T	CO23	Theory and Hand-on Experiments Definitions of Green Chemistry. Brief introduction of twelve principles of Green Chemistry, . Green Chemistry and catalysis
	Skill Enhancement Course SEC2 P	CO24	Preparation and characterization of biodiesel from vegetable oil. (2) Bromination of Anilide Using Green Approach. (3) Preparation of Benzilic acid by using Green Approach. (4) Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper(II).

SEM 5 Honours	Organic Chemistry CC11 T	CO25	Pericyclic Reactions Nucleic Acids Amino Acids, Peptides and Proteins Enzymes Lipids Concept of Energy in Biosystems
	Organic Chemistry Practical CC11 P	CO26	Estimation of glycine by Sorenson's formalin method. 2. Study of the titration curve of glycine. 3. Estimation of proteins by Lowry's method. 4. Study of the action of salivary amylase on starch at optimum conditions. 5. Effect of temperature on the action of salivary amylase. 6. Saponification value of an oil or a fat. 7. Determination of Iodine number of an oil/fat.
	Physical ChemistryCC12 T	CO27	Quantum Chemistry Molecular Spectroscopy Photochemistry Colloids Statistical Thermodynamics

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	Physical Chemistry Practical CC12 P	CO28	Verify Lambert – Beer's Law and determine the concentration of KMnO4 / K2Cr2O7 in asolution of unknown concentration. 2. Study the 200-500 nm absorbance spectra of KMnO4 and K2Cr2O7. (in 0.1 M H2SO4) and determine the λmax values. Calculate the energies of the two transitions in different units (J molecule-1, kJmol-1, cm-1, eV). 3. Analysis of the given Vibration – Rotation Spectrum of HCl [g]. 4. Study the pH-dependence of the UV-Vis spectrum (200-500 nm) of K2Cr2O7
	Discipline Specific Elective 1 T	CO29	Qualitative and quantitative aspects of analysis Optical methods of analysis Thermal methods of analysis Electroanalytical methods
SEM 5 Honours			Separation techniques Solvent extraction Chromatography
	Discipline Specific Elective 1 P	CO30	Chromatography: (a) Separation of mixtures (i) Paper chromatographic separation ofFe3+, Al3+, and Cr3+.
	Discipline Specific Elective 2 T	CO31	Glass Ceramics Cement Fertilizer Surface coating Battery Alloy Catalysis
	Discipline Specific Elective 2 P	CO32	Determination of free acidity in ammonium sulphate fertilizer. 2. Estimation of Calcium in Calcium ammonium nitrate fertilizer. 3. Estimation of phosphoric acid in superphosphate fertlizer. 4. Electroless metallic coatings on ceramicand plastic material. 5. Determination of composition of dolomite(by complexometric titration). 6. Analysis of (Cu, Ni); (Cu, Zn) in alloy or synthetic samples. 7. Analysis of Cement. 8. Preparation of pigment (zinc oxide).

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	Inorganic Chemistry CC13 T	CO33	Theoretical Principles in Qualitative Analysis (H2S Scheme) Organometallic Compounds Reaction Kinetics and Mechanism Catalysis by Organometallic Compounds
	Inorganic Chemistry Practical CC13 P	CO34	Qualitative semimicro analysis of mixtures containing four radicals Measurement of 10 Dq by spectrophotometric method
	Organic Chemistry CC14 T	CO35	Organic Spectroscopy Carbohydrates Dyes Classification, Colour and constitution; Mordant and Vat Dyes; Chemistry of dyeing;Synthesis and applications of: Azo dyes
	Organic Chemistry Practical CC14 P	CO36	Extraction of caffeine from tea leaves 2. Preparation of sodium polyacrylate 3. Preparation of urea formaldehyde 4. Analysis of Carbohydrate: aldoses and ketoses, reducing and non-reducing sugars

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SEM 6 Honours			5. Qualitative analysis of unknown organiccompounds containing monofunctional groups 6. Identification of simple organic compounds by IR spectroscopy and NMRspectroscopy (Spectra to be provided) 7. Preparation of methyl orange
	Discipline Specific Elective 3 T	CO37	Introduction and history of polymericmaterials: Functionality and its importance Kinetics of Polymerization Determination of molecular weight ofpolymers Properties of Polymers Brief introduction to preparation, structure, properties and application of the followingpolymers
	Discipline Specific Elective 3 P	CO38	Interfacial polymerization, preparation of polyester from isophthaloyl chloride (IPC)and phenolphthalein (a) Preparation of IPC (b) Purification of IPC (c) Interfacial polymerization 2. Redox polymerization of acrylamide 3. Precipitation polymerization ofacrylonitrile 4. Preparation of urea-formaldehyde resin 5. Preparations of novalac resin/ resold resin. 6. Microscale Emulsion Polymerization of Poly(methylacrylate)
	Discipline Specific Elective 4 T	CO39	Industrial Gases and Inorganic Chemicals Environment and its segments Energy & Environment
	Discipline Specific Elective 4 P	CO40	Measurement of chloride, sulphate and salinity of water samples by simple titrationmethod (AgNO3 and potassium chromate). Study of some of the common bio-indicatorsof pollution. Estimation of SPM in air samples.Preparation of borax/ boric acid

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PO-CO MAPPING

PO 1 Critical Thinking	PO 2 Effective Communication	PO 3 Social Interaction	PO 4 Ethics	PO 5 Laboratory Skills and Instrumentation	PO 6 Environmental & Sustainability	PO 7 Self oriented and lifelong learning
CO1	CO5	CO3	CO4	CO2	CO15	CO4
CO3	CO9	CO11	CO12	CO4	CO16	CO7
CO5	CO11	CO15	CO13	CO6	CO23	CO12
CO7	CO15	CO26	CO22	CO8	CO24	CO15
CO9	CO20	CO32	CO26	CO10	CO29	CO18
CO11		CO35	CO35	CO12	CO30	CO20
CO13				CO14	CO31	CO24
CO15				CO16	CO32	CO26
CO17				CO18	CO37	CO31
CO19				CO20	CO38	
CO21				CO22	CO39	
CO23				CO24	CO40	
CO25				CO26		
CO27				CO28		
CO29				CO30		
CO31				CO32		
CO33				CO34		
CO35				CO36		
CO37				CO38		
CO39				CO40		

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PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Upon completion of BSc Hons/Programme students should be able to know the facts , concepts, principles, theory related to chemistry

PSO2: Communication skill in subject should enrich

PSO 3: Mathematical and numerical calculation, error analysis ability will build up.

PSO 4: Computational knowledge using computer software will grow up.

PSO 5: They will learn the techniques of safe handling of chemicals, conduct laboratory experiments which are documented in chemical literature and research article format

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DARJEELING GOVERNMENT COLLEGE
UG GENERAL

UG PO-CO MAPPING (2018-2023)

UG-CBCS CURRICULUM (UNDER THE UNIVERSITY OF NORTHBENGAL)

Programme Outcome (PO):

PO 1 Critical Thinking: Understanding and critical interpretation of theory, facts and figures available in chemical literature.

PO 2 Effective Communication: Use of knowledge of subject , scientific reasoning in problem solving and to understand chemistry in broad area.

PO 3 Social Interaction: Ability to communicate scientific result in academia, industry and government.

PO 4 Ethics : Use of chemistry for safe handling and key issues of our environments in the field of enery, health and medicine.

PO 5 Laboratory Skills and Instrumentation: For designing of chemical experiments and instruments. Theoretical understanding of instrument and their analytical application in diverse field.

PO 6 Environmental & Sustainability: Role of chemistry in environmental protection and food water safety for global healthcare **.**

PO 7 Self oriented and lifelong learning: Acquisition of flexible knowledge and problem solving ability for writing and communication

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Darjeeling Government College
Darjeeling - 734 101, West Bengal, INDIA.

Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

Year	Paper	Course	Outcome
Sem 1 GE1 DSC1	Inorganic Chemisty T Organic Chemist T	CO 1	Atomic Structure Chemical Bonding and Molecular Structure: Fundamentals of Organic Chemistry Stereochemistry Aliphatic Hydrocarbons Alkanes: (Upto 5 Carbons).
		CO 2	1. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. 2. Estimation of oxalic acid by titrating it with KMnO4.
	Inorganic Chemistry P Organic Chemistry P		1. Detection of extra elements (N, S, Cl, Br, I) in organic compounds Thermodynamics Chemical Equilibrium Ionic Equilibrium Alkyl and Aryl Halides Alcohols and Phenols and Ethers Aldehydes and ketones
Sem 2 GE2 DSC1		CO 3	Heat capacity determination pH determination of solution pH of Buffer
	Physical Chemistry T Organic Chemistry T	CO 4	Enthalpy of neutralization Purification, preparation Bromination of Phenol/Aniline (b) Benzoylation of amines/phenols
	Physical Chemistry P Organic Chemistr	CO 5	Solution Phase equilibria Conductance electrochemistry Carboxylic acid & derivative Amine & diazonium salts Amino acid,peptide,protein Drug Pharmaceutical Fermentation

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Sem 3 DSC3	**y P Physical Chemistry T Organic Chemistry T SEC 1 T** **Physical Chemistry P Organic Chemistry P SEC 1 P**	**CO 6**	**Conductometric titration Potentiometric titration Functional group detection of organic compounds**

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Sem 4 DSC4	Physical Chemistry T Inorganic Chemistry T SEC 2 T Physical Chemistry P Inorganic Chemistry P SEC 2 P	CO7 CO8	Gaseous state Liquid state Solid state Chemical Kinretics Cordination chemistry Crystal field theory Lanthanoids Actinoids Green Chemistry Determination of surface tension, viscosity Determination of rate of saponification Semi micro analysis Green chemistry project work
Sem 5 DSC5	Industrial ChemistryT Industrial ChemistryP	CO9	Inorganic materials of industrial importance Analysis Estimation and Preparation
Sem 6 DSC6	Industrial ChemistryT Industrial ChemistryP	CO10	Industrial chemicals and environment Project / Industry visit

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: Upon completion of BSc Hons/Programme students should be able to know the facts , concepts, principles, theory related to chemistry

PSO2: Communication skill in subject should enrich

PSO 3: Mathematical and numerical calculation, error analysis ability will build up.

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PSO 4: Computational knowledge using computer software will grow up.

PSO 5: They will learn the techniques of safe handling of chemicals, conduct laboratory experiments which are documented in chemical literature and research article format

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Program outcome

BSc. Microbiology is a three-year undergraduate programme that focuses on the study of microorganisms, which includes organisms such as bacteria, viruses, fungi and algae. Microorganisms exist virtually everywhere life is possible. The whole biosphere depends on the activities of microorganisms and they influence human society in countless ways. As microorganisms play such diverse roles, modern microbiology has a great impact on different fields such as medical, agricultural and food sciences, ecology, genetics, biotechnology, biochemistry and molecular biology.

Statements of Program outcome

- **Critical thinking:** It will elicit the critical thinking and take informed actions after identifying the assumptions by checking out the degree to which these assumptions areaccurate and valid, and looking at our ideas and decisions (intellectual, organizational,and personal) from different perspectives.
- **Creative thinking:** It will make the students to think creatively (divergently and convergent) and make them able to propose novel ideas in explaining facts and figures.
- **Problem solving nature:** By performing various experiments in the laboratory the students will inculcate the habit the habit of solving a problem, and look for the alternative ways when one doesn't work rather than giving up.
- **Effective Communication skills:** A good communicative skill is developed. One can speak, read, write and listen well which we will help in expressing ideas and views clearly and effectively. Communicate and collaborate with other disciplines by effectively communicating.
- **Understanding the interdisciplinary approach:** It will help them to realize how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.
- **Inculcate scientific thinking:** Identify credible scientific sources to interpret and evaluate the evidences in microbiology. The skills of observations and drawing logicalinferences from the scientific experiments. To undersyand the basic concepts, fundamental principles, and the scientific theories related to various scientific

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phenomena and their relevancies in the day-to-day life.Developed scientific outlook not only with respect to science subjects but also in all aspects related to life.

- **Handling of scientific instruments:** Acquired the skills in handling scientific instruments, planning and performing in laboratory experiments. Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.
- **Social Interaction:** Interaction with the class mates for three years both in classroom, laboratory and outside class room it will elicit views of others, mediate disagreements and help reach conclusions in group settings.
- **Participation in various activities:** Developed talent by participating in various social and cultural activities voluntarily, in order to spread knowledge, creating awareness about the social evils, blind faith, etc.
- **Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- **Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them. Understand the relationship between science and society by recognizing and discussing logical, scientific and ethical issues. Imbibed ethical, moral and social values in personal and social life leading to highly cultured and civilized personality.
- **Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- **Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning through different means. Realized that pursuit of knowledge is a lifelong activity and in combination with untiring efforts and positive attitude and other necessary qualities leads towards a successful life.

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Program specific outcome

The aim of the undergraduate degree in Microbiology is to make students knowledgeable about the various basic concepts in a wide-ranging context which involve the use of knowledge and skills of Microbiology. On successful completion of graduation, the students will gain insight of microbiology starting from history, basic laboratory techniques and fundamental knowledge about the microorganisms.

- The students will understand the basic concepts, significance and essence of Microbiology discipline. They will understand fundamental principles involved in Microbiology. They will gain knowledge on the contributions of various scientist in microbiology and scope of various branches, understand various kinds of prokaryotic & eukaryotic microbes and their interactions, details of Bacteriology, which includes the structure, cellular organization, growth, reproduction and various culture methods.
- The students will acquire detail knowledge on the importance of organic compounds found in living cells and also their biochemistry. They will learn the various processesof metabolism of carbohydrates amino acids and vitamins.
- Enhance their idea on industrial microbiological processes, application of microbes in food industry, learn details about quality control of various products and control contamination in industries.

- They will acquire the skill in the use and care of basic microbiological equipment; performance of basic laboratory procedures in microbiology; proper collection and forwarding of microbiological and parasitological specimens to the laboratory.
- The skill enhancement elective course will help students to gain hands on experience on handling equipments that could enrich them to perform high throughput research on microorganisms and execute diagnostic procedures required in food, dairy and pharmaceutical industries.
- They will be able to analyse the relationships among microbes and plants, animals, humans.
- They will learn of the role of microorganisms in plant, animal and human health and disease. Students will gain knowledge of various biotechnological applications of

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microorganisms and will learn of industrially important substances produced by microorganisms.

- It will help the students to design and perform experiments, analyse data, relate to scientific theories and conceive potential technological applications.
- Students will acquire and demonstrate proficiency in good laboratory practices in a microbiological laboratory and be able to explain the theoretical basis and practical skills of the tools/technologies commonly used to study this field.
- They will understand and evaluate the impact of new research discoveries in the life sciences, and will be able to pursue a wide range of careers, including biological and medical research in higher education institutions as well as careers in public and global health, scientific writing, environmental organizations, and food, pharmaceuticals and biotechnology industries.
- Besides this integration of science with society through community development programmes help students not only to become independent researchers, regain innovative ideas, plan and execute them but also become a good human being ready to help the society and help in the overall development of the nation.
- They are trained to take up self-employment and thus help in job creation. Besides this, they can work in collaboration with industries, take up higher studies, provide consultancies, become academicians and take up higher research.

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COURSE OUTCOME

SEMESTER I

Paper-1: **INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY**

The students will understand the developments in Microbiology and list the contributions of various scientists. They will understand the diversity of microbial world and learn the general characteristics of acellular microorganisms, algae, fungi and bacteria

Paper -2: **BACTERIOLOGY**

The students will gain knowledge on the cellular organization of bacterial cell wall. They will learn the different bacteriological techniques like pure culture isolation, streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures. They will utilize the principles and applications of different types of microscopes, apply various staining procedures for visualising microorganisms under the microscope. They will analyse the nutritional requirement of microorganisms and their cultivation techniques under laboratory conditions. They will also learn the implication of various sterilisation procedures and bio safety measures in clinical labs and industries.

SEMESTER II

Paper -3: **BIOCHEMISTRY**

It will help students to understand the classification of organic compounds like carbohydrates, lipids and proteins, to understand the chemistry of different kinds of carbohydrates. The students will learn the importance of vitamins to human body and their deficiency syndrome and the mechanism of enzyme.

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Paper -4: **VIROLOGY**

The students will gain knowledge about viruses and the chemical nature of viruses, different types of viruses infecting animals, plants and bacteria - Bacteriophages . They will learn about the mode of replication of different types viruses, about the emerging viral diseases. The students will understand the role of viruses in the causation of the cancer. Gain wider knowledge on clinical aspects and related implications of viral diseases, viral vaccines and antiviral drugs.

SEMESTER III

Paper -5: **MICROBIAL PHYSIOLOGY AND METABOLISM**

The students will comprehend the various physiological processes exhibited by different microorganisms. They will understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism and learn about the mechanism of aerobic and anaerobic respiration.

Paper -6: **CELL BIOLOGY**

The students will learn about the structure and function of various cell organelles of the eukaryotic cells. They will also get the thorough knowledge about cell cycle, cell signalling pathways. They will be able to get the practical knowledge of cell division, polyploidy by studying different stages of Mitosis and meiosis.

Paper -7: **MOLECULAR BIOLOGY**

The students will understand the properties, structure and function of genes in living organisms at the molecular level. They will learn about the structures of DNA and RNA, central dogma of life. They will have a conceptual knowledge about DNA as a genetic material, enzymology, and replication strategies. They will understand the

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molecular mechanisms involved in transcription and translation and post transcriptional processing. They will also learn a regulation of gene Expression in Prokaryotes and Eukaryotes

Paper -8**: MICROBIAL GENETICS**

The students will understand the genome organization of *E. coli and Saccharomyces. To understand* Mutations and its types. They will understand plasmid and its types. They will gain knowledge on mechanisms of genetic Exchange like transformation, transduction and conjugation. They will acquire knowledge on Phage Genetics transposable elements

Paper -9: ENVIRONMENTAL MICROBIOLOGY

The students will learn about different microorganisms and their habits. They will understand microbial interaction, biogeochemical cycling and its types. They will also have knowledge on waste management, microbial remediation and water potability.

Paper -10: FOOD AND DAIRY MICROBIOLOGY

The students will be able to know the principles and methods of food preservation, production of different fermented foods, different food borne diseases: their causative agents, foods involved, symptoms and preventive measures. They will have the know food sanitation and control. The students will know about the cultural and rapid detection methods of food borne pathogens in food.

Paper -11: INDUSTRIAL MICROBIOLOGY

To isolate the industrially important microbial strains and fermented media. They also have the knowledge about the fermentation processes, bio-reactors and measurement of fermentation parameters. They also well-known about microbial production of industrial products, downstream processing & enzyme immobilization. The students will visit industries to have practical knowledge on fermenters.

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Paper -12: IMMUNOLOGY

Students will gain knowledge on antigens, antibodies, complement System, major histocompatibility Complex, different immune cells and organs. They will also able to know about the generation of immune response, immunological disorders, autoimmunity and tumor immunity. The students will also learn about different immunological techniques through performing experiments.

Paper -13: MEDICAL MICROBIOLOGY

Students will acquire a thorough knowledge about the diseases caused by various bacteria, virus, protozoa and fungi. They also enrich about the antimicrobial agents, their characteristics, mode of action etc. They will acquire a clear understanding about host pathogen interaction, normal microflora in human body, different sample collection & diagnosis. They will also enrich by hands on training about these techniques through these practical classes.

Paper -14: RECOMBINANT DNA TECHNOLOGY

Through completion the course the students will capable the acquire the knowledge about the genetic engineering, different methods in molecular cloning, DNA amplification, DNA sequencing, Construction and Screening of Genomic and cDNA libraries and its applications

DSE Paper -1: INSTRUMENTATION AND BIOTECHNIQUES

The students will learn about different instruments and techniques to function them. The students will learn about the working principle and types of Microscopes, Chromatography, electrophoresis, Spectrophotometry and Centrifugation.

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DSE Paper -4: MICROBIAL BIOTECHNOLOGY

The students will learn about microbial biotechnology and its applications. The students will learn about Therapeutic and Industrial Biotechnology, applications of Microbes in Biotransformation, Microbial Products and their Recovery, Microbes for Bio-energy and Environment, RNAi and Intellectual Property Rights.

DSE Paper -5: BIOSAFETY AND INTELLECTUAL PROPERTY RIGHTS

The students will learn about biosafety, biosafety guidelines, AERB/RSD/RES guidelines, Intellectual Property, Patent and Patenting Authorities, Agreements and Treaties

DSE Paper -7: MICROBES IN SUSTAINABLE AGRICULTURE AND DEVELOPMENT

The students gain knowledge on soil Microbiology, Mineralization of Organic & Inorganic Matter in Soil, Microbial Activity in Soil and Green House Gases, Microbial Control of Soil Borne Plant Pathogens, Biofertilization, Phytostimulation, Bioinsecticides, Secondary Agriculture Biotechnology and GM crops.

SEC Paper -1: MICROBIAL QUALITY CONTROL IN FOOD AND PHARMACEUTICAL INDUSTRIES

The students will learn about Microbiological Laboratory and Safe Practices, methods for determination of microbes in food, Pathogenic Microorganisms of Importance in Food & Water and HACCP for Food Safety and Microbial Standards

SEC Paper-3: MICROBIAL DIAGNOSIS IN HEALTH CLINICS

The students will learn about importance of diagnosis of diseases, collection of clinical samples. The students will also have knowledge on direct microscopic examination and culture, serological and molecular methods, kits for rapid detection of pathogens and will learn method for Testing for Antibiotic Sensitivity in Bacteria.

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DEPARTMENT OF HINDI

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PROGRAMME OUTCOMES (PO)

PO1.Critical Thinking: Acquiring sound knowledge of authors and its text in their context and the basics of literary criticism including literary genres and conventions. Applying the skill of textual linguistic and rhetorical analysis to literary as well other varieties of text and also disseminating the same skills.

PO2.Effective Communication: Applying vocabulary and comprehension skills to written as well as spoken tracts and becoming adept at communicating ideas and arguments with clarity.

PO3.Social Interaction: Elicit views of others, mediate disagreement and help reach conclusion in group setting.

PO4.Effective Citizenship: Demonstrate empathic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

PO5.Ethics: Cultivate ethical values in the study and interpretation of Hindi literature, respective diverse perspectives, promoting inclusivity and demonstrating sensitivity to cultural differences.

PO6.Environment and Sustainability: Impact of environmental changes on man and how it is reflected and sometimes even predicted through literary works.

PO7.Self- Directed and life-long learning: Acquire the ability to engage in independent and life-long learning in broadest context socio-technological changes.

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Course outcomes

Sem	Paper Code & Name	Course Outcomes
1	DSC-1(Hindi Sahitya ka Itihas)	• Understanding the concept of history ofHindi Literature. • Understanding the basis of the classification of Hindi Literature. • Understanding the importance and basisof the names given to each period of Literature. • Understanding the features of Aadikal, Bhaktikal, Ritikal and Adhunikkal in contextof socio-cultural and political condition of that period.
	LCC-1,P-1(Hindi Bhasha aur Sahitya)	• Understanding the concept of HindiLanguage & Linguistics. • Develop proficiency in spoken and writtenHindi language, including grammar, vocabulary and pronunciation.
	GE-1, P-1(Sarjnatmak Lekhan Kevividh kshetra)	• To provide knowledge about various areasof creative writing. • Students will be exposed to different writing styles and genres, encouraging experimentation and exploration of their own writing style. They will gain an understanding of the unique characteristics and requirements of each genre. • Through writing exercises and assignments, students will learn to overcome creative blocks and find innovative solutions to writing challenges.
	DSC-2(Madhyakaleen Hindi Kavita)	• Understanding the concept of text basedMadhyakaleen Hindi Literature. • Studying the prescribed sakhis of Kabirdas.Describing the social factors and secular thoughts of the poet. Also a detailed studythe sadhukkadi language used by the poet. • Studying the prescribed padas of Krishna Bhakt Kavi Surdas. Depicting the conceptsof virah, vatsalya and bhakti in Surdas Kavya. • Studying the aspects of life, social norms,

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2		bhakti and love in the dohas authored by Ritikaleen Kavi Bihari.
	AECC-2(Hindi Vyakaran aur Sampreshan)	• To understand the basic concept of HindiGrammar. • To understand parts of speech- Noun,Pronoun, Verb etc.
	GE-1, P-2(Pashchatya DarshanikChintan evam Hindi Sahitya)	• To provide knowledge about western philosophical thought and Hindi literature. • Students will develop a comprehensive understanding of the major philosophicalideas and thinkers in the Western tradition. • Students will learn to critically analyze and evaluate philosophical texts and literary works in Hindi that have been influenced by Western philosophical ideas.They will develop the ability to interpret and assess the philosophical concepts and arguments presented in these works.
3	DSC-3(Adhunik Hindi Kavita)	• Understanding the concept of ModernHindi Poetry • Ability to understand the development ofModern Hindi Poetry • Students will gain a comprehensive understanding of the major trends, themes, and techniques in modern Hindi poetry. They will become familiar with theworks of renowned Hindi poets and their contributions.
	SEC-1(Hindi Bhasha Shikshan)	• To provide knowledge about Hindilanguage teaching. • Students should achieve a certain level ofproficiency in speaking, reading, writing, and understanding the Hindi language. They should be able to communicate effectively in various contexts using appropriate vocabulary, grammar, and pronunciation. • Students should gain an understanding ofthe cultural aspects related to Hindi language and literature.
	LCC-1, P-2(Hindi Bhasha aur Sampreshan)	• Understanding the meaning andimportance of language. • To understand the phonetic system, partsof speech and the structure of the Hindi Language in detail. • Understand the types of sentence and

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		sentence analysis.
	GE-2, P-1(Sarjnatmak Lekhan Kevividh kshetra)	• To provide knowledge about various areasof creative writing. • Students will be exposed to different writing styles and genres, encouraging experimentation and exploration of theirown writing style. They will gain an understanding of the unique characteristics and requirements of eachgenre. • Through writing exercises and assignments, students will learn toovercome creative blocks and find innovative solutions to writing challenges.
4	DSC-4(Hindi Gadya Sahitya)	• Description of not giving shelter to the oldage parents by their children through the story 'Wapsi' by Usha Priyamvada. • Describing the establishment of sentiments, travelling through differentsides of life through the essay 'Lobh aurPriti' by Acharya Ramchandra Shukla. • Description of indomitable living life through the essay 'Shirish Ke Phool' byHazariprasad Dwivedi.
	SEC-2(Anuvad: Siddhant aur pravidhi)	• Studying the meaning, form and nature oftranslation. • Understanding the requirement andimportance of translation work. • Studying the role of translation in changein multilingual society and imparting cultural intellectual respect. • Understanding the translation of documents prescribed under section 3(3) in compliance with official language policy. • Understanding the English and Hindi formof the key vocabulary used in the construction of the terminology, office administration, banks and railways.
	GE-2, P-2(Pashchatya DarshanikChintan evam Hindi Sahitya)	• To provide knowledge about western philosophical thought and Hindi literature. • Students will develop a comprehensive understanding of the major philosophicalideas and thinkers in the Western tradition. • Students will learn to critically analyzeand evaluate philosophical texts and literary works in Hindi that have been

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		influenced by Western philosophical ideas.They will develop the ability to interpret and assess the philosophical concepts andarguments presented in these works.
5	DSE-1(Kabirdas)	• Completed this course, students understand the Medieval age of Hindipoetry. • Students will gain knowledge about the life, background and contributions of the renowned Hindi poet Kabir Das. They will study his biographical details, including hisbirthplace, upbringing and the socio- cultural context in which he lived. • Students will develop skills to interpret and analyze Kabir's poetry. They will learnto identify the symbolic and metaphoricalaspects in his verses, unravel the deeper meanings embedded in his writings, and analyze the social, religious, and philosophical dimensions of his work. • Students will study the historical and cultural context of Kabir's era, particularlythe Bhakti movement and its influence onhis poetry.
6	DSE-2(Hindi Sansmaran Sahitya)	• Students will develop a comprehensive understanding of Hindi memoir literature,its historical background, major writers, themes, and literary techniques. • Students will be able to analyze and interpret Hindi memoir texts, including their structure, narrative style, symbolism,and character development. • The course will provide students with insights into the social, cultural, and historical aspects of the time periods reflected in Hindi memoir literature. Theywill gain an understanding of the society, traditions, and events that influenced thememoir writers. • Students will improve their Hindi languageskills through reading, analyzing, and discussing Hindi memoir texts. They will enhance their vocabulary, comprehension,and ability to express ideas effectively in Hindi.

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PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1. Students gain the knowledge in communication, reading and writing skills effectively.

PSO2. The student gains the knowledge and understanding of the various intricacies of the grammar and literature of Hindi.

PSO3. The student gains the knowledge and understanding of the rich folk and cultural heritage of India.

PSO4. Evaluating the concept of Hindi from past to present and to study the society closely through Literature.

PSO5. To make the students understand the literature in broader areas than merely confined to the subject.

PSO6. To make the students understand the importance of Hindi in the contemporary world.

PSO7. Understanding the relation between society and literature and analyze the role played by Hindi literature in past and present.

PSO8. It develops interest in History, Tradition & Culture and enhances Moral values.

PSO9. Increasing the critical attitude about literary writing.

PSO10. The students get to know and understand Hindi language in a far better way.

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Department of Physics

Programme outcome for Honours

PO1 Logical thinking : A graduate Physics honours student will be capable of think and analyze logically with scientific view.

PO2 Laboratory skill : Student will be capable of applying the scientific methods to design , perform and demonstrate experiments with skill.

PO3 Communication skillts : Students will be capable of communicating scientifically and can convince any arguments logically to others.

PO4 Environmental aspects : The roots of most of the recent environmental problems are explained by the theories underlying in Physics. A physics student may be able to find out the causes of various environmental crisis to overcome the harmful situations.

PO5 Ethics : A Physics student will be able to appreciate the impact of physics in social, economical, and environmental issues

PO6 Social interactive skill : A Physics students will be able to identify, analyze and solve the various problems faced by the society in daily life which can be justified by the underlying theories of Physics.

PO7 Self improvement and lifelong learning: A Physics graduate will have confidence in his ability and will be motivated for lifelong learning.

PSO (Programme specific outcome for Physics Honours)

PSO1: Graduate Physics honours students will acquire clear knowledge in mathematics.

PSO2: Students will get clear ideas about the basic mechanism of the instruments and machines used in everyday life.

PSO3: Physics students will learn various computer languages.

PSO4: Physics students will aware of simple and complex electrical circuits and networks.

PSO5: Students will have knowledge of electronics, IC, gates etc help the Physics graduate students to establish themselves in modern smart technological world

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Course outcome (Physics Department)

For the year 2018-2019,2019-2020,2020-2021

Year	Papers	Course	Outcomes
Semester 1	CC1 (Mathematical PhysicsI)	CO1	The topics of the course are effective for the students because • It includesbasic mathematical physics. • develops required mathematical skills to solveproblems inother fields of theoretical physics. • It helps thestudents to grow theprogramming skill to solvethe differentkind of physics problems.
	CC2 (Mechanics)	CO2	Students will get adeep understanding of • Laws ofmechanics • differentialequations • dynamics of cl.mechanics • the experiments relating the laws of mechanics.
Semester 2	CC3 (Electr icity & Magne tism)	CO3	This course is very beneficial for the students because

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			• It gives the ideaof interactions of charged and magnetic materials and a fundamental understanding of electromagneticphenomena. • Students can understand the basic mathematical concepts related to electromagneticvector fields, functions of different circuits and networks. • Experiments with electrical circuits , network theorem and magnetism strengthen theirtheoretical studies.
	CC4 (Waves & Optics)	CO4	Students will acquirethe concrete idea about • different typesof oscillatingnature andcharacteristics of waves. • it gives athorough learning of functions of waves inoptics.

			• The theoreticalstudies become strengthen bythe experiments relating variousphenomena of waves .

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Year	Papers	Course	Outcomes
Semester 3	CC5 (Mathematical Physics II)	CO5	Students will befamiliarized with different types of differential equations They will also be able tosolve Fourier series andalso be familiarized withsome special type of integration. They will also be familiarized withcomputational language to solve the above equations.
	CC6 (Thermal Physics)	CO6	Students will learn • the foundationof thermalPhysics. • The ideas aboutthe systems instable equilibrium. • Laws ofthermodynamicsalong withentropy . • about Statistical mechanics and Kinetic theory. • about thedifferent measuring devices which
			show variations with tempe- rature. • They also learn the process of calibration.
	CC7 (Digital Systems and Applications)	CO7	Students will get the basic idea about • technique of building integrated circuits, logic gates, Boolean algebra etc. • the constructions of combinational and sequential circuits using logic circuits and their applications in laboratory.
	SEC-A (Basic programming and Scientific word processing)	CO23	This course is very effective to the students because it includes from algorithms, flowcharts, basic programming in FORTRAN/C, to Gnuplot, introduction to LaTeX word processor, equation representation, picture environment etc.

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	SEC-A (Electrical circuits and Network Skills)	CO24	Students willunderstand the electricalcircuits, electrical drawing, theories and operations of generators, transformers etc, solid state devices and electrical wiring. This course is very effective and beneficial for the students.
Semester 4	CC8 (Mathematical Physics-III)	CO8	Students will learn in details of complex numbers and how tosolve complex integration. They will also learn the basics of probabilities and special theory of relativity. Students will learn to solve the problemsstudied in theory by the application through programming

	CC9 (Elements of	CO9	Students will learn thehistory behind thedevelopment of quantum mechanics. It also develops the mathematical framework for studyingquantum mechanics which has variousapplications in other fields of physics. Thecourse also provides basic concept of structure of nucleus and Radioactivity phenomena. Experiments based on theoretical studies helpstudents to get a clearconcept of the course.

	CC10 (Analog systems & Applications	CO10	After the completion of the course, Students willbe able to : • learn about thesignificance ofelectric components, • various devicesand their operations • can analyze dccircuits and relate ac modelsof semiconductor devices with their physicaloperations • understand rectification, amplification,transistor etc. • Design and analyze of electronic circuits, OPAMP, amplifiers etc.
	SEC-B (Computer Algebra System& Figure Drawing Skill)	CO25	This course helps the students to be competent with elementary symbolic computation using CAS, figure generation using drawing tools like xfig, latexdraw etc, .
	SEC-B (Renewable Energy andEnergy Harvesting)	CO26	Students will get an ideaabout the renewal of various types of non- conventional energy sources. Students learn the energy harvesting procedure from solar energy, wind energy, ocean, geothermal ,

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			hydro, piezoelectric andelectromagnetic energy.

Year	Papers	Course	Outcomes
Semester 5	CC11 (Quantum Mechanics & its application)	CO11	• Students will get an idea of difference between classical & quantum mechanics. • They will be familiarwith various aspectsof quantummechanical approach and its applications. • Solutions of Schrodinger wave equation for various atomic and molecular systems make the students to correlate with the theory.
	CC12 (Solid state)	CO12	In this branch of study, • students will learn toapply the methods ofquantum mechanics,crystallography and electromagnetism inreal crystalline systems. • They will come to know the reason underlying the interpretation of the physical propertiesof solids. • At the end of the course students will

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			Learn crystal structure, lattice dynamics, magnetic properties and super conductivity.
	DSE-A1 (Advanced Mathematical Methods-I)	CO15	• Students will acquireknowledge about the fundamental concepts of a specialtopic (linear Algebra) inmathematical physics. • will be familiar with basic calculus andwill be able to solve the basic differentialequations by computation.
	DSE-A1 (Communication electronics)	CO16	• Students will betaught to analyzeand design noise-free analog and digital communication systems. • They will have a clear concept of different modulationtechniques. • They will have aclear concept of satellite communication which is currently a very important topicand idea about GPSnavigation system.
	DSE-B1 (Advanced Mathematical Methods-II)	CO17	Students will get a clear knowledge about Cartesian and general tensors, transformation of coordinates, group, lie group, lie algebra etc. which help them in future in formulat in various complex mathematical problems.
	DSE-B1 (Nuclear and Particle Physics)	CO18	On completing the Nuclear & Particle Physics course, students will get a clear idea about • Nuclear model, reactions and interactions of radiation with matter. • Detectors, accelerators and the concepts of particle physics and the quark model
Semester 6	CC13 (E.M Theory)	CO13	Students will be taught different coordinate systems. This course helps them to familiarize with the different concepts of electrostatic, magneto static and time varying electromagnetic systems, and their applications in practical problems. Students will have strengthened their concepts by the experiments based on e.m theory.

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	CC14 (Statistical Mechanics)	CO14	Students will get the idea of • basic statisticalmethods andconcepts. • thermodynamicalparameters. • Computaion of the problems based on statistical theory andplotting functions..
	DSE-A2 (Astronomy and Astrophysics)	CO19	Students will have the basic ideas about astronomical systems, scale and distances .They will learn the techniques of observations of stellar objects, the sun and solar family, the milky way, galaxies and the expanding universe.
	DSE-A2 (Advanced Dynamics)	CO20	This Course will give the students a working knowledge of Analytical Mechanics. They will be taught how a physical system might alter or develop over time. A student studying the course will be exposed to various types of oscillations and thewonder of chaos. They will be familiar withthe computational visualisation of fractal nature in logisticmap

	DSE-B2 (General Relativity)	CO21	Students will have the basicconcepts of fundamental principles of the general theory of relativity, the equivalence principles, inertial frames, motion in the gravitational field, time dilation and frequency shifts, etc. Students can apply the mathematical andphysical ideas of the theoryof general relativity for the study of various systems in astrophysics andcosmology.
	DSE-B2 (Nano Materials & Applications)	CO22	After completing this coursestudents will be able to: • learn about the background on Nanoscience, • understand the synthesis of nanomaterials, their applications and theimpact of nanomaterials on environment. • understand the basic electronic and optical nanomaterial properties and application in variouselectronics devices.

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Mapping of PO AND CO

PO1 Logical thinking	PO2 Laboratory skill	PO3 Communication skill	PO4 Environmental aspects	PO5 Ethics	PO6 Social interactive skill	PO7 Self improvement and lifelong learning
CO1	C01	C023	CO26	CO18	CO2	CO1
CO5	CO2	CO24	CO19	CO9	CO3	CO3
CO7	CO3	CO25	CO22	CO4	CO4	CO7
CO8	CO4	CO26	CO13	CO3	CO6	CO5
CO10	CO5	CO16	CO9	CO6	CO9	CO8
CO15	CO6		CO3	CO26	CO13	CO10
CO17	CO7		CO4		CO18	CO15
	CO8				CO22	CO16
	CO9					CO17
	CO10					CO19
	CO11					CO20
	CO12					CO21
	CO13					CO22
	CO14					CO23
	CO20					CO24
						CO25

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U.G. PHILOSOPHY HONOURS

Programme Outcome: B.A. Philosophy (Honours)

PO	Summery	Description
PO1	Critical Thinking	Developing proficiency in critical thinking involves honing skills such as posing pertinent inquiries, analyzing diverse perspectives on a matter, assessing arguments, and fostering the capacity to generate novel viewpoints.
PO2	Effective Communication	Acquires the ability to effectively convey information to varied audiences by participating in group assignments and delivering presentations.
PO3	Social Interaction	Promotes collaborative efforts that enhance individual comprehension of concepts and foster higher-order thinking skills.
PO4	Effective Citizenship	Embodies a voluntary global perspective and aligns with a commitment to community service.
PO5	Ethics	Cultivates the capacity for ethical reasoning and engages in actions guided by deliberate ethical considerations.
PO6	Environment and Sustainability	Enhances cultural and moral consciousness to articulate and tackle significant philosophical and environmental challenges.
PO7	Self-directed and Life-long Learning	Strengthens the capacity to comprehend, elucidate, and apply knowledge to unfamiliar scenarios, fostering self-motivation and autonomy.

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Course Outcome: B.A. Philosophy (Honours)

Semester	Course Name	CO	Course Outcome
I	C-I Indian Philosophy -I	CO1	❖ Introducing with the idea of some of the central texts, schools and concepts of classical Indian philosophy which help torelate views and arguments of classical Indian Metaphysics, Epistemology, Logic, and Ethics etc.
	C-2 Logic-I	CO2	❖ Building the capacity to develop criticalreading to analyze propositions and arguments in propositional logic by natural deductive methods.
II	C-3 Western Philosophy-I	CO3	❖ Strengthening the ability to identify and distinguish the main historical traditions in western philosophy from Pre-Socraticto the enlightenment.
	C-4 Ethics	CO4	❖ Imparting the awareness in the core ethical problems and helps to develop ideas to distinguish the basic ethicaltheories and approaches.
III	C-5 Indian Philosophy -II	CO5	❖ Making advance understanding to someof the critical Indian philosophical schools and their theories.
	C-6 Western Philosophy-II	CO6	❖ Developing knowledge about differenttheories of justifications and how those are different.
	C-7 Logic -II	CO7	❖ Procuring the basics of formal logic which provides symbolic methods for representing and assessing the logicalform of argument.
	SEC-I Paper I Basics of Counselling	CO8	❖ Discovering the knowledge and skillsnecessary to support individuals in overcoming challenges, promoting mental well-being, and fostering personal growth and resilience.
IV	C-8 Psychology	CO9	❖ To understand human behaviour and thecomplexities of the mind, and applying evidence-based strategies to enhanceindividual and societal well-being.
	C-9 Philosophy of Religion	CO10	❖ Developing ability to read, understand and interpret philosophical and religioustexts and think critically about religiousproblems and their relationship with our own lives.

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	C-10 Social and Political Philosophy	CO11	❖ Understanding and critically analyzing the fundamental principles, structures, and values that shape societies and govern political systems.
	SEC-II Paper -II Critical Thinking	CO12	❖ Developing the skills to evaluate information, analyze arguments, and make well-reasoned decisions, enablingindividuals to navigate complex issues and engage in thoughtful and informed discussions.
V	C-11 Tarka Saṁgraha	CO13	❖ Making a deeper insight into the foundational principles of logical reasoning and argumentation, therebyfostering a deeper understanding of Nyāya epistemological thought.
	C-12 Analytic Philosophy -I	CO14	❖ Developing rigorous analytical skills, clarifying conceptual puzzles, and engaging in systematic, evidence-based reasoning across various disciplines.
	DSE-I Enquiry Concerning Human Understanding	CO15	❖ Comprehending the foundations of empirical skepticism, causality, and the limitations of human knowledge, offering valuable insights into the nature of human cognition and the philosophy of science.
	DSE-II Philosophy of Mind	CO16	❖ For exploring the nature of consciousness, understanding the relationship between the mind and thebody, and grappling with the fundamental questions of identity, perception, and the nature of mentalphenomena.
VI	C-13 Analytic Philosophy-II	CO17	❖ Making further development of rigorousanalytical and logical thinking skills, fostering precision in conceptual analysis, and advancing the understanding and resolution of philosophical problems.
	C-14 Applied Ethics	CO18	❖ Examining and addressing the ethicalchallenges and dilemmas that arise inreal-world contexts, guiding ethical decision-making, and promoting responsible and morally informedactions.
	DSE-III Phenomenology & Existentialism	CO19	❖ To explore the subjective experience, understanding the complexities of

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			human existence, and examining the fundamental questions of meaning, freedom, and authenticity in life.
	DSE-IV Contemporary Indian Philosophy	CO20	❖ Gaining profound insights into spirituality, social justice, cultural revival, individual liberation, and the synthesis of Modern Indian thinkers.

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BOTANY Hons. (B.Sc.)
COURSE OUTCOME

SEMESTER	CORE COURSE	COURSE CONTENT	OUTCOME
I	CC-1 Credit:4	Phycology and Microbiology	Students will learn: (i) Microbial world, types of microbes, microbial diversity including algae; their growth pattern, nutritional behaviours, their importance in relation to agriculture and industry (ii) structure of viruses, their multiplication process (iii) structure, types of bacteria, and their replication process (iv) characteristics of algae including structure, distribution, their classification and importance (v) structure, occurrence, pigments and life cycle of different genera belonging to different classes
	CC-2 Credit: 4	Biomolecules and Cell Biology	Students will learn: (i) concept of biomolecules, important biomolecules, pH and buffers (ii) bioenergetics controlling the turnover/metabolism of biomolecules (iii) enzymes, their types, role and mechanism of action (iv) cell structure, types, cell division and cellular organelles and their functions
II	CC-3 Credit: 4	Mycology and Phytopathology	Students will learn: (i) General characteristics of a true fungi, structure, thallus organization, nutrition and classification. (ii) Characteristics, thallusorganization, reproduction, lifecycle, ecology and significance ofChytridiomycota, Zygomycota, Ascomycota, Basidiomycota &Oomycota. (iii) General characteristics of allied fungi. (iv) Symbiotic association with reference to General characteristics and significance of lichen and mycorrhizae. (v) Role of fungi in Biotechnology, food industry, medicine and agriculture; Mycotoxins. (vi)Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases.; Bacterial diseases, viral diseases, fungal diseases
	CC-4 Credits: 4	Archegoniate	Students will learn: (i) features of archegoniate,Alternation of generations. (ii) General characteristics; Adaptations to land habit; Classification of bryophytes,morphology, anatomy and reproduction of different bryophytes, economic and ecological importance of bryophytes. (ii) General characteristics, Classification of Pteridophytes; Early land plants. Classification of Pteridophytes, morphology, anatomy and reproduction of different pteridophytes,economic and ecological importance of pteridophytes. (iii)General characteristics; Classification of Gymnosperms; Classification of Gymnosperms, morphology, anatomy and reproduction of different Gymnosperms, economic and ecological importance of Gymnosperms.

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III	CC-5 Credits: 4	Morphology and Anatomy of Angiosperms	Students will learn; (i) Plant Morphology and Anatomy Introduction and Scope. (ii) Tissue system, Internal organization and development of plant body. (iii) Tissue classification; Cytodifferentiation of trachery elements and sieve elements; study of pits, plasmodesmata, wall ingrowth, transfer cells, ergastic substances etc. (v) Evolution of concept of organization of shoot apex, types of vascular bundles, structure of monocot and dicot stem. Origin Development, arrangement and diversity in size and shape of leaves, structure of monocot and dicot leaves, Kranz anatomy.Organization of root apex. (vi) Structure, function and seasonal activity of cambium; Secondary growth in root and stem; Dendrochronology; Development and composition of periderm, rhytidome and lenticels. (vii) Epidermal tissue system, cuticle, epicuticle waxes, trichomes, stomatal classification,Anatomical adaptations of xerophytes and hydrophytes.
	CC-6 Credit: 4	Economic Botany	Students will learn: (i) cultivated plant species, their origin and distribution (ii) types of edible plants, their morphology, cultivation process and harvesting and processing

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			(iv) plants which are important for economic welfare of communities such as rubber and drugs yielding species
	CC-VII Credit: 4	Genetics	Students will learn: (i) meaning of genetics, Mendelian genetics, its extension to modern genetics (ii) inheritance mechanism other than chromosomal and its importance (iii) variation due to natural and physical processes like mutation (iv) concept of genes and population genetics relevant to species evolution
IV	CC-8 Credit: 4	Molecular Biology	Students will learn: (i) structure and functions of DNA and RNA as a carrier of genetic information (ii) chemical structure of DNA and RNA, different model to explain their molecular configuration, DNA organisation in chromosome (iii) DNA replication in prokaryotes and eukaryotes (iv) Central Dogma consisting of transcription, translation (v) Transcription, processing and modification of RNA and translation in prokaryotes and eukaryotes
	CC-9 Credit: 4	Plant Ecology and Phytogeography	Students will learn: (i) the concepts of ecology and phytogeography, their importance (ii) role of biotic components (producers, consumers, and decomposers), and abiotic components (water, light, temperature, soil) and energy flow in the ecosystem (iii) population ecology, plant communities, ecosystem and parameters to study them (iv) dynamic of ecosystem related to different biogeochemical cycles (v) localisation and distribution of plant species, phytogeographical region and distribution of plants in India and world
	CC-10 Credit: 4	Plant Systematics	Students will learn: (i) importance of identification, naming and classification of plants and the criteria/evidences for classification (ii) taxonomic hierarchy related to classification, principles and rule of nomenclature and also the different systems of classification – artificial, natural, and phylogenetic (iv) numerical taxonomy and phylogeny related to the evolution of angiosperms
V	CC-11 Credit: 4	Reproductive Biology of Angiosperms	Students will learn: (i) detail structure of angiospermic reproductive structure, their development functions (ii) mechanism of pollination and fertilisation, self-compatibility, their implication in production of hybrids and cybrids. (iii) process of endosperm formation, seed and embryo development and unusual features during embryo development.

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	CC-12 Credit: 4	Plant Physiology	Students will learn: (i) Water potential; water absorption by roots; pathway of water movement; root pressure; guttation; Ascent of sap Theories, Transpiration. (ii) Macro and micronutrients; Mineral deficiency symptoms; essential elements; chelating agents, soil (as a nutrient reservoir), faccilited diffusion; active absorption, Role of ATP, Passive absorption, electrochemical gradient, carrier systems, uniport, symport, antiport. (iii) Phloem as a site of sugar translocation, pressure flow model; Source Sink Relationship. (iv) Basic structure and Physiological roles of different plant growth regulators. (v) Photoperiodism; Flowering stimulus, seed dormancy, discovery, chemical nature & mode of action of phytochromes, cytochrome and phototropins.
	CC-13 Credit: 4	Plant Metabolism	Students will learn: (i) the concept of metabolism, their regulation and enzyme systems involve (ii) carbon assimilation their components and pathways (iii) Carbon oxidation and related reactions and pathways (iv) ATP – synthesis, types and mechanism, and model to explain the process (v) Lipid and nitrogen metabolism (vi) Signal transduction
			Students will learn: (i) Historical perspective of plant tissue culture, Composition of media, organogenesis, somatic and zygotic embryogenesis, isolation culture and

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	CC-14 Credit:4	Plant Biotechnology	fusion of protoplast, application of tissue culture. (ii) Restriction Endonucleases (History, Types I-IV, biological role and application),Restriction Mapping (Linear and Circular), Cloning vectors. (iii) Recombinant DNA, PCR mediated gene cloning, transformation and selection of recombinant clones,construction of genomic and cDNA libraries. (iv) Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment. (v) Application of biotechnology in Agriculture,medicine,industry and human health.
	DSE-1 Credit:4	Analytical Techniques in PlantSciences	Students will learn: (i) Principle and types of microscopy; chromosome banding and painting;FISH, transmission and scanning electron microscopy. (ii) Centrifugation, Use of radioisotopes in biological research, autoradiography, Pulse Chase Experiment, Spectrophotometry, Principleand types of chromatography. (iv) Mass Spectrometry, X-Ray Diffraction and crystallography; Characterization of proteins and nucleic acid. (v) Statistics; Representation of data, measures of Central tendency and dispersion , Arithmetic mean, median and mode , Standard deviation, Chisquare.
	DSE-2 Credit:4	Bioinformatics	Students will learn: (i) Branches of Bioinformatics, Aim, Scope and Research areas of Bioinformatics. (ii) Classification format of Biological Databases, Biological DatabaseRetrieval System. (iii) Tools and Databases of NCBI, Database Retrieval Tool, Sequence Submission to NCBI, Basic local alignment search tool (BLAST), ProteinDatabase, Gene Expression Database.EMBL Nucleotide Sequence Database (EMBL-Bank), DNA Data Bank of Japan (DDBJ), Protein Information Resource (PIR), Swiss-Prot. (iv) Concept of Alignment, Multiple Sequence Alignment (MSA), PercentAccepted Mutation (PAM), Blocks of Amino Acid Substitution Matrix (BLOSUM). (v) Methods of Phylogeny, Software for Phylogenetic Analyses, Consistency of Molecular Phylogenetic Prediction. (vi) Applications of Bioinformatics in Drug discovery, Quantitative structure-activity relationship (QSAR) techniques in Drug Design,Microbial genome applications, Crop improvement.
	DSE-3 Credit:4	Stress Biology	Students will learn: (i) Acclimation and adaption, water stress, salinity stress, temperaturestress, hypersensitive reaction, pathogenesis, Protein, stress sensing mechanism in plant: calcium modulation, phospholipid signaling. (ii) Adaptation in plant against environmental stress, compatible solute production, reactive oxygen species.
	DSE-4 Credit:4	Plant Breeding	Students will learn: (i) Objective of plant breeding, breeding system, modes of reproduction incrop plants, achievements of plant breeding. (ii) Origin and demonstration of crop plants, plant genetic resources,selection methods, hybridization. (iii) Concept and mechanism of Quantitative inheritance, Examples of inheritance, monogenic vs polygenic inheritance. (v) History, Genetic basis of Inbreeding depression, heterosis. (vi) Role of nutrition, polyploidy, Distant hybridization and role of biotechnology in crop improvement.
	DSE-5 Credit:4	Natural Resource Management	Students will learn: (i) about different natural resources such as land, water, forest, energy andbiological resources (ii) sustainable utilisation of natural resources (iii) management practices of natural resources

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	DSE-6 Credit: 4	Horticultural Practices and Post- harvest Technology	Students will learn: (i) growing, caring, marketing techniques of ornamental plants, fruit and vegetables (ii) landscaping and garden design (iii) techniques and importance of floriculture, post harvest technology, disease control and pest management, conservation of horticultural and floricultural species, and also the sustainability and livelihood viability with respect to known knowledge.

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	DSE-7 Credit: 4	Research Methodology	Students will learn: (i) concept of research, types and importance of research and processes (ii) laboratory protocols, data collection, processing, documentation and dissemination of research knowledge (iii) the prominent areas which need research for human welfare
	DSE-8 Credit: 4	Industrial and Environmental Microbiology	Students will learn: (i) the importance of microbes in environment and industry and their manipulation and conservation (ii) production techniques of microbial products like enzymes, organicacids, ethanol, antibiotics, etc. (iii) application of microbial techniques in water purification, removal of environmental pollution, and agricultural practices.
	DSE-9 Credit: 4	Biostatistics	Students will learn: (i) the basic concept of biostatistics, its importance in minor to majorresearch (ii) data collection, processing, analysis and interpretation (iii) to present authentic research
	SEC-1 Credit: 2	Biofertilizers	Students will learn: (i) the concept of biofertilisers, organisms which are used as biofertilisers,and importance (ii) application of biofertilisers in organic farming
	SEC-2 Credit: 2	Herbal Technology	Students will learn: (i) about herbal medicine, different medicinal plants both traditionally usedand used by ethnic community (ii) pharmacognosy, phytochemistry, analytical pharmacognosy,propagation and conservation of medicinal plants
	SEC-3 Credit: 2	Nursery and Gardening	Students will learn: (i) techniques of nursery and gardening, their scope and importance (ii) methods of propagation and care of garden species and also theirmarketing and economic viability
	SEC-4 Credit: 2	Floriculture	Students will learn: (i) techniques of floriculture, its importance (ii) disease and pest management of floricutural species (iii) aesthetic and economic values of ornamental plants, their conservationand propagation and marketing
	SEC-5 Credit: 2	Medicinal Plants	Students will learn: (i) history, scope and importance of management and conservation ofmedicinal gardens (ii) prehistoric importance of medicinal plants as mentioned in Ayurveda (iii) folk medicines and ethnomedicines used by different communities (iv) propagation and conservation of medicnal plants
	SEC-6 Credit: 2	Plant Diversity andHuman Welfare	Students will learn: (i) the concept of plant diversity, importance of plants and their conservation and management (ii) different agencies and their role to promote / assist the conservation ofplants (iii) role of plants in human welfare
	SEC-7 Credit: 2	Ethnobotany	Students will learn: (i) concept, scope and importance of ethnobotany (ii) methodologies of ethnobotany (iii) role of ethnobotanically important plants and their conservation andlegal aspects
	SEC-8 Credit: 2	Mushroom Culture Technology	Students will learn: (i) food values of edible mushroom, their culture methods (ii) storage, preparation, preservation and marketing of mushroomproducts
	SEC-9 Credit: 2	Intellectual Property Rights	Students will learn: (i) the concept, types and importance of IPR (ii) methods of IPR and legal aspects

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(0354) 2254019
Email : dgc.principal@gmail.com

M.Sc. Botany

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SEMESTER	CORE COURSE	COURSE CONTENT	• OUTCOME
I	CC-1 Theory (Credit:3) Practical (Credit: 1)	Microbiology	• Students will be able to understandand appreciate role of genetic engineering in bacteria. • Students will develop theoretical skills of food industry. • Students will be able to understand and appreciate fermentation technology. • Students will develop practical skills in microbiological techniques and appreciate the versatile role of microbes in commercial fermented products. • Students will be able to understandand appreciate role of microbes in biological nitrogen fixation. • Students will also develop both theoretical and practical knowledge regarding study of microbial diversity. • Students will be able to appreciate the resourceful part of microbes in overcoming major health • problems of the world
	CC-2 Theory (Credit:3) Practical (Credit: 1)	Mycology and Plant Pathology	• Students will comprehend the function of fungi in several spheres of life, with a focus on agriculture. • Students will gain knowledge of various plant-pathogen interactions, as well as how to diagnose and treat them. • Students will study sustainable farmingpractices. • Additionally, students will learn aboutcurrent advances in plant-microbe interactions the importance and mechanism of it.
	CC-3 Theory (Credit:3) Practical (Credit: 1)	Taxonomy of Angiosperms	• Students will acquire knowledge on history and development of planttaxonomy. • They will understand the delimitation of taxa and their hierarchical arrangement and major system of angiosperm classification including APG classification. • They will know about different methods and codes of nomenclature along with detailed accounts of ICN- its rules, regulations, applications etc.

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			• Students will have direct knowledge on concept of characters, their evolution and will be able to choose the suitable ones and to use them. • Students will be able to understand the importance and significance of different branches of botany as taxonomicdata source. • Students will have knowledge on different Herbaria and Herbarium technique; Botanical gardens, taxonomic literatures and their importance in taxonomic study. • They will understand the origin and evolution of angiosperms and affinities among different groups. • They will know the diversity of flora and vegetation of E. Himalaya and understand the diversity of ethnic groups and their knowledge system on plants and their uses.
	DSE-1 Credit: 2	DSE-1A Biophysics and Instrumentation	• Students will learn about different molecular techniques in biological sciences. • Students will get detailed knowledge of different chromatographic techniques in biochemistry. • Students will get information about spectrophotometry, centrifugation andradiobiology. • Students will understand different microscopic techniques.
		DSE-1B Environmental Biology	• Understand how ecological andphysical science theories and methodologies are used to solve environmental problems. • Recognize the ethical, historical, cross- cultural, and linkages between human andnatural systems contexts of environmental challenges
		DSE-1C Evolutionary Biology	After successful accomplishment of thecourse, the learners would have a detailed knowledge regarding the essential aspectsof evolutionary biology which would further help them in acquiring better understanding of the subject
	AEC-1	Communicative: English/ Nepali/Hindi/Bengali/ Sanskrit (any one)	Students will be able to use the preferredlanguage in their day-to-day life.
			• Students will learn about the location, importance, and mechanisms of

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II	CC-4 Theory (Credit:3) Practical (Credit: 1)	Plant Physiology	photosynthesis. • They will learn about the photosynthetic light harvesting system and C1, C2, C3, C4 and CAM in plants. • Students will learn about the various plant growth substances. Their chemistry and biosynthesis and their mode of action. • During this course student will learn about plant water relation and how mineral are a source of nutrition in plants • Students will learn about, phytochromes and biochemical signaling in plants and photoperiodism. • They will be taught about seed germination, dormancy in details and the role of hormones in seed germination. • Students will learn about various the major biochemical pathways of plant physiology, they will also gain knowledge about senescence and programmed cell death. • Students will learn about solute transport, membrane transport its mechanism-organization of import molecules and ion channels.
	CC-5 Theory (Credit:3) Practical (Credit: 1)	Plant Biochemistry	• Students will be taught about various types of metabolism in plants like amino acid metabolism, protein metabolism and lipid metabolism their chemistry, structure and synthesis in details. • Students will gain knowledge about bioenergetics -thermodynamic principles, energy rich compounds and phosphorylation. • Students will learn about what carbohydrates are its classification, structure and biosynthesis along with its function. • Students will learn about enzymes, its classification and enzyme kinetics. Biosynthesis of purine and pyrimidine ribonucleotides. • Students will learn about nitrogen metabolism in plants and secondary metabolites. Various types of secondary metabolites its biosynthetic pathways, and role in defense mechanism.
	CC-6 Theory (Credit:3) Practical (Credit: 1)	Cytology and Genetics	• Students will gain knowledge about structure of prokaryotic and eukaryotic chromosome and also their molecular constitution and respective gene expression pattern. • Students will learn the concept of nucleolar gene expression and extra-chromosomal inheritance.

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			• Students will gain knowledge about molecular and genetic markers and theirimplication in gene mapping. • Students will learn the concept of transposon, mutation and related diseaselike cancer. • Students will know the implications of cytology and genetics in plantbreeding and population genetics.
	DSE-2 Credit: 2	DSE-2A Mushroom Technology	• Due to the high demand for wholesome and high-quality food products, mushroom gardening is now a source of income. • Mushrooms are also used to produce avariety of goods with additional value. • The cultivation process is characterizedby low start-up costs and continuous output.
		DSE-2B Floriculture	• Explore with the prospects of protectedfloriculture in India. • Gain the knowledge about different typesof protected structure for floriculture. • Assess the idea about the landscape andgardening. • Understand field nursery management,site selection layout and water nutrient management. • Assess about different techniques of plant propagation such as vegetative andsexual methods. • Explore with idea about commercial floriculture for the production of flowercrops like Marigold, Rose, Orchid, Chrysanthemum etc. • Gain a deeper knowledge in post-harvesttechniques in cut flowers dehydration technique for drying of flowers and foliage. • Assess with landscaping for specific Institutions, Industries, Road sides, ITparks and corporates. • Explore with idea about special types ofgardens such as vertical garden, Roof Garden, Bog Garden, sunken garden, rock garden and Sacred groves.
	SEC Credit: 2	Choose any one:	Students will learn: • basic concept of informationtechnology • role, importance and application of information technology in modern society
		Fundamentals ofInformation Technology	
		Instrumentation and Analytical Methods	Students will learn: • the importance of instrumentation

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			and analytical methods in scientificstudies and research
		Environmenta lStudies	Students will learn: • importance of environment for betterment of human communitiesand other biological being • control methods of pollution, management and conservation ofall the natural resources • laws governing the conservationand protection of environment
III	CC-7 Theory (Credit:3) Practical (Credit: 1)	Cryptogamic Botany;Gymnology and Palaeobotany	• Gain the adequate knowledge on structural organization, classification andeconomic importance of algae. • Evaluate the thallus organization ofLichens. • Learn about the recent classificationof Bryophytes their general account, biogeographical distribution, hotspots, ecology and endemism. • Assess the origin and evolution ofPteridophytes, general features of different groups of Pteridophytes. • Learn about the general account of different groups of Gymnosperms. Theirdetailed structure and reproduction. • Know about the Geological time scale,continental drift plate tectonics and Radiometric dating.
	DSE (Special) Credit (Theory: 2; Practical:2)	Choose any one: Cytogenetics	• Students will gain the concept of Mendelian principles and its extension andalso their implication in the field of genetics. • Students will acquire the knowledge of cell cycle, cell signalling and their role in control of cellular mechanisms mainly celldivision and abnormalities like cancer. • Students will know the gene regulationmechanism at transcription, post- transcription, translation and post translation levels. • Students will be acquainted with the concepts of molecular hybridization, mapping and its implication in the field ofcrop improvement. • Students will obtain the knowledge offunctional and structural genomics.
		Microbiology	• To provide value-based education, withacademic excellence and advanced research based skills in microbiology. • To make students understand the diversity in structure and functioning inmicrobial biota. • To understand the concepts of

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			metabolism and growth of prokaryotes.
		Mycology and PlantPathology	• Students will understand molecularinteraction of host-pathogen. • Students will knowledge about differentproducts from fungi and their application in human life. • Students will learn about biocontrol ofplant pathogens • Students will learn different diagnostictechniques applied in pathology and will also be able to diagnose plant disease for proper recommendation ofcontrol measures. • Students will learn basics of research and publications in molecular as well asclassical plant pathology.
		Plant Physiology andBiochemistry	• Students will learn about various plant pigments, its biosynthesis ad degradation. • Students will learn about Nitrogen Fixation and assimilation of nitrogen inplants • Students will learn about the plant and itsreaction will stress both biotic and abiotic • Students will be gain knowledge aboutfruit ripening and its biochemistry • Students will be gain knowledge about signal transduction, signalling pathways,chemical signals and cellular receptors • Students will learn about translocationin phloem: pathways, pattern of pressure flow model for phloem transport, phloem loading and unloading • Students will learn about various crop physiology in plants, blue light responseand stomatal movements and morphogenesis. • Students will gain knowledge aboutmechanism and regulation or K^+ transport, phosphorous nutrition and transport, plant responses of mineral toxicity and Protein biochemistry including transcriptional and post transcriptional modification and translation.
		Plant Biochemistryand Molecular Biology	• The learners would have a comprehensive idea of the concept ofprotein biochemistry initiating from transcription to organellar proteintargeting and characterization. • The students would gather knowledge of the varied sorts of metabolic eventsevident in plants viz. amino acid,

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			brassinosteroid and sulphate metabolism including their chemistry,structure, biosynthesis and assimilatory pathways in details. • The pupils would obtain a transparentidea of protein sorting mechanism and vesicle traffic machinery in addition to Golgi apparatus based protein modification. • The learners would precisely understandthe concept of RNA-i and antisense technology. • The students would know in detail about enzymes with reference to its purification and immobilisation strategiesbesides learning about allosteric enzymes and multi-substrate reactions.
		Taxonomy of Angiosperms and Ecology	• Students will be able to develop theconcept on history of Indian plant taxonomy and contributions of Indian scholars in thisfield. They will also know the major system of plant classification from Pre and Post Darwinianperiod. • Students will be familiar with differentmethods and codes of nomenclature and will acquire special knowledge on ICN. • They will learn description and identification methods, taxonomic literatures and keys, their application andpreparation. • Students will learn about numerical taxonomy and other modern branches of taxonomy and systematic-Cladistics, molecular systematics. They will also know about different aspects of biosystematics. • They will be familiar to concept of species, delimitation of species and other taxa using different taxonomic data sourcelike palynology. • Students will develop clear idea regarding different modern tools for taxonomic study including software fordata analysis and construction of Dendrograms. • Ultimately, students will develop a complete and concrete concept on angiosperm taxonomy and also the skills and expertise.
		Phycology	• After completion of the course, thestudents will be able to: • Provide an overview of algal systematics explaining algal origin and

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			apply their knowledge in explaining theevolutionary significance. • Address the general features of differentimportant groups of algae and compare them with different forms. • Elucidate the theories of chloroplast evolution and use it as a basis for understanding the evolutionary pathwaysto the other plant groups.
	DSE (Special) Credit (Theory: 2; Practical:2)	Any one: Cytogenetics	• Students will learn basic and essentialtechniques of plant improvement and conservation through the steps of plant tissue culture. • Students will be familiar with tools andprocess of recombinant DNA technologyand also the uses of Agrobacterium and different vectors and selection of recombinant cells implies in this techniques. • Students will acquire the knowledge about importance of biodiversity for thehuman civilisation and its healthy manipulation in the production of genetically modi fied plants and related intellectual property rights. • Students will learn the concepts and role of functional and structuralproteomics and embryonic stem technology.
		Microbiology	• Students will be able to understand andappreciate role of genetic engineering in bacteria. • Students will develop theoretical skillsof industrial microbiology and understand the molecular mechanisms underlying the gene cloning. • Students will be able to understand andappreciate fermentation technology. • Students will develop practical skills in microbiological techniques and appreciatethe versatile role of microbes in commercial products. • Students will be able to understand and appreciate role of microbes in sustainableenvironment. • Students will be able to appreciate the resourceful part of microbes in overcoming major environmental problems of theworld.
		Mycology and Plant Pathology	• Students will understand the concept ofplant immunity and defence signalling. • Students will knowledge about the management of viral disease by

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			biotechnology methods. • Students will learn about genetic engineering of pathogenic plasmids. • Students will learn about avirulent gene for crop disease management andmolecular biological techniques for disease management.
		Plant Physiology and Biochemistry	• Students will learn about amino acid metabolism, sulphate metabolism their chemistry and assimilation pathway. • Students will gain knowledge aboutBrassinosteroids its structure, biosynthesis and its metabolism • Students will gain knowledge about alkaloids its chemistry, classification, biosynthesis and its industrial application • Students will learn about protein sortingand its details • Students will learn about the latesttechnology of RNAi. They will gain detail knowledge aboutenzymes in plants. • Students will learn about DNA replication in plants, role of topoisomersand DNA repair. • Students will gain knowledge about restriction endonuclease and cloning vectors, construction of cDNA, genomic libraries, identification of specific clonesand DNA Sequencing.
		Plant Biochemistry and Molecular Biology	• The pupils would obtain a clear ideaabout DNA replication mechanism in addition to DNA repair schemes. • The learners would know about the enzymatic molecular scissors, cloning vectors, cDNA & genomic libraries, clonal screening and gene sequencing methodologies. • The students would have an understanding of the modern concept ofgene besides gene duplication phenomenon and pseudo-genes. • The pupils would have comprehensiveknowledge about regulation of gene expression in plants including transcriptional and post transcriptional control of gene expression. • The learners would understand the principles, techniques and application ofRecombinant DNA technology. • The students would know about the Polymerase Chain Reaction phenomenon including its types and application.

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		Taxonomy of Angiosperms and Ecology	• Students will learn the concept of originof life on earth and their evolution. • They will know about the phytogeographic regions, major biomesof the world, megadiversity countries, biodiversity hotspots, loss andconservation of biodiversity. • They will learn about different ecological principles, structure and function of ecosystems, origin and extinction of species, natural selection etc. • Students will get detailed study of someecological issues, environmental biotechnology to mitigate the problems • Students will learn the applications ofecological concept for benefit to different life forms, and different national and international organizations working on ecological issues. • They will learn about remote sensing andits application in ecological study, functional genomics for studying taxonomic and ecological variations,molecular and adaptive variation etc
		Phycology	• Students will be able to understand thecommercial aspects regarding algae. • Students will be able to learn the structural details and life history ofdifferent fossil thallophytes. • Students will also gain knowledge regarding the physiological and biochemical aspects of the lower group of plants. • Students will be able to learn thephytoplankton diversity. • Students will also acquire knowledgeabout culturing techniques. • Students will be able to learn about theacclimation and environmental stress.
	GE Credit (Theory: 3; Practical: 1)	Any one: Fundamentals of Anthropology – I	
		Fundamentals of Anthropology – II	
		Rice Breeding, Organic Farming, & Tissue Culture	Students will learn: • importance of rice breeding, problems, and also the management of rice germplasmand their improvement • importance of organic farming in terms of ecological balance, humanand animal health • importance of tissue culture inconservation of species

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		Nanobiology, Bioseparation Techniques & Drug Designing and Bioinformatics	
		Human-Computer Interaction (COMP)	
	AEC-2 Credit:2	Communicative: English/ Nepali/Hindi/Bengali/ Sanskrit (any one)	Students will be able to use the preferredlanguage in their day-to-day life.
	CC-8 Theory (Credit:3) Practical (Credit: 1)	Plant Anatomy and Development and Bioresource Utilisation	• By the end of the course the studentsshould be able to • Evaluate Anatomy as a moderndiscipline. • Assess the physiological and anatomicalclassification of plant tissue. • Evaluate the control of tissuedifferentiation. • Know about the development of wood inrelation to environmental factors. • Learn about the overview of plant andcivilization and plant as a source of renewable energy. • Explain the principles of plant breeding. • Learn about polyploidy and geneticvariability. • Know about chemistry and application of *Swertia, Gloriosa, Digitalis, Taxus, Stevia,Chlorophytum and Podophyllum.*
	CC-9 Theory (Credit:3) Practical (Credit: 1)	Ecology and Biostatistics	• Students will acquire knowledge about the structural and functional aspects of ecosystem, in terms of different ecological processes operating between environment and biotic components. • Students will know the process of adaptation of plants to new as well asadverse environmental conditions. • Students will gain knowledge about the pollution and related environmental issuesand their effects and remedial measures. • Students will acquire knowledge aboutbiodiversity, their importance and conservation strategies. • Students will know the basic conceptsof biostatistics and their role in the interpretation of biological experiments and researches.
IV	DSE (Special) Credit (Dissertation:2)	Cytogenetics Microbiology Mycology and Plant Pathology Plant Physiology and Biochemistry	Students will learn: • Basic methods of research inspecific field/subject • Concept of hypothesis related toresearch

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		Plant Biochemistry and Molecular Biology	• Be acquainted with instrumentation, experimentation, data collection, and arrangement • Data analysis and interpretation
		Taxonomy of Angiosperms and Ecology	
		Phycology	
	SEC Credit: 2	Any one: Fundamentals of Information Technology – II (B): Advanced	Students will learn: • basic concept of information technology • role, importance and application of information technology in modern society
		Instrumentation and Analytical Methods II	Students will be acquainted with instrumentation and analytical techniques, their application in the field of research in plant science
		Environmental Studies – II	Students will know about the environment, its importance, management of natural resources, control of pollution and ultimately the sustainable use of environment for human welfare.
	GE Credit: 4	Any one: Fundamentals of Anthropology – III	
		Fundamentals of Anthropology - IV	
		Climate change and Stress Physiology & Sustainable Development	Students will learn the causes, effects of climate change; its impact on plant physiology, and also control and manipulation of plants to withstand and grow in stress caused by climatic variation; sustainable development of human society with healthy growth of plant resources
		Biodiversity, Plant Treaty & IPR	Students will learn about the concept of biodiversity, its importance and conservation of biodiversity and different acts and treaties related to plant conservation, IPR related to new discoveries and inventions.
		Optimization Techniques	
		Management Information System	

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Department of Mathematics

Programme outcome for Honours

PO1 Logicalthinking: Agraduate Mathematics honours student will be capable of thinking and analyze logically with scientific view.

PO2 Laboratory skill : Student will becapable of solving various mathematical equations applying the computer programmin and demonstrate experiments with skill.

PO3 Communication skills : Students will be capable of communicating scientifically and canconvince anyarguments logicallytoothers.

PO4 Environmental aspects : The roots of most of the recent environmental problems are explained by the theories of science. A Mathematics student may be able to find out the causes of various environmental crisis to overcome the harmful situations.

PO5 Ethics :A Mathematics student will be able to appreciate the impact of Mathematics in social,economical, and environmental issues

PO6 Social interactive skill : A Mathematics student will be able to identify, analyze and solve the various problems faced by the society in daily life which can be justified by the underlying theoriesof Science.

PO7 Self improvement and lifelong learning: A Mathematics graduate will have confidence in his ability and will be motivated for lifelong learning.

PSO (Programme Specific Outcome for Mathematics Honours)

PSO1 : Graduate Mathematics honours students will acquire clear knowledge in science.

PSO2 : Students will get clear ideas about the basic mechanism of the instruments and machines used in every day life.

PSO3 : Mathematics students willl earn various computerlanguages.

PSO4 : Mathematics students will aware of simple and complex electricalcircuits and net works.

PSO5 : Students will have knowledge of Algebra, Geometry, Calculus Differential equations and Analysis.

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Course Outcome (Mathematics Department)

For the year 2018-2023

Year	Papers	Course	Outcomes
Semester1	HCC1 (Cal, Geometry, Diff. Equ)	CO1	The topics of the course are effective for the students because • It develops required fundamental mathematical skills to solve problems in Mathematics
	HCC2 (Algebra)	CO2	• It develops required fundamental mathematical skills to solve algebric problems in Mathematics
	HCC3 (Real Analysis)	CO3	• This course is very beneficial for the students because it gives the idea of Mathematics that was develop to formalise the study of numbers and functions and to investigate important concepts such as limits and continuity. This concepts leads to the calculus and its applications.

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Semester 2	HCC4 (D.E & Vector Calculus)	CO4	Students will acquire the concrete idea about • Movement or flow of electricity, waves and their characteristics. • Motion of an object to and fro like a pendulam, to explain thermodynamic concepts. • Vector calculus plays an important role in differential geometry and in the study of partial differential equations. It is used extensively in physics and engineering, especially in the description of electromagnetic fields, gravitational fields, and fluid flow.
Year	**Papers**	**Course**	**Outcomes**
Semester 3	HCC5 (Theory Of Real Functions & Introduction of the metric space)	CO5	• The topics of the course are effective for the students for developing the basic concepts of numbers and structures.
	HCC6 (Group Theory-I)	CO6	• The topics of the course are effective for the students for developing the basic concepts of Mathematical structures.
	HCC7 (Riemann Integration & Series of functions)	CO7	• The topics of the course are effective for the students for developing the basic concepts of integral calculus.
Semester 4	HCC8 (Multivariate Calculus)	CO8	. • The topics of the course are effective for the students for developing the basic concepts of integral calculus.
	HCC9 (Ring Theory & Linear Algebra I)	CO9	• The topics of the course are effective for the students for developing the basic concepts of Algebra.

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Year	Papers	Course	Outcomes
Semester 4	HCC10 (Metric Space & Complex Theory)	CO10	• The topics of the course are effective for the students for developing the basic concepts of Abstruct structure and their real applications.
Semester 5	HCC11 (Group TheoryII)	CO11	• The topics of the course are effective for the students for developing the deep concepts of Abstruct algebra.
	HCC 12 (Numerical Methods+Lab)	CO12	• In this area the students will learn different programming languages (C++) and applying this they will find out the solution of numerical equations.
	DSE 1 (Probability & Statistics/Linear Programming)	CO 15	• Student will study about the uncertaintity using Mathematics. • Students will be capable of solving a system of linar equations under certain constrain.

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	DSE 2 (Number Theory/Mechanics)	CO 16	• Students will learn about the woders of numbers • Lagrangian and Hamiltonian mechanics. • Small amplitude oscillation
Year	**Papers**	**Course**	**Outcomes**
Semester 6	HCC 13 (Ring Theory & Linear Algebra-II)	CO 13	• The topics of the course are effective for the students for developing the deep concepts of Abstruct algebra. .
	HCC 14 (Partial Differential Equations & Applications)	CO 14	• The topics of the course are effective for the students for developing the deep concepts of Calculus. .
	DSE-3 (Point Set Topology /Boolean Algebra & Automata Theory)	CO 17	Students will have the basic ideas about • Functional Analysis. • Boolean Algebra and switching circuit. • The Automata Theory.
	DSE-4 (Differential Geometry/Theory Of Equation)	CO 18	• On completing this course, students will get a clear idea about Space curves and surfaces.

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Year	Papers	Course	Outcomes
Semester 1	Ability Enhancement Compulsory Courses (AECC)-I (English Communication)	CO19	Students will be capable of • Communicating scientifically • Able to convince any arguments logically to others.
Semester 2	Ability Enhancement Compulsory Courses (AECC)-II (Environmental Science)	CO20	Students will get an idea about • Knowledge of environment. • Protection of environmental damage from different causes.

Year	Papers	Course	Outcomes
Semester 3	Skill Enhancement Courses (SEC)-1 (ElectricalcircuitsandNetworkSkills)	CO21	Students will achieve the theory and practical skills about • The electrical principles and circuits. • Electrical drawing and symbols. • Theories and operations of generators, transformers and electric motors. • Idea about solid state devices, electrical wiring, and electrical protection.
Semester 4	Skill Enhancement Courses (SEC)-2 (Renewable Energy and EnergyHarvesting)	CO22	Students will get an idea about • Need of renewal energy sources. • Energy harvesting procedure from solar, wind, ocean, geothermal, hydro, piezoelectric and electromagnetic energy.

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Mapping ofPOAND CO

PO1 Logicalthinking	PO2 Laboratoryskill	PO3 Communicationskill	PO4 Environmentalaspects	PO5 Ethics	PO6 Socialinteractive skill	PO7 Selfimprovement andlifelong learning
CO 1	CO 1	CO 19	CO 20	CO 20	CO 19	CO 21
CO 2	CO 2				CO20	CO 22
CO 3	CO 4					
CO 4	CO 5					
CO 5	CO 12					
CO 6	CO 14					
CO 7	CO 18					
CO 8						
CO 9						
CO 10						
CO 11						
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CO 18						

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ARTS FACULTY

POST GRADUATE DEPTT. OF NEPALI, Darjeeling Govt. College.

Subject: NEPALI HONOURS UNDERGRADUATE 2018-19 to 2022-23
MAPPING OF P.O. & C.O. OF B.A. HONOURS IN NEPALI (CBCS SYSTEM)
SESSION 2018-19 to till 2022-23

Course Outcome	P. O. 1	P. O. 2	P. O. 3	P. O. 4	P. O. 5	P. O. 6	P. O. 7
CC 1							
CC 2							
CC 3							
CC 4							
CC 5							
CC 6							
CC 7							
CC 8							
CC 9							
CC 10							
CC 11							
CC 12							
CC 13							
CC 14							
DSE 1 A							
DSE 1 B							
DSE 2 A							
DSE 2 B							
DSE 3 A							
DSE 3 B							
DSE 4 A							
DSE 4 B							
SEC 1							
SEC 2							
AECC 2							

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Darjeeling Government College
Darjeeling - 734 101, West Bengal, INDIA.

Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

Semester	Course Name	Course Code	Course Outcomes
1st.	Core Course 1: Nepali Sahityako Itihas (History of Nepali literature)	NEP-CC-1	Get elaborate knowledge & information about the history of Nepali Literature, its development.
	Core Course 2: Nepali Kavita	NEP-CC-2	Ability to follow the evolution of Nepali poetry and to get the inner meaning of the poetry.
2nd	Core Course 3: Sahityaka Tatwaharu	NEP-CC-3	Ability to learn the elements of the Literature and the differentiate the different forms of literature.
	Core Course 4: Pramukh Sahityik Siddhanta & Vad (Important Literary Theories & Ism)	NEP-CC-4	Ability to understand the different theories & ism of the literature.
	AECC 2- Nepali Bhasha Vyakran & Rachana	AECC 2	Ability to learn the grammer and to develop the writing skill.
3rd	Core Course 5: Samannya Vasha Vigyan	NEP-CC-5	Ability to get the knowledge in linguistics.
	Core Course 6: Nepali Katha	NEP-DSC-6	Ability to get a conception about history of Nepali short stories and will know about short stories writers.
	Core Course 7: Nepali Upanyas	NEP-CC-7	Will get the detail understanding of the history of Nepali Novels and get the information to know about Nepali Novelists.
	Core Course : SEC -I (A) Rachana Lekhan	SEC-1 (A)	Ability to learn the writing skills in essay writings, Advertisements, Radio Scripts & News cum Interviewing skill.
4th.	Core Course : CC-8 Nepali Nibandha (Nepali Essay)	NEP-DSC-8	It helps the students to get a conception about the essays, history of Nepali essays development.
	Core Course 9: Nepali Bhasha Vigyan	NEP-CC-9	Ability to get the information & conception of the depth of Nepali linguistics.

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	Core Course 10: Samakalin Nepali Kavita (Contemporary Nepali poetry)	NEP-CC-10	Ability to get the information about the contempo-rary Nepali poetry writing and get the ability to compare and contrast the Nepali poetry with other poetry composed in past.
	Core Course: SEC 2A Chalachitra Adhyayan (Study of Cinema)	NEP-SEC-2(A)	Ability to engage the students in under-standing the Cinema critically & to know about the history of Nepali cinema too.
5th	Core Course 11: Nepali Samalochana	NEP-CC-11	* To provide knowledge about the critical writingsin Nepali sahitya, the critics of Nepali sahitya. * It gave the ability to learn the critical analysis and evaluate philosophical texts and literary worksin Nepali. It develop the ability to interpret and assess the philosophical concepts and arguments presented in the critical writings.
	Core Course 12: Nepali Natak	NEP-CC-12	* Ability to get the history of Nepali Plays, its development from translated version of Nepaliplays to modern Nepali plays. * Ability to discuss the evolution of Nepali playsstarting from ancient era to the modern contem- porary Nepali plays.
6th	Core Course 13: Nepali Prabandhakavya	NEP-CC-13	* Ability to get a comprehensive idea of classicalliterature. * Ability to know about the elements of Epics,the history of Nepali Epics & Epic writers. * Provided to read the Nepali Epics throughly. * Develope reading habits.
	Core Course 14: Nepali Lok Sahitya	NEP: CC 14	*Ability to know about the Folk literature ofNepali. * Ability to know about the modern techniquetheories to read the folk literature. * Ability to discuss the difference about the folkliterary forms, Folk lore & Folk literature. * Develop the ability to interact to read, and topersue research on folk lore.

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DISCIPLINE SPECIFIC ELECTIVE COURSE (DSE)

SEMESTER	5TH-	DSE 1A OR DSE 1B	SEMESTER	6TH-	DSE 3A OR DSE 3B
SEMESTER	5TH-	DSE 2A OR DSE 2B	SEMESTER	6TH-	DSE 4A OR DSE 4B

ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)

Semester	Course Name	Course Code	Course Outcomes
2nd	AECC - 2: MIL Nepali Bhasa Byakran ra Rachana	AECC 2 : NEPALI (MIL)	* Ability to know the basic and grammer of Nepali * Ability to communicate effectively in Nepali using gramatically correct sentences and correct format.

SKILL ENHANCEMENT COURSE (SEC)

SEMESTER	5TH-	SEC 1A OR SEC 1B
SEMESTER	5TH-	SEC 2A OR SEC 2B

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PROGRAMME OUTCOME OF B.A. HONOURS IN NEPALI (CBCS SYSTEM)

SESSION 2018-2019 TO 2022-2023

PROGRAMME OUTCOME (PO)

P.O. 1 **CRITICAL THINKING** : Ability to interpret, evaluate issues, to form judgements and acquiring soundknowledge of literary text cum genres, their authors. Applying the skill of textual linguistic and rehetoricalanalysis to literary text.

P.O. 2 **EFFECTIVE COMMUNICATION** : Ability to improve the four basic skills of speaking, learning,reading and writing clearly in person and also through electronic media in NEPALI and in other native orforeign languages.

P.O. 3 **SOCIAL INTERPRETATION** : The capacity to elicit views of others, mediate disagrements and helpreach amicable conclusion in group situations.

P.O. 4 **EFFECTIVE CIIZENSHIP** : Ability to an empathetic social concern and equity centered nationaldevelopment and the ability to cut with an informal awareness of issues and participate in civic life through volunteering.

P.O. 5 **ETHICS** : Cultivate ethical values in the study and interpretation of NEPALI Literature, respective diverse perspectives, promoting inclusivity and demonstrating sensitivity to cultural differences. Includ-ing this recognize different value systems including one's own self, understand the moral dimensions ofone's decisions and accept responsibility for the same.

P.O. 6 **ENVIRONMENT AND SUSTAINABILITY** : Ability to understand the issues of environmental con-texts and sustainable development and act accordingly.

P.O. 7 **SELF DIRECTED AND LIFE LONG LEARNING** : Increasing the ability to engage in independentand life-long learning in the broader context of socio-technological changes.

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PROGRAMME SPECIFIC OUTCOME OF B.A. HONOURS IN NEPALI (CBCS SYSTEM)

SESSION 2018-2019 TO 2022-2023

PROGRAMME SPECIFIC OUTCOME (PSO)

P.S.O. 1 - Ability to be familiar with texts and authors from within and outside the syllabus. The students gain theknowledge in communication and writing skills effectively.

P.S.O. 2 Ability to impart their literary consciousness to others simultaneously the student gains the knowledgeand understanding of the various intricacies of the NEPALI grammer and literature.

P.S.O. 3 Ability to judge a work of literature keeping in consideration the generalized, thematic and historicalaspects. Including evaluating the NEPALI literature with social context.

P.S.O. 4 Ability to take initiative in publishing the literary endeavours in wall magazines, news-letters, journalsand individual book with various articles.

P.S.O. 5 Ability to understand the literature in broader areas than merely confined to the subject. So that thestudents can relate literature with other performing arts.

P.S.O. 6 Ability to relate, compare and contrast literature written in other languages including to understand theimportance of NEPALI in the contemporary world literature.

P.S.O. 7 Ability to relate literature with other branches of knowledge like history, political science, philosophy etc. Again with the gain the ability to understanding the relation between society and literature and the role of NEPALI literature in the various socio-political movements.

P.S.O. 8 Ability to study and analyse the critical attitude the philosophy in the literary writings.

P.S.O. 9 Ability to gain the knowledge and writing NEPALI correctly. Simultaneously, it develops the interest inHistory, Asian & Western philosophy, Folk lore, Tradition & Culture and enhance MORAL VALUES.

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PO & CO FOR B.COM.(HONOURS)
DEPARTMENT OF COMMERCE
DARJEELING GOVERNMENT COLLEGE
LEBONG CART ROAD, DARJEELING – 734101

Programme Outcomes (PO)

Program Name: B.Com. Honours Course

1. Foundational Knowledge: Gain a comprehensive understanding of core business principles, including accounting, finance, economics, and management, essential for a career in commerce.

2. Analytical Skills: Develop strong analytical skills to interpret financial data, evaluate market trends, and make informed business decisions.

3. Communication Skills: Enhance communication skills through presentations, written reports, and group projects, crucial for effectively conveying financial information and ideas in professional settings.

4. Critical Thinking: Cultivate critical thinking abilities to assess complex business problems, identify opportunities, and propose innovative solutions.

5. Ethical Awareness: Understand the ethical considerations and responsibilities associated with commerce practices, ensuring integrity and ethical behavior in business operations.

6. Quantitative Proficiency: Acquire proficiency in quantitative methods and analytical tools to analyze financial data, manage budgets, and forecast business performance accurately.

7. Global Perspective: Develop a global perspective on commerce by studying international trade, global markets, and cross-cultural business practices, preparing for a diverse and interconnected business environment.

8. Entrepreneurial Skills: Cultivate entrepreneurial skills by understanding business startup processes, risk management, and innovation strategies, empowering students to pursue entrepreneurial ventures or contribute to business innovation.

9. Professional Development: Enhance professional development through internships, workshops, and industry exposure, gaining practical experience and networking opportunities crucial for career advancement.

10. Adaptability and Lifelong Learning: Foster adaptability and a commitment to lifelong learning to thrive in dynamic business environments, equipped to continuously update skills and knowledge to stay relevant in the ever-evolving field of commerce.

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Course Outcomes (CO): B.Com. (Honours)

Semester	**AECC - 1: ENVIRONMENTAL STUDIES**	
S e	• These course outcomes aim to equip students with the knowledge, skills, andattitudes necessary to understand, address, and advocate for environmental sustainability and conservation.	
	CC – 1: FINANCIAL ACCOUNTING	
	CO I : Theoretical FrameworkCO II: Accounting for Depreciation, Reserves andProvisions CO III: Final Accounts CO IV: Accounting for Hire Purchase and InstallmentPayment Systems, Consignment and Joint Venture CO V: Accounting for InlandBranches CO VI: Accounting for Dissolutionof the Partnership Firm (excluding sale to a company)	• The objective of this course is to help students to acquire conceptual knowledge of the Financial Accountingand to impart skills for recording various kinds of business transactions.
	CC-2: MANAGEMENT PRINCIPLES AND APPLICATIONS	
	CO I: Introduction CO II: Planning and Organizing CO III: Directing and CoordinatingCO IV: Controlling	• The objective of the course is to providethe students with an understanding of basic management concepts, principles and practices.
	GE(H) – 1: AN INTRODUCTION TO ECONOMIC ENVIRONMENTOF INDIA	
	CO I: Indian EconomicEnvironment CO II: Economic Planning andReforms CO III: Sectoral Trends and IssuesCO IV: Major Problems of Indian Economy	• This course seeks to enable the studentsto grasp the knowledge about the economic environment of business in India.

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Semester		
	AECC-2: ENGLISH/MIL COMMUNICATION	
	• These course outcomes aim to develop students' language proficiency, communication skills, and cultural competence in English/MIL, equipping them with the abilities needed to succeed in academic, professional and socialcontexts.	
	CC-3: CORPORATE ACCOUNTING	
	CO I: Accounting for Share Capital& Debentures CO II: Final Accounts CO III: Cash Flow Statement CO IV: Valuation of Goodwill andShares CO V: Amalgamation ofCompanies CO VI: Accounts of Holding Companies/Parent Companies	• To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniquesof preparing the financial statements.
S e	**CC-4: BUSINESS LAW**	
	CO I: The Indian Contract Act, 1872: General Principle ofLaw of Contract CO II: The Indian Contract Act,1872: Specific Contract CO III: The Sale of Goods Act,1930 CO IV: The Limited Liability Partnership (LLP) Act,2008 CO V: Consumer Protection Act, 1986	• The objective of the course is to impart basic knowledge of the important business legislation along with relevantcase laws.
	GE(H)- 2: BUSINESS STATISTICS	
	CO I: Statistical Data and Descriptive Statistics CO II: Probability and Probability Distributions CO III: Simple Correlation andRegression Analysis CO IV: Index Numbers CO V: Time Series AnalysisCO VI: Sampling- Concepts, Distributions andEstimation	• The objective of this course is to familiarize students with the basic statistical tools used for managerial decision-making.

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Semester		
Semester III	**CC - 5: BUSINESS MATHEMATICS**	
	CO I: Matrices and DeterminantsCO II: Calculus-I CO III: Calculus-II CO IV: Mathematics of Finance	• The objective of this course is to familiarize the students with the basic mathematical tools, with an emphasis onapplications to business and economic situations.
	CC- 6: CORPORATE LAWS	
	CO I: Introduction CO II: Documents CO III: ManagementCO IV: Winding Up CO V: The Depositories Act, 1996	• The objective of the course is to impart basic knowledge of the provisions of theCompanies Act, 2013 and the Depositories Act, 1996. Students will also get to know several case studies involving issues of corporate laws.
	CC - 7: HUMAN RESOURCE MANAGEMENT	
	CO I: Introduction CO II: Acquisition of Human Resource CO III: Training and DevelopmentCO IV: Performance Appraisal CO V: Maintenance	• The objective of the course is to acquaint students with the proceduresand principles of managing human resources of an organisation.
	GE(H) – 3: MICRO ECONOMICS	
	CO I: Demand and Consumer Behaviour CO II: Production and CostCO III: Perfect Competition CO IV: Imperfect Competitions	• The objective of the course is to acquaint the students with the concepts of microeconomics dealing with consumer behavior. The course also makes the student understand the supplyside of the market through the production and cost behavior of firms and also the price-output decision of thefirm under different market conditions.

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	SEC (H)-1 : ENTREPRENEURSHIP	
	CO I: Introduction CO II: Micro, Small and Medium Enterprises (MSME) CO III: Entrepreneurial sustainability CO IV: Business Plan Preparations CO V: Mobilizing Resources	• The purpose of the course is to orient the learner toward entrepreneurship as a career option and to imbibe creative thinking in their behavior.

Semester	**CC-8: COST ACCOUNTING**	
S a	CO I: Introduction CO II: Elements of Cost: Material, Labour and Overheads CO III: Methods of Costing CO IV: Book Keeping in Cost Accounting	• To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment and cost accounting book keeping systems.
	CC-9: AUDITING AND CORPORATE GOVERNANCE	
	CO I: Introduction CO II: Audit of Companies CO III: Special Areas of Audit CO IV: Corporate Governance CO V: Business Ethics CO VI: Corporate Social Responsibility (CSR)	• To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility.
	CC-10: PRINCIPLES OF MARKETING	
	CO I: Introduction CO II: Consumer Behaviour and Market Segmentation CO III: Product CO IV: Pricing, Promotion and Distribution CO V: Recent Developments in Marketing	• The objective of this course is to provide basic knowledge of policies, principles and tools and techniques of marketing.
	GE(H)-4: MACRO-ECONOMICS AND QUANTITATIVE TECHNIQUES	

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	CO I: Introduction CO II: Economy in the Short Run CO III: Inflation, Unemployment and Labour Market CO IV: Open Economy CO V: Quantitative Techniques	• The course aims at providing the student with knowledge of basic concepts of the macro-economic tools and techniques that are helpful for policy framework even in open economic concept and also to impart knowledge on quantitative methods in analyzing the situation.

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	SEC(H)-2: E-COMMERCE	
	CO I: Introduction CO II: E-payment System CO III: On-line Business Transactions CO IV: E- Security CO V: IT Act 2000 and Cyber Crimes	• To enable the students to become familiar with the mechanism of dealing with the business transactions through electronic means and the security mechanism.

Semester		
Semester V	**CC-11: FUNDAMENTALS OF INVESTMENT**	
	CO I: The Investment EnvironmentCO II: Fixed Income Securities CO III: Approaches to EquityAnalysis CO IV: Portfolio Analysis andFinancial Derivatives CO V: Investor Protection	• To familiarize the students with different investment alternatives, introduce them to the framework of theiranalysis and valuation and highlight therole of investor protection.
	CC - 12: INCOME TAX LAW AND PRACTICE IN INDIA	
	CO I: Introduction CO II: Computation of Income of Individual under DifferentHeads-(Part-I) CO III: Computation of Income of Individual under DifferentHeads-(Part-II) CO IV: Computation of Total Income and Tax Liabilityof Individual	• To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961and the relevant Rules.
	DSE(H) – 1(a): COMPUTER APPLICATIONS IN BUSINESS	
	CO I: Word Processing CO II: Preparing PresentationsCO III: Spreadsheet and its Business ApplicationsCO IV: Creating Business Spreadsheet	• To provide computer skills and knowledge among the students of commerce and to enhance their understanding of usefulness of information technology tools for business operations.
	DSE(H)-1 (b): COMPUTERISED ACCOUNTING AND SYSTEMS	
	CO-I: Computerized AccountingSystems CO-II: Preparation of Return ofIncome CO-III: Computerized Accounting:Using Generic Software	• This course seeks to enhance the skills needed for computerized accounting system and to enable the students to develop simple accounting applications.

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	DSE(H) – 2 (a): MANAGEMENT ACCOUNTING	
	CO I: Introduction CO II: Ratio Analysis CO III: Budgetary Control CO IV: Standard Costing CO V: Marginal Costing and Decision-Making CO VI: Contemporary Issues	• To impart knowledge among the students about the use of financial, costand other data and their analysis for thepurpose of managerial planning, controland decision making.
	DSE(H)-2 (b): ADVERTISING	
	CO I: Advertising- Concept, Objectives and Budgeting CO II: Media Decisions CO III: Message DevelopmentCO IV: Measuring Advertising Effectiveness CO V: Advertising Agency	• The objective of this course is to familiarize the students with the basic concepts, tools and techniques of advertising used in marketing.

Semester	**CC-13: FUNDAMENTALS OF FINANCIAL MANAGEMENT**	
Semester VI	CO I: Introduction CO II: Investment DecisionsCO III: Financing Decision CO IV: Dividend Decisions CO V: Working Capital Decisions	• To familiarize the students with the principles and practices of managing finance for short-term and long-term requirements.
	CC - 14: GOODS AND SERVICES TAX AND CUSTOMS DUTY	
	CO-I: Concept of Indirect TaxesCO-II: Goods and Services Tax (GST) Laws CO-III: Customs Law as containedin the Customs Act, 1962and the Customs Tariff Act, 1975	• This course aims at a glance towards the understanding of Indirect Taxes as prevail in India. The students will be exposed to Indirect Taxes as a whole aswell as will be trained to computationaltechniques of Indirect Taxes in India.
	DSE(H) - 3 (a): BUSINESS RESEARCH METHODS AND PROJECTWORK	
	CO I: Introduction CO II: Research Process CO III: Measurement and Hypothesis TestingCO IV: Report Preparation	• This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze,present and interpret data.

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	DSE(H) - 3(b): BANKING AND INSURANCE	
	CO I: Introduction CO II: Cheques and Paying Banker CO III: Bank Lending CO IV: Internet Banking CO V: Risk and Insurance	• To impart knowledge about the basic principles and practices of the banking and insurance.
	DSE(H) - 4 (a): FINANCIAL MARKETS, INSTITUTIONS AND FINANCIAL SERVICES	
	CO I: Introduction CO II: Financial Markets CO III: Financial Institutions CO IV: Financial Services CO V: Leasing and Hire–purchase	• To provide basic knowledge to the students about the financial markets and institutions and to familiarize them with major financial services in India.
	DSE(H) - 4 (b) INDUSTRIAL RELATIONS AND LABOUR LAWS	
	CO I: Industrial Relations CO II: Trade Union CO III: Collective Bargaining and Workers' Participation in Management CO IV: Discipline and Grievance Redressal CO V: Labour Laws	• To enable the students to learn the concepts of industrial relations including trade unions, collective bargaining, discipline and various labour enactments.

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Programme Outcomes (PO)

Program Name: B.Com. Program Course

1. Foundational Knowledge: Gain a comprehensive understanding of core business principles, including accounting, finance, economics, and management, essential for a career in commerce.

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9. Professional Development: Enhance professional development through internships, workshops, and industry exposure, gaining practical experience and networking opportunities crucial for career advancement.

10. Adaptability and Lifelong Learning: Foster adaptability and a commitment to lifelong learning to thrive in dynamic business environments, equipped to continuously update skills and knowledge to stay relevant in the ever-evolving field of commerce.

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Course Outcomes (CO): B.Com. (Program)

<table>
<tr><td>Semester</td><td colspan="2">AECC - 1: ENVIRONMENTAL STUDIES</td></tr>
<tr><td rowspan="8">Semester I</td><td colspan="2">• These course outcomes aim to equip students with the knowledge, skills, and attitudes necessary to understand, address, and advocate for environmental sustainability and conservation.</td></tr>
<tr><td colspan="2">DSC - 1: FINANCIAL ACCOUNTING</td></tr>
<tr><td>CO I : Theoretical Framework
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CO VI: Accounting for Dissolution of the Partnership Firm (excluding sale to a company)</td><td>• The objective of this course is to help students to acquire conceptual knowledge of the Financial Accounting and to impart skills for recording various kinds of business transactions.</td></tr>
<tr><td colspan="2">DSC-2: MANAGEMENT PRINCIPLES AND APPLICATIONS</td></tr>
<tr><td>CO I: Introduction
CO II: Planning and Organizing
CO III: Directing and Coordinating
CO IV: Controlling</td><td>• The objective of the course is to provide the students with an understanding of basic management concepts, principles and practices.</td></tr>
<tr><td colspan="2">LCC-1: MAJOR INDIAN LANGUAGE-1</td></tr>
<tr><td colspan="2">• These course outcomes aim to develop students' language proficiency, communication skills, and cultural competence in English/MIL, equipping them with the abilities needed to succeed in academic, professional and social contexts.</td></tr>
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Phone / Fax : (0354) 2254078
(0354) 2254019
Email : dgc.principal@gmail.com

<table>
<tr><td>Semester</td><td colspan="2">AECC-2: ENGLISH/MIL COMMUNICATION</td></tr>
<tr><td rowspan="6">Semester II</td><td colspan="2">• These course outcomes aim to develop students' language proficiency, communication skills, and cultural competence in English/MIL, equipping them with the abilities needed to succeed in academic, professional and social contexts.</td></tr>
<tr><td colspan="2">LCC-2: ENGLISH-I</td></tr>
<tr><td colspan="2">• These course outcomes aim to develop students' language proficiency, communication skills in English, equipping them with the abilities needed to succeed in academic, professional and social contexts.</td></tr>
<tr><td colspan="2">DSC-3: CORPORATE ACCOUNTING</td></tr>
<tr><td>CO I: Accounting for Share Capital & Debentures
CO II: Final Accounts
CO III: Cash Flow Statement
CO IV: Valuation of Goodwill and Shares
CO V: Amalgamation of Companies
CO VI: Accounts of Holding Companies/Parent Companies</td><td>• To help the students to acquire the conceptual knowledge of the corporate accounting and to learn the techniques of preparing the financial statements.</td></tr>
<tr><td colspan="2">DSC-4: BUSINESS LAW</td></tr>
<tr><td>CO I: The Indian Contract Act, 1872: General Principle of Law of Contract
CO II: The Indian Contract Act, 1872: Specific Contract
CO III: The Sale of Goods Act, 1930
CO IV: Partnership Laws: The Limited Liability Partnership Act, 2008
CO V: Consumer Protection Act, 1986</td><td>• The objective of the course is to impart basic knowledge of the important business legislation along with relevant case laws.</td></tr>
</table>

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<table>
<tr><td>Semester</td><td colspan="2">DSC - 5: BUSINESS MATHEMATICS</td></tr>
<tr><td rowspan="8">Semester</td><td>CO I: Matrices and Determinants
CO II: Calculus-I
CO III: Calculus-II
CO IV: Mathematics of Finance</td><td>• The objective of this course is to familiarize the students with the basic mathematical tools, with an emphasis on applications to business and economic situations.</td></tr>
<tr><td colspan="2">DSC- 6: CORPORATE LAWS</td></tr>
<tr><td>CO I: Introduction
CO II: Documents
CO III: Management
CO IV: Winding Up
CO V: Depositories Law</td><td>• The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. Students will also get to know several case studies involving issues of corporate laws.</td></tr>
<tr><td colspan="2">LCC-1: MAJOR INDIAN LANGUAGE-2</td></tr>
<tr><td colspan="2">• These course outcomes aim to develop students' language proficiency, communication skills, and cultural competence in Major Indian Language-2, equipping them with the abilities needed to succeed in academic, professional and social contexts.</td></tr>
<tr><td colspan="2">SEC (P)-1: ENTREPRENEURSHIP</td></tr>
<tr><td>CO I: Introduction
CO II: Micro, Small and Medium Enterprises (MSME)
CO III: Entrepreneurial sustainability
CO IV: Business Plan Preparations
CO V: Mobilizing Resources</td><td>• The purpose of the course is to orient the learner toward entrepreneurship as a career option and to imbibe creative thinking in their behavior.</td></tr>
</table>

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Semester		
Semester	**DSC-7: COST ACCOUNTING**	
	CO I: Introduction CO II: Elements of Cost: Material, Labour and Overheads CO III: Methods of Costing CO IV: Book Keeping in Cost Accounting	• To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment and cost accounting book keeping systems.
	DSC-8: AUDITING AND CORPORATE GOVERNANCE	
	CO I: Introduction CO II: Audit of Companies CO III: Special Areas of Audit CO IV: Corporate Governance CO V: Business Ethics CO VI: Corporate Social Responsibility (CSR)	• To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards and to give an overview of the principles of Corporate Governance and Corporate Social Responsibility.
	LCC – 2: ENGLISH – 2	
	• These course outcomes aim to develop students' language proficiency, communication skills in English, equipping them with the abilities needed to succeed in academic, professional and social contexts.	
	SEC(P)-2: E-COMMERCE	
	CO I: Introduction CO II: Security and Encryption CO III: IT Act 2000 and Cyber Crimes CO IV: E-payment System CO V: On-line Business Transactions	To enable the students to become familiar with the mechanism of dealing with the business transactions through electronic means and the security mechanism.

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Semester		
S e	**DSE(P)-1(a): INCOME TAX LAW AND PRACTICE IN INDIA**	
	CO I: Introduction CO II: Computation of Income of Individual under Different Heads-I CO III: Computation of Income of Individual under Different Heads-II CO IV: Computation of Total Income and Tax Liability of Individual	• To provide basic knowledge and equip students with application of principles and provisions of Income-tax Act, 1961 and the relevant Rules.
	DSE(P)-1(b): HUMAN RESOURCE MANAGEMENT	
	CO I: Introduction CO II: Acquisition of Human Resource CO III: Training and Development CO IV: Performance Appraisal CO V: Maintenance	• The objective of the course is to acquaint students with the procedures and principles of managing human resources of an organization.
	DSE (P)-2 (a): MANAGEMENT ACCOUNTING	
	CO I: Introduction CO II: Ratio Analysis CO III: Budgetary Control CO IV: Standard Costing CO V: Marginal Costing and Decision-Making	• To impart knowledge among the students about the use of financial, cost and other data and their analysis for the purpose of managerial planning, control and decision making.
	DSE (P)-2 (b) COMPUTERISED ACCOUNTING AND SYSTEMS	

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	CO-I: Computerized Accounting Systems CO-II: Preparation of Return of Income CO-III: Computerized Accounting: Using Generic Software	• This course seeks to enhance the skills needed for computerized accounting system and to enable the students to develop simple accounting applications.

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	GE(P) – 1: ELEMENTARY CONCEPTS OF MICRO AND MACRO ECONOMICS	
	CO I: Demand Analysis CO II: Production and Cost CO III: Perfect Competition and Imperfect Competitions CO IV: Introduction to Macroeconomics CO V: Inflation, Unemploymentand Open Economy	• The objective of the course is to acquaint the students with the conceptsof micro macroeconomics. The coursealso enhances the understanding of the market through the production and cost behavior of firms and thereby to frame the policies of the economy as a whole.
	SEC(P) - 3: COMPUTER APPLICATIONS IN BUSINESS	
	CO I: Word Processing CO II: Preparing PresentationsCO III: Spreadsheet and its Business ApplicationsCO IV: Creating Business Spreadsheet	• To provide computer skills and knowledge among the students of commerce and to enhance their understanding of usefulness of information technology tools for business operations.

Semester	**DSE(P) – 3(a): GOODS AND SERVICES TAX AND CUSTOMS DUTY**	
Semester VI	CO-I: Concept of Indirect TaxesCO-II: Goods and Services Tax (GST) Laws CO-III: Customs Law as containedin the Customs Act, 1962and the Customs Tariff Act, 1975	• This course aims at a glance towards the understanding of Indirect Taxes as prevail in India. The students will be exposed to Indirect Taxes as a whole aswell as will be trained to computationaltechniques of Indirect Taxes in India.
	DSE(P) - 3 (b): PRINCIPLES OF MARKETING	
	CO I: Introduction CO II: Consumer Behaviour andMarket Segmentation CO III: Product CO IV: Pricing, Promotion and Distribution CO V: Recent Developments in Marketing	• The objective of this course is to provide basic knowledge of concepts, policies, principles and tools and techniques of marketing.
	DSE(P) – 4(a): FINANCIAL MARKETS, INSTITUTIONS AND FINANCIAL SERVICES	
	CO I: Introduction CO II: Financial Markets CO III: Financial InstitutionsCO IV: Financial Services CO V: Leasing and Hire–purchase	• To provide the student a basic knowledge of financial markets and institutions and to familiarize them withmajor financial services in India.

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	DSE(P) - 4(b): BANKING AND INSURANCE	
	CO I: Introduction CO II: Cheques and Paying Banker CO III: Bank Lending CO IV: Internet Banking CO V: Risk and Insurance	• To impart knowledge about the basic principles and practices of the banking and insurance.
	GE(P)-2: BUSINESS STATISTICS	
	CO I: Statistical Data and Descriptive Statistics CO II: Probability CO III: Simple Correlation and Regression Analysis CO IV: Index Numbers CO V: Time Series Analysis	• The objective of this course is to familiarize students with the basic statistical tools used for managerial decision-making.
	SEC(P)-4: BUSINESS COMMUNICATION	
	CO I: Nature of Communication CO II: Business Correspondence CO III: Report Writing CO IV: Oral Presentation	• To equip students of the B. Com course effectively to acquire skills in reading, writing, comprehension, and communication, as also to use electronic media for business communication.

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CO & PO for B.A in Tibetan
Darjeeling Government College

Programme Outcomes

- **Basic Communication Skills**: Student will be able to engage in basic conversations with native speakers, like greetings, asking for directions, ordering food, and other daily activities.

- **Cultural Understanding**: These provide student insights into Tibetan culture, traditions, and society. Further this understanding can deepen their exposure to Tibetan literature, music, and art.

- **Academic Pursuits**: Modern Tibetan is an important language for scholars and researchers interested in Tibetan history, culture and tradition especially Tibetan Buddhist studies. Proficiency in Modern Tibetan can open up opportunities for academic research and collaboration.

Programme Specific Outcome: PSO

Graduates of the Modern Tibetan Studies program will be able to:

- Achieve advanced proficiency in reading, writing, speaking, and comprehending modern Tibetan language.
- Students will be able to engage in conversations, write scholarly articles, and understand contemporary literature and soforth
- Analyze and interpret the social, political, and cultural developments in modern Tibetan society
- Actively participate in contributing in preserving and promoting Tibetan language, cultural heritage in the modern context,
- Conduct independent and collaborative research using modern methodologies in Tibetan studies.
- Utilize modern Tibetan language skills and cultural knowledge in professional settings such as translation, interpretation, teaching, and media.

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Program Name : B.A Modern Tibetan			
SEMESTER	COURSE NAME	SYLLABUS	COURSE OUTCOME
SEM-I	GE-01	Introduction to Tibetan Grammar & History of Tibetan	The course covers the understandingthe concept of linguistic as well as historical studies. • It will acquire proficiency inreading and writing. • Acquires the knowledge of theorigins of Tibetan language and key historical events that have shaped the language. • Apart from linguistic and historical knowledge, studentsmay gain insights into Tibetanculture, traditions, and society. • Overall, the course outcome would aim to provide studentswith a fundamental understanding of Tibetan language, grammar, and history, allowing them to partake in Tibetan texts, culture, and society
SEM-II	GE-02	Poetry	Studying poetry will increase indeveloping of a rich vocabularyspecifically Tibetan poetry and literature. • It will familiarize them withCanonical Works. • Further poetry will give Insight into various poetic forms, styles, and genres inmodern Tibetan literature. • Overall, a program in modern Tibetan, poetry aims to produce graduates who are notonly proficient in the language but also deeply knowledgeable

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			about Tibetan literarytraditions and culture.
SEM-III	GE-03	Hagiography (IndianBuddhist Masters)	The study of the hagiography of Indian Buddhist masters in modern Tibetan can lead to several significantoutcomes, encompassing linguistic, cultural, academic, and spiritual aspects. • Students will gain advancedskills in reading and interpreting classical and Modern Tibetan texts. • An extensive understanding ofthe historical figures and their impact on Tibetan Buddhist traditions. • Understanding and using technical terms related to Buddhist hagiographies.
SEM-IV	GE-04	Prose Text in Tibetan	Studying prose texts in Tibetan can lead to a several beneficial outcomesacross different field like: • It improves reading, writing, and comprehension skills in modern and classical Tibetan. • A deeper understanding of Tibetan grammar, syntax, andeloquent conventions used in prose writing. • Acquires comprehensive knowledge of historical andcultural background. • Understand the development of Tibetan prose literature overtime.
SEM-I & II	MINOR	History of Tibetan Script and Introductionto Tibetan Preliminary Grammas Unit-I	Studying the origin of Tibetan writingits script and grammar, students will be able to learn various concepts of linguistic as well as grammar: • Students will learn to use the

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		Unit-II Unit-III	vocabulary, grammar both written and oral. • It will enable the learner to read, write and understand basic Tibetan language the formation of words and sentences. • It will also enable the students to recognize and use homophones
SEM-I & II	MDC	Introduction to Tibetan Writing and Tibetan Traditions	By the end of this course Students will be able to learn various subjects like: • The course will enable the learner to read, write and understand basic Tibetan language. • It will make aware to the scholar Tibetan tradition in Tibet and in India. • Students will also learn to use the vocabulary, grammar both written and oral. • Overall the student will gain knowledge both in Tibetan Language and Culture

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