RAJA PEARY MOHAN COLLEGE

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (LOCF)

PRINCIPAL
Raja Peary Mohan College
Uttarpara, Hooghly

DEPARTMENT OF ENGLISH
RAJA PEARY MOHAN COLLEGE

B. A. Honours in English

Programme Outcome, Programme Specific Outcome
and Course Outcomes
(PO, PSO & COs)

English Literature courses in the Department of English expose students to a wide range of writing from British, American and Anglophone traditions. Students are expected to strive, to be imaginative, rhetorically dexterous, and technically proficient and as a result, to gain a deeper insight into life. For the old syllabus under 1+1+1 system, students take a yearly examination and the departmental teachers guide them through graded progression and class tests. There is one long paper on creative writing and faculties ensure that they perform well in that paper. Teachers make them understand and practise creative writing to acquaint them with the writing process. Students also arrange small class presentations to develop both their speaking and writing skills. And with the introduction of new syllabus under CBCS from 2018, which promotes a new thematic frame work where classical literature shares space with contemporary literary crosscurrents, UG syllabus at RPMC helps students build skills of analytical and interpretive argument, and become careful and critical readers. Again, students' engagement with various strategies of drafting and revising, style of writing and analytical skills, diagnosing and developing scholarly methodologies, use of language as a means of creative expression, will make them effective thinkers and communicators — qualities which are crucial for choosing careers in our information-intensive society.

PROGRAMME OUTCOMES (FOR ALL COURSES):

The College adapts outcome-based education rather than input oriented bell-shaped curve of learning. The following mechanism is followed by the institution to communicate the learning outcomes to the teachers and students.

 At least five hours are spent by the teachers for introducing the subject to the students.

 Learning Outcomes of the courses are observed and measured periodically.

 Soft copy of Curriculum and Learning Outcomes of Programmes and Courses are uploaded on the Institution website for reference.

 The importance of the learning outcomes has been communicated to the teachers in every IQAC Meeting and Staff Meeting.

 The students are also communicated about the Programme outcomes, Programme Specific Outcomes and Course Outcomes through Tutorial Meetings.

PROGRAMME SPECIFIC OUTCOMES: B.A. ENGLISH

- **Objectives:**

- Educate students in both the aesthetics and utility of the English language through the study of literature and other contemporary forms of culture.
- Provide students with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.
- Nurture graduate students who are capable of performing research, analysis, and criticism of literary and cultural texts from different historical periods and genres.
- Assist students in the development of intellectual flexibility, creativity, and cultural literacy.

OUTCOMES:

PSO1: On pursuing English Literature, the students gain a deep understanding of the resources of the written word, whether it is fiction, poetry, non-fictional prose or drama. While reading complex texts they can actively recognize key passages, raise questions, appreciate complexity and ambiguity and comprehend the literal and figurative uses of language.

PSO2: It helps students to build skills of analytical and interpretive arguments; become careful and critical readers, practice writing in a variety of genres as a process of intellectual inquiry, creative expression and ultimately to become more effective thinkers and communicators who are well equipped for a variety of careers in our information intensive society.

PSO3: Students gain an understanding of the relations between culture, history and texts. They learn to use texts as a gateway to various cultural traditions and interpret them in their historical contexts. How a literary text can appear as an ideal platform to locate dominant and marginalized voices of a society, is an important focus of the under-graduate literature programme.

PSO4: Students of English Honours should also be able to articulate the ideological and political aspects of representation, economic processes of textual production, dissemination,

reception and cross-fertilization with other arts: architecture, sculpture, music, film, painting, dance and theatre.

PSO5: Literature course teaches a student to believe that one's own sense of identity is not enough to persuade the rest of the world to agree. Human beings are no longer bound by such binary concepts as male-female or masculine-feminine. They will learn that sex is a biological concept based on biological characteristics, whereas gender deals with personal, societal and cultural perceptions of sexuality. Appropriation of literary texts as tools of cultural study will help students to challenge centuries of social tradition and scientific belief which promote such differentiations.

PSO6: It provides imagination and critical insights into all areas of human experience- war and peace, nature and culture, love and sexuality, selfhood and social identity, justice and atrocity, the burdens of history and the dreams of the future.

PSO7: Increases confidence in speaking publicly, articulate clear questions and ideas in class discussion; listen thoughtfully and respectfully to other ideas and prepare, organize and deliver engaging oral presentations.

PS08: Students will be able to recognize and comprehend different varieties of English language and develop a writing style of their own. English honours students should be aware also that textual analysis can be extended with profit to political, journalistic, commercial, technical, and web-based writing. It is expected that their exposure to the ideas of variety of writers and their cultural backgrounds, will have a bearing in their own literary styles. With the development of their writing skills and finesse of style there will be a possibility of them emerging as perspective writers, editors, content developers, teachers etc.

PSO9: Study of literature is intertwined with the study of language. Learning various language patterns, sentence structures and dialogue forms can help one in real life in effectively communicating with others. English is the language of science, computers, diplomacy and tourism. Knowing English increases students’ chances of getting a good job in future.

Semester-wise Course for B.A. (Honours) in Philosophy

	Sem-1	Sem-2	Sem-3	Sem-4	Sem-5	Sem-6
Core Course (CC)	2TH+2TU CC-1&2	2TH+2TU CC-3&4	3TH+3TU CC-5,6 &7	3TH+3TU CC-8,9 &10	2TH+2TU CC-11&12	2TH+2TU CC-13&14
Discipline Specific Elective (DSE)					2TH+2TU DSE–A(1) +B(1)	2TH+2TU DSE–A(2) +B(2)
Skill Enhancement Course (SEC)			1TH+0TU SEC-A(1)	1TH+0TU SEC-B(2)		
Generic Elective (GE)	1TH+1TU GE-1	1TH+1TU GE-2	1TH+1TU GE-3	1TH+1TU GE-4		
Ability Enhancement Compulsory Course (AECC)	1TH+0TU AECC-1	1TH+0TU AECC-2				
Total No. of Courses and Marks	**4 x 100 = 400**	**4 x 100 = 400**	**5 x 100 = 500**	**5 x 100 = 500**	**4 x 100 = 400**	**4 x 100 = 400**
Total Credits	**20**	**20**	**26**	**26**	**24**	**24**

TH = Theory T = Tutorial

- CC/GE/DSE : Each theory and Tutorial Course have 5 and 1 Credit(s) respectively
- GE : Covering two subjects with two courses each; any subject in any semester; CC of a different subject in general course is to be treated as GE for Honours Course
- DSE/SEC : Group (A&B) for specified semesters
- AECC/SEC : Each Course has 2 Credits
- AECC-1 : Communicative English / MIL; AECC-2 : Environmental Studies

FORMAT OF THE SEMESTERS:

Semester 1

CC1 – History of Literature and Philology

CC2 – European Classical Literature

Semester 2

CC3 – Indian Writing in English

CC4 – British Poetry and Drama (14^{th} – 17^{th} century)

Semester 3

CC5 – American Literature

CC6 – Popular Literature

CC7 – British Poetry and Drama (17^{th} – 18^{th} century)

Semester 4

CC8 –BRITISH LITERATURE (18TH CENTURY)

CC9 –BRITISH ROMANTIC LITERATURE

CC10 –19TH CENTURY BRITISH LITERATURE

Semester 5

CC11 – WOMEN'S WRITING

CC12 – EARLY 20TH CENTURY BRITISH LITERATURE

Semester 6

CC13 – Modern European Drama

CC14 – Postcolonial Literature

DISCIPLINE SPECIFIC ELECTIVE COURSE

DSE-A-(1) AND DSC-B-(1) in Semester 5 and DSE-A-(2) AND DSC-B-(2) in Semester 6

DSE A-1- Translation Studies

DSE – A- 2- Partition Literature

DSE –B-1-- Literary types, Rhetoric and Prosody

DSE –B-2— Text and Performances

SKILL ENHANCEMENT COURSE

SEC-A-(1) in Semester 3 and SEC-B-(2) in Semester4

SEC –A-(1)- Business Communication

SEC –B-(2)- Creative Writing

AECC1 – Communicative English

SEMESTER-WISE COURSE OUTCOMES IN B.A. HONOURS (ENGLISH):

AECC1 – COMMUNICATIVE ENGLISH: 2 CREDITS (SEMESTER 1)

- This course will help the students to grasp a good knowledge about English grammar and effectively help to enhance their communicative skills.

CC (H) 1: Group A: HISTORY OF ENGLISH LITERATURE AND PHILOLOGY (SEMESTER 1)

After Completion of this Course Students will be able to

- Trace the developmental history of English Literature from Old English Period to 20th century.
- Show familiarity with major literary works by British writers in the field of poetry, fiction and drama.
- Be acquainted with major social, political and religious movements from 14th to 19th century and their influence on literature.
- Learn various interpretative techniques to approach literary texts of varied genres.
- Trace the origin and evolution of English language.

CC (H) 2: EUROPEAN CLASSICAL LITERATURE (SEMESTER 1)

- This paper in the UG level will provide students an opportunity to know European classical texts in translation.
- It gives them an idea of how these texts of antiquity shaped the canon of western philosophical and literary tradition.

CC (H) 3: INDIAN WRITING IN ENGLISH (SEMESTER 2)

- The purpose of this course is to provide an overview of the various phases of the evolution of Indian writing in English and to introduce students to the thematic concerns, genres and trends of Indian writing in English.

CC (H) 4: BRITISH POETRY AND DRAMA (14TH –17TH CENTURY) (SEMESTER 2)

- The purpose of this course is to introduce the students to the basic elements of British poetry and drama and enrich the students with different perspectives of critical thinking regarding the genres.

CC (H) 5: **AMERICAN LITERATURE (SEMESTER 3)**

- The purpose of this course is to acquire knowledge about American literature, its cultural themes, literary periods and key artistic features and to understand the various aspects of American society through a critical examination of the literary texts representing different periods and cultures.

CC (H) 6: POPULAR LITERATURE (SEMESTER 3)

After Completion of this Course Students will be able to,

- Know the meaning of Popular Literature and its distinct characters.
- Read and understand some of the representative popular literary pieces.
- Understand how formulaic elements create the ideal world without limitations or uncertainties in readers' imagination.
- Probe into the literary and aesthetic merits of popular fictions.

CC (H) 7: BRITISH POETRY AND DRAMA (17TH - 18TH CENTURY) (SEMESTER 3)

After completion of this course students will be able to,

- Trace the developmental history of English Literature of 17th and 18th century
- Show familiarity with major literary works by British writers in the field of Epic, Drama and Poetry.
- Be acquainted with major religious, political and social movements from 17th to 18th century and their influence on literature.
- Learn various interpretative techniques to approach literary texts of varied genres.

SEC-A1 (SEMESTER 3)

TRANSLATION STUDIES:

- The study of translation usually includes the analysis of key texts, enabling students to develop an awareness of the problems of understanding and interpretation. It also involves the development of the analytical, practical, evaluative, aesthetic, and expository skills required to address translation problems.

SEC-A2 (SEMESTER 3)

BUSINESS COMMUNICATION

- This course will help the students to sharpen their formal and informal communication skill by making them ready to face the job market.

CC (H) 8: 18th CENTURY BRITISH LITERATURE (SEMESTER 4)

- Eighteen Century English Prose will help to develop critical thinking in students and to enable them to write and appreciate different types of prose.
- Eighteen Century Poetry will help to introduce the students to the basic elements of poetry and to enrich the students through various perspectives readings in poetry.
- Reading 18th century fiction will help to develop critical thinking and imagination through long and short fiction and to familiarize students with cultural diversity through different representative samples of fiction.

CC (H) 9: BRITISH ROMANTIC LITERATURE (SEMESTER 4)

This course will help the students to embrace,

- A fascination for the strange and the mysterious leading to a yearning for the past.
- An idea about supernaturalism and orientalism.
- Awakening of imagination.
- Love of Nature.
- Intense intellectual curiosity.
- Keen ideas of Liberty.
- Insistence on autonomy of the individual and subjectivity.

CC (H) 10: 19TH CENTURY BRITISH LITERATURE (SEMESTER 4)

This course will help the students to understand,

- A rich harvest of scientific and philosophical writings; loss of faith and spiritual bewilderment.
- Growing concerns for social evils and conditions arising out of the Industrial Revolution.
- How the Education Acts made primary education compulsory which led to a steadily swelling readership.

SEC-B1 (SEMESTER 4)

After completion of this course students will be able to,

- Know the process of beginning and growth of English language.
- Know about various innovative ways of using English language in verbal and non-verbal communications.
- Write clearly, effectively, and creatively, and adjust writing style appropriately to the content, the context, and nature of the subject.
- Think about the relation between language and literature.

SEC-B2 (SEMESTER 4)

ACADEMIC WRITING AND COMPOSITION:

- This course will help students to sharpen their language skills and to make them write error free and correct grammatical sentences. This will make their skill of academic writing stronger.

CC (H) 11: WOMEN'S WRITING (SEMESTER 5)

- The students will have an awareness of class, race and gender as social constructs and about how they influence women's lives.
- The students will have acquired the skill to understand feminism as a social movement and a critical tool.
- They will be able to explore the plurality of female experiences.
- They will be equipped with analytical, critical and creative skills to interrogate the biases in the construction of gender and patriarchal norms

CC (H) 12: **EARLY 20TH CENTURY BRITISH LITERATURE (SEMESTER 5)**

CC (H) 13: MODERN EUROPEAN DRAMA (SEMESTER 6)

After completion of both these courses (CC 12 and CC 13) students will be able to,

- Know about the meaning and scope of the concepts of the Modern/Modernity/Modernism.
- Study and interpret representative writings from the early 20th century.
- Acquaint themselves with the great tradition of modern European poetry and fiction and plays.

- Examine various literary techniques that writers of 20th century use in writing their texts, and demonstrate an understanding of these techniques.
- Reflect upon the great upheaval that the world has undergone during 20th century and the constructive role of literary activism/movements in restoring humane values.

CC (H) 14: **POSTCOLONIAL LITERATURES (SEMESTER 6)**

- Know how a literary text, explicitly or allegorically, represents various aspects of colonial oppression.
- Question how a text reveals the ambiguity of post-colonial identity.
- Learn how a text reveals about the politics and/or psychology of anti-colonialist resistance.
- Trace the history of post-colonial movements in India and its textual representations.
- Locate and represent subaltern voices through their own writings.

PSO-

1. After completing honours degree students can go for higher studies and they have an opportunity to prepare themselves for various competetive examinations,
2. They can opt for teaching in the primany, secondary and higher level
3.They aquire knowledge to opt for comparative literatue as an interdisciplinary approach.
4. They can opt for research in linguistics
5. They can opt for translation related jobs

PO-

1. Students can take part in competetive examinations
2. They can take tearchr's training and opt for teaching
3. They can opt for higher studies through distance learning system

CO-

1. One needs to learn their mother language first interms of learning other languages
2. Humanities and Linguistics studies give an opportunity to use imagination power which help one to grow as a person and drive one to learn more about it.

RAJA PEARY MOHAN COLLEGE

Department of Sanskrit

B.A Honours in Sanskrit

Programe Specific Outcome, Course Outcome, Programe Outcome

(PSO, CO, PO)

Program Outcome

Program Outcome represent the knowledge, skills and attitudes of the students should have at the end of Graduate Degree Course. It is a broad statements that describe the career and professional accomplishments in Three years after graduation that the program is preparing graduates to achieve.

B.A Honors in SANSKRIT

From the Academic Session 2017-2018,CBCS program in Sanskrit was introduced by the Calcutta University, which is our affiliating University at present. The first batch of students under the newly introduced semester system is, therefore, supposed to complete graduation in the year 2021. Our departmental faculty members pondered over the current syllabi and tried to chalk out some general outcomes for B.A. Degree Programs of their own. Such expected Program Outcomes may be listed as follows:

1. **Course Selection:** The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses.
2. **Evaluation Process:** The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system.
3. **Discrimination:** The CBCS aims at diminishing the discrimination between HONOURS and GENERAL courses of study.
4. **Scope :** . Under the CBCS, the graduating batch of students, both HONOURS and GENARAL would be eligible for pursuing Postgraduate Courses of studies.
5. **Grading System :** It will also enable for assessing the performance of the candidates. This uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations.
6. **Academic Load:** Under the CBCS, the academic load will distributed among the departmental faculty members. Besides, there will be provision for remedial classes to cover all syllabus. This will definitely add momentum to the teaching, learning and evaluation process.
7. **Research Methodology:** : Every Academic Session under the CBCS will take care to make the students familiar with the existing trends in Research Methodology, and there will be a Scope to get some primary concepts of academic research among the undergraduate students.
8. **Employment:** Students graduating by this programme become able to get a good job.

PROGRAM SPECIFIC OUTCOME

PSOs are statements that describe what the graduates of a specific Honours and General program should be able to do.It specify the students either they will get about their career what they want or not.

The term 'Sanskrit' is derived from the conjoining of the prefix 'Sam' meaning 'samyak' which indicates 'entirely', and 'krit' that indicates 'done'. Thus, the name indicates perfectly or entirely done in terms of communication, reading, hearing, and the use of vocabulary to transcend and express an emotion. An extraordinarily complex language with a vast is an ancient religious scriptures. Many identify Sanskrit as being a connect to our ancient history and religious scriptures. But contrary to the popular opinion Sanskrit is not a language restricted to the religion. Sanskrit is a language first which by the very meaning

translates to “sculpted to perfection”.It is a language more evolved and richer than any other yes it`s centuries old to be precise sage Panini laid out the grammar rules in 500 BCE yet, it manages to be of use and relevance to us now and the coming future. It is always been so much more than religious texts. There are actually lot more non-religious texts written in every subject we can imagine astronomy, Physiology, metallurgy, botany and so much more.

So we can say that Sanskrit is the pathway which connects the past of ancient India to the present digital India . Indian historical society and culture are unique . This contextually specificity of Indian social realities could be grasped through Sanskrit texts.

The academic program, both Honours and General courses enable the students not only to acquire the professional skills but also enrich by a deep understanding of Past scenario of Indian heritage through various texts in different disciplines of ancient pedagogy, composed in Sanskrit .

Outcome:

PSO 1. A student pursuing this course has advanced knowledge of ancient Indian philosophy, literature and history.

PSO 2. They are able to know the Vedic Literature and classical Sanskrit literature.

PSO 3. It helps students explore how writers use the creative resources of language-in fiction, poetry, nonfiction prose, and drama-to explore the entire range of human experience.

PSO 4. Students are expected to strive, to be imaginative, rhetorically dexterous, and technically proficient and as a result, to gain a deeper insight into life.

PSO 5. With the introduction of new syllabus under CBCS, which promotes a new thematic frame work with vedic and classical Sanskrit literature. Inscriptional literature also help the student to know the ancient society and culture of India.

PSO 6. UG syllabus will help students build skills of analytical and interpretive argument, and become careful and critical readers.

PSO 7. Again, students’ engagement with various strategies of drafting and revising, style of writing and analytical skills, diagnosing and developing scholarly methodologies.

PSO 8.By using of language as a means of creative expression, will make the students effective thinkers and communicators — qualities which are crucial for choosing careers in our information-intensive society.

COURSE OUTCOME
Sanskrit Honors and General

The subject Sanskrit is a subject of self education through which students can learn to understand and enhance their overall wellbeing along with academic achievements.

Outcomes:

- **Scope for doing Masters:** In spite of being general degree course, the subject provides opportunity for doing Masters in Sanskrit from various universities like IGNOU, RBU etc..

- **Self Management:** Studying the undergraduate course of Sanskrit, students are familiar with Srimadbhaagavatgita, Ramayana, Mahabharata,Pouranic literature, Vedic God ,Vedic society and culture and also ethical, moral conduct oneself in accordance with the accepted norms and society. It can help the students in dealing with challenges like everyday life stress, anxiety and depression and all other materialistic world`s problem.

Applicability: The course provides a platform for the students to develop their insights, characteristic nature and behavior which can help them becoming future mental health care and professionals.

Awareness : Students can develop knowledge in understanding and analysing human behaviour both on individual as well as social levels. Such analyses of human mind both on individual and social contexts not only provide knowledge for social growth but also dissemination of mental health awareness to ensure wellbeing of the society in general and individual in particular.

Tradition : The current syllabus in the UG level will provide students an opportunity to know India's age old literary and cultural tradition through their exposure to Sanskrit texts.

Analysis : practice of textual analysis of Sanskrit and Vedic Sanskrit texts endowed him/her to develop a critical perspective to assess existing research through careful reading, analysis and discussion.

Perspective : the ability to apply relevant theoretical perspectives in Sanskrit philosophical and literary works to contemporary topics and also to develop a scientific approach towards analysis of modern texts

Course Outline:

1. Core Course: It is a course, which is compulsory for those candidates who are pursuing B.A Honors Course, is termed as a Core course.

2. Elective Course: It is a course which can help the students to choose very specific or advanced subject of study . It helps the candidate's to enrich their skill, is called an Elective Course.

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

3. Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective.

4. AECC : Ability Enhancement Compulsory Course . It is based upon the Competency Improvement Courses. Environmental Science, English Communication/MIL Communication are compulsory in this course. It is to provide value-based or skill-based instruction.

5. SEC : Skill Development Course by which candidates are able to enhance their Knowledge enhancement. They ((i) Environmental Science, (ii) English/MIL Communication) are mandatory for all disciplines.

Course Structure :

SEMESTER I

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 1	65	10	15	10	-	100	6
CC 2	65	10	15	10	-	100	6
GE 1	65	10	15	10		100	6
AECC 1	80	10		10		100	2

SEMESTER -2

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 3	65	10	15	10	-	100	6
CC 4	65	10	15	10	-	100	6
GE 2	65	10	15	10		100	6
AECC 2 ENVS	50	10	-	10	30	100	2

SEMESTER -3

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 5	65	10	15	10	-	100	6
CC 6	65	10	15	10	-	100	6
CC 7	65	10	15	10	-	100	6
SEC A-1	80	10	-	10	-	100	2
GE 3	65	10	15	10	-	100	6

SEMESTER -4

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 8	65	10	15	10	-	100	6
CC 9	65	10	15	10	-	100	6
CC 10	65	10	15	10	-	100	6
SEC B-2	80	10	-	10	-	100	2
GE 4	65	10	15	10	-	100	6

SEMESTER -5

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 11	65	10	15	10	-	100	6

CC 12	**65**	**10**	**15**	**10**	**-**	**100**	**6**
DSE 1	**90**	**10**	**-**	**-**	**-**	**100**	**6**
DSE 2	**90**	**10**	**-**		**-**	**100**	**6**

SEMESTER-6

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC 13	**65**	**10**	**15**	**10**	**-**	**100**	**6**
CC 14	**65**	**10**	**15**	**10**	**-**	**100**	**6**
DSE 3	**90**	**10**	**-**	**-**	**-**	**100**	**6**
DSE 4	**90**	**10**	**-**	**-**	**-**	**100**	**6**

Distribution of courses in different semesters for General Course in Sanskrit

SEMESTER 1

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC A 1	**65**	**10**	**15**	**10**	**-**	**100**	**6**
CC B 2	**65**	**10**	**15**	**10**	**-**	**100**	**6**
GE 1	**65**	**10**	**15**	**10**	**-**	**100**	**2**
AECC 1	**80**	**10**		**10**	**-**	**100**	**6**

SEMESTER 2

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC A 3	**65**	**10**	**15**	**10**	**-**	**100**	**6**
CC B 3	**65**	**10**	**15**	**10**	**-**	**100**	**6**
GE 1	**65**	**10**	**15**	**10**	**-**	**100**	**2**
AECC 2	**50**	**10**		**10**	**30**	**100**	**6**

SEMESTER 3

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC A 1	65	10	15	10	-	100	6
CC B 2	65	10	15	10	-	100	6
LCC A 1	65	10	15	10	-	100	2
SEC A 1	80	10		10	-	100	6

SEMESTER 4

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
CC A 4	65	10	15	10	-	100	6
CC B 4	65	10	15	10	-	100	6
LCC B 1	65	10	15	10	-	100	6
SEC B 1	80	10		10	-	100	2

SEMESTER 5

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
DSE 1	65	10	15	10	-	100	6
DSE 2	65	10	15	10	-	100	6
LCC 1(2)	65	10	15	10	-	100	6
SEC A 2	80	10		10	-	100	2

SEMESTER 6

Course	Theory Marks	Internal Assessment Marks	Tutorial Marks	Attendance Marks	Project	Total Marks	Total Credits
DSE 3	65	10	15	10	-	100	6
DSE 4	65	10	15	10	-	100	6
LCC 2(2)	65	10	15	10	-	100	6
SEC B 2	80	10		10	-	100	2

SEMESTER COURSE DETAILS FOR HONOURS IN SANSKRIT

SEMESTER 1

Paper Name	Course Title	Objectives	Outcome
CC 1	**Classical Sanskrit Literature(POETRY)**	This course aims to get students acquainted with Classical Sanskrit Poetry. It intends to give an understanding of literature .	students will be able to appreciate the development of Sanskrit Literature.
CC 2	**Critical Survey of Sanskrit Literature**	This course aims to get students acquainted with the journey of Sanskrit literature from Vedic literature to Purāṇa.	It also intends to give an outline of different shastric traditions, through which students will be able to know the different genres of Sanskrit Literature and Śāstras.

SEMESTER 2

Paper Name	Course Title	Objectives	Outcome
CC 3	**Classical Sanskrit Literature(PROSE)**	To give a Broader Understanding of Prose Literature in Sanskrit.students with Classical Sanskrit Prose literature. The course also seeks to help students negotiate texts independently.	Students are able to know the Classical Sanskrit Prose literature. Origin and development of prose, Important prose romances and fables Sanskrit are also included here for students to get acquainted with the beginnings of Sanskrit Prose literature.
CC 4	**SELF MANAGEMENT IN THE *GĪTĀ***	This course gives candidates an understanding of the concepts for making their character quality	Gita gives us the knowledge the value of life..The course seeks to help students negotiate the text independently

		better.The objective of this course is to study the philosophy of self-management in the Gītā.	without referring to the traditional commentaries so as to enable them to experience the richness of the text.It is a cardinal principal of the system to view the contents of Philosophy as falling into the doctrine of purusartha or the way of Self realization.

SEMESTER 3

Paper Name	Course Title	**Objectives**	**Outcome**
CC 5	CLASSICAL SANSKRIT LITERATURE (DRAMA)	To know the dramatic value by the classical Sanskrit Literature	Students are able to know the value of life in audio-visual dramatic way.This course aims to acquaint students with three most famous dramas of Sanskrit literature which represent three stages in the growth of Sanskrit drama
CC 6	**Poetics and Literary Criticism**	The study of *sāhityaśāstra* (Sanskrit Poetics) covers all poetic arts and includes concepts like *alaṅkāra, rasa, rīti, vakrokti, dhvani*, *aucitya* etc. The entire Sanskrit poetics has enrich with the topics such as definition of poetry and divisions, functions of word and	This develops capacity for creative writing and literary appreciation.

		meaning, theory of *rasa* and *alaṁkāra* (figures of speech) and *chandas* (metre), etc.	
CC 7	**Indian Social Institutions and Polity**	Students are able to know the *Dharma-śāstra* literature. They enrich with the ancient Sanskrit texts such as *Saṁhitās*, *Mahābhārata*, *Purāṇa*, Kauṭilya's *Arthaśāstra* and other works known as *Nītiśāstra.*	The aim of this course is to make the students acquainted with various aspects of social institutions and Indian polity

SEMESTER 4

Paper Name	**Course Title**	**Objectives**	**Outcome**
CC 8	**Indian Epigraphy, Palaeography and Chronology**	Students are getting with the scope to know the epigraphical journey in Sanskrit, the only source which directly reflects the society, politics, geography and economy of the time.	The course also seeks to help students to know the different styles of Sanskrit writing.
CC 9	**Modern Sanskrit Literature**	Students are able to rich & profound by the tradition of modern creative writing in Sanskrit .enriched by new genres of writing .	This course helps the students to enriched by new genres of writing .
CC 10	**SANSKRIT WORLD LITERATURE**	Candidates are able to know the Survey of Sanskrit Literature in the World.	They know the Upaniṣads and Gītā in World Literature Sanskrit, Fables in World Literature, Rāmāyaṇa and Mahābhārata in South East Asian Countries , Kālidāsa's Literature in World Literature.

SEMESTER 5

Paper Name	Course Title	Objectives	Outcome
CC 11	**Vedic Literature**	Vedic literature aims to introduce various types of vedic texts. Students will also be able to read one Upaniṣad, namely, Muṇḍaka, where primary Vedānta-view is related.	To know Vedic Culture and Civilization through Vedic Texts. And also Students are able to know Self-realization through Upanisadic Texts**.**
DSE 1	**Darsana**	Students enriched with principles of the Nyāya-Vaiśeṣika philosophy through the Tarkasaṁgraha.	Students are able to handle philosophical texts in Sanskrit. It also intends to give them an understanding of essential aspects of Indian Philosophy.
CC 12	**Sanskrit Grammar**	Candidates are able to know grammar to prepare proper sentences.	Students are able to aquar the knowledge to spoke or write in Sanskrit Language.
DSE 2	**Kavya**	Students are enriched with ancient Indian Poetry Literature.	Students are habituated to know the Sanskrit Poetic Literature.

SEMESTER 6

Paper Name	Course Title	Objectives	Outcomes
CC 13	**Indian Ontology & Epistemology**	Students are able to know the Indian Philosophy .To know the Meaning and purpose of darśana, general classification of philosophical schools in classical Indian philosophy	They are able to know Definitions of first seven dravyas and their examination; Ātman and its qualities, Manas, Qualities (other than the qualities of the Ātman) Five types of Karma. Buddhi(jñāna) – nature of jñāna in Nyāya vaiśeṣika;

			smṛti-anubhava; yathārtha and ayathārtha , Karaṇa and Kāraṇa, definitions and types of pramā, kartākāraṇa-vyāpāra-phala
DSE 3	**Vyākaraṇa**	To know Siddhāntakaumudī-Strīpratyaya, Siddhāntakaumudī-TiṅantaPrakaraṇa, Siddhāntakaumudī-Ajanta Puṃliṅga	To Know the root of Sanskrit by Vyakarana.
CC 14	**Sanskrit Composition & Communication**	This paper aims at teaching composition and other related informations based on Laghusiddhantakaumudi Vibhaktyartha Prakaraa.	To write good Sanskrit.
DSE 4	**Veda**	To Know the Eastern & Western interpretation of the Veda, Śunaḥśepopākhyāna of AitareyaBrāhmaṇa, TaittiriyopaniṣadŚikṣāvallī Muṇḍakopaniṣad	Students are know eastern and western literature..They are able to realize Self through Upanisads.

,

SEMESTER COURSE DETAILS FOR GENERAL IN SANSKRIT

SEMESTER 1

Paper name	Objectives	Outcome
CC-A1: Section A Text of Kalidasa	To teach the students about the history and society of Ancient India,which revealed in Kalidasa's writing.	Develop Power of analytical text criticism depth of cultural knowledge and comparative study will develop. They will

		knows the good quality of human beings and knows the periodic life style.
CC-A1: Section B Text of Magha	To teach students about the importance of Magha in Sanskrit poet. The students are enrich about the history and society of ancient India ,which exposed on Magha's writing.	Students will be able to write in Maghas style. Students will knows about that periodic society and its history.
CC-A1:Section –C Nitisatakam	To teach the social experience of Bhartrihari. To teach the type of fool. Students will know about scholar.	Students will be able to practice and follow values on their practical life and they will be able to know what to do and what not to do.
CC-A1: Section –D History of Sanskrit poetry	To teach the students of Sanskrit poetry in Sanskrit Literature. To teach Students different works in Sanskrit poetry History.	Students can understand poetic concept and they write down different poetry.
SEMESTER 2		
Paper Name	Objectives	Out Come
CC-A2: Section A&B Prose of Bana and ambika dutta vyasa.	To introduce our students with the Prose Literature written in Sanskrit Langu	Students will be able to trace the literacy style of the prose authors of the SanskritLanguage.
CC-A2:Section C Survey of Sanskrit Literature	To teach the students origin and development prose and their importance in Sanskrit Literature.	To realize the basic concepts of Sanskrit Literature. They will be introduced different different fables in Sanskrit.

SEMESTER 3

Paper Name	objectives	Out Come
CC A 3		
Sec A & B Sanskrit Drama	Drama is considered to be the best amongst all forms of arts.. The history of Drama in India is very old, the glimpses of which can be traced in the hymns (saṁvādasūkta) of the Ṛgveda.	Candidates can habituates with the ancient Indian Dramatic culture.
Sec C Technical Terms from Sanskrit Dramaturgy	The Sanskrit dramaturgy was later developed by the Bharatamuni. The objectives of this curriculum are to identify the beauty of drama .	Dramaturgical technical terms help the candidates to know old age Indian audio visual culture
Sec D History of Sanskrit Drama and an Introduction to Principle of Sanskrit Drama	India also has an old and long-lasting tradition of full-length poetic plays, which are called Sanskrit Dramas because they were written mainly in Sanskrit. In fact, however, they combine both classical Sanskrit with Prakrit or different forms of vernacular languages.	The Sanskrit dramas cover a wide range of subjects and types of play. They include full-length poetic love stories, political plays and palace intrigues, as well as shorter farces and one-act love monologues. The earliest existing plays are attributed to Bhasa. The best known is a kind of political romance called The Vision of Vasavadatta. Other writers include the poet-king Sudraka, to whom three plays are attributed. The most famous of them is The Little Clay Cart, in which a love story and political intrigue intermingle.

SEMESTER 4

Paper Name	Objective	Outcome
CC A 4		
Sec A & B & C Sanskrit Grammar : Laghusidhanto Koumodi Samga, Sandhi. Bibhokti Prakaran	This is an elementary course in Sanskrit language designed for students who wish to learn Sanskrit from the very beginning.	Essential Sanskrit grammar will be introduced through the multiple example method with emphasis on students constructing the sentences. Candidates are able to enrich their reading , writing, and spoken skill in Sanskrit.

SEMESTER 5

Paper Name	Objectives	Outcome
DSE 1		
Philosophy, Religion and Culture in Sanskrit Tradition Sec A = Dharma Sec B= Samskar & Purusartha Sec C = Saddharma	This course aims to get the students acquainted with the basic approach to study Indian philosophy. It also intends to give an elementary understanding of Indian Philosophy and to enable students to handle philosophical texts in Sanskrit easily.	Candidates are able to know the Indian Philosophical approach in Sanskrit. They are also enrich with the four types of purusharthas of Life.

Paper Name	Objectives	Outcome
DSE 2		
Indian Perspectives in Personality Development	Candidates are able to know the historical perspective through Rigveda , Chandyogga Upanisads Brihadarnyaka Upanisads	Candidates are able to develop their personality and measures for behavioural development.

SEMESTER 6

Paper Name	Objectives	Outcome
DSE 3		
Literary Criticism	To know the characteristic features about Kavya.,requirement for reading kavya.	Candidates are able to know the Sanskrit kavya literature.
Paper Name	Objectives	Outcom e
DSE 4		
Nationalism in Sanskrit Literature	Candidates are able to know about the Concepts and Basic Features of	To know theName of Country, National Symbols and Rise of

	Indian Nationalism	Nationalism. Nationalistic Thought and Modern Sanskrit Literature

Program Outcome

There must be some purpose in performing any function. Similarly, after enrolling in a course like B.A. Honours and General, it is natural for the students to have a purpose in completing this course. Our goal is to achieve this aim for the students and we, the teachers of the college are committed to this. Let's see the possibility of students after passing B.A. Honours and General courses.

1. After completing the B.A. Program, knowledge will be developed among the Honours and General students and overall skills will increase. Through this we believe that, they will be able to progress their studies to the next higher level and will also be able to solve various problems related to studies.
2. When students move from school level to college level they have an interest in learning something new, with this, what will the college environment be like, will I be able to adapt to the college environment, what will the teachers be like, how will they behave etc., there is some fear in their mind. After passing this program students will be able to learn new subjects as well as learn how to adapt to the larger environment of the society.
3. In this program students will have different questions about learning in their mind, they will be able to know the answers to those questions from the teachers and they will be enriched. Also they will be able to master the techniques of how to answer complex questions easily.
4. Discussions are generally constructive and fragile. Students who come to this program will learn how to move constructive discussion forward and how to discard fragile discussion.
5. After completing this program students will have the opportunity to participate in competitions and work according to their qualifications.
6. Political Science and Politics are interrelated. It is hoped that by completing this program students will be able to engage in politics and fulfil their social responsibilities.
7. It is hoped that, through this program students will be able to acquire the skills to become good citizens of the country in the future and strive to contribute to a larger section of the society.

Program Specific Outcome

B.A. Honours in Political Science Program

We know that Political Science and Politics are interrelated. Because, in ancient times the word politics was used instead of Political Science. In other words, what was Politics in ancient times is now known as Political Science. Almost 2350 years ago, the famous Greek scholar Aristotle called Politics the ‘Master Science', which still carries equal significance today. Because, Politics is all around us. It influences all aspects of human life: what we can do, what can say, where we can live, even what we can eat. There is no escaping Politics, but we can discover more effective way to use it by studying Political Science.

A. The first thing that comes to mind is what will be the benefit of studying Political Science. In response to this, we will say on behalf of the college what should be the benefit, the matter should not be seen in this way, what should not be gained, should be seen in that way. Because, quoting Aristotle, it can be said that the study of Political Science has all the knowledge to understand the present society. In other words, if student study Political Science, it can be said without any hesitation that they will gain knowledge about all the necessary social issues.
B. Looking at the reading, it can be said that those who will complete the B.A. program with Honours in Political Science, if they get good result, they will get the opportunity to do higher education that is PG course in regular mode. In other side those who will complete the B.A. programme in general with political science will not get the opportunity to do PG course in regular mode, but will have the opportunity to distance mode.
C. Now let’s come to the future of the students. In this case, it can be said that the future of the students studying Political Science is most assured. Because, if you study this subject, you are most likely to get a job in the age of modern competition. Most of all in the sense that, if you study Political Science, you will have the opportunity to work in various administrative jobs as well as teaching in schools, colleges and universities. There is only on reason, students who get higher marks in Higher Secondary, study less on this subject. It can be seen that the students who get higher marks, but do not get the opportunity to study or take courses in other subjects, then they eventually come to study in this subject. We are not saying this in a fictional way, we are

saying this form the experience of the past years. If necessary, its authenticity can be verified from any Political Science student.

Another reason behind this is the lack of knowledge of parents. Most parents, whether they are highly educated or poorly educated, have a idea that, if their children study Political Science, then the future of their children is dark. As a result, such subjects as Political Science, Philosophy are known to them as back row subject.

Anyway, there are exceptions, some good students come of course, who really love the subject. But, it is mass less than necessary. So it can be said that, the exception cannot be an example.

However, we, the Political Science teachers, will say that the chances of getting a job at present in the Political Science subject are the brightest among the arts subjects at present.

D. B.A. program course includes some subjects in the Political Science curriculum for Honours and General students, through which students will become good citizens in addition to their jobs. That is to say, the students are expected to be able to perform their duties and responsibilities towards the state as well as to take advantage of the facilities provided by the state.

E. In the curriculum of Political Science various information of the Indian Constitution are mentioned in detail. Through which the students will be able to decide how to find a solution and get legal help if they face any problem in the future in their personal life and in the management of state. That is, if you study Political Science, you will have the opportunity to establish yourself as a self reliant person.

F. At the present time another issue is considered very important in the society. That matter is the politician or the political leader. The role of this politician and political leader is especially important in the formation and management of society. But, politicians and political leadership with political knowledge is very evident in the current political system. After studying Political Science, if they joint politics, then they will have the potential to become a skilled politician and their role in the betterment of the society will also be useful.

G. The state is the largest institution in modern society. There is no person who does not live in the state. The discussion of this state is the main subject of political science. In other words, it is expected that through the study of Political Science, students will be able to acquire all the knowledge about the state and apply their knowledge in practice.

H. Knowledge of Political Science is necessary to know the answer to all the questions like how a country is run, who runs it, how those who run it come to power, how they survive after coming to power, why cannot many stay in power etc. Students can get answers to all these questions from the Political Science curriculum if they complete the course.

I. The Greek philosopher and scholar Aristotle said on more think that, “man is social animal. He who lives without society is either a beast or God.” Political Science must be read in order to properly understand the interpretation of this concept. Because, the proper explanation of the idea that human beings are social beings is found in the Political Science. It is also possible to get an idea of the duties of human beings as social creators through the curriculum of Political Science.

J. Students who have completed Honours and General program with Political Science will be able to acquire knowledge on public administration and public policy. Because, the Political Science curriculum also has a detailed discussion on public administration and public policy. Having a clear knowledge of public Administration and public policy can lead to performance enhancement, ability to manage, development of leadership qualities, gaining important government positions, job opportunities in public and private sectors, job opportunities in newspaper and entertainment, improvement of current profession etc.

K. Students who will study Political Science Honours have to read a paper called sociology. The study of sociology helps the individual to understand human society and how social system work. A comparative study of human societies enables us to understand that people in different societies have many different solutions to the universal human problems of making a living.

L. Both the Honours and General courses of Political Science have detailed discussions on Human rights. As a result, students who study Political Science will gain a thorough knowledge of Human rights. In this case it can be said, an important outcome of Human rights education is empowerment, a process through which people and communities increase their control of their own lives and the decisions that affect them. The ultimate goal of Human rights education is people working together to bring about human rights, justice and dignity for all.

M. There are also detailed discussions on social research in the Political Science curriculum. So, students of Political Science will also be able to gain knowledge about social research. At present social research is of considerable

importance. Because, social research provides accurate and timely information on the needs, attitudes and motivations of a population. It plays a vital social role, assisting our government and businesses to develop services, policies and products that are responsive to an identified need.

N. Women make up almost half of the world's population. Women also play an important role in the progress of society, like men. But in reality women are ruled and exploited by men in different ways. Gender studies or Gender politics deals with these aspects of women's deprivation. If you study Political Science you can also gain knowledge about Gender politics. Gender politics is vital because sex, love, care and reproduction are basic dimensions in life, and yet, the meaning of gender is contested. Gender study or Gender politics offers update empirical knowledge about gendered practices, norms and discourses in politically significant ways.

O. In the end, it can be said that in both Honours and general in the syllabus of Political Science as mentioned about the constitution and governance of India, there is also a detailed discussion about the constitution and governance of several states of the world. Again, how is India's foreign relations with neighbouring countries, that has also been said. As a result, by completing the course with Political Science Honours and General, the students will be able to gain an idea about the politics and governance of the world as well as India. In other words, if you study Political Science, there is an opportunity and possibility to be established in the country as well as abroad. More can be said at the present time, this opportunity has increased as the whole world has become a Global Village.

_____

Programme Specific Outcome of B.A. History Honours :

1. The expected outcome to provide students with a sense of how interconnected our present is with the past and how learning about the past provides them with the skills to understand the present.

2. Knowing the significant developments and multiple perspective of Indian History from earliest times to modern period.

3. Familiar with the Social formation and Cultural patterns of the Ancient and Medieval World as well as political transformation along with socio-cultural changes of Modern Europe and Modern East Asia.

4. Recognize the different kinds of Art, Architectural pattern and Heritage. Also understand the conservational importance of it.

5. Understanding the importance of Sources in History writing and ability to distinguish between that which is historical and which is not.

6. Acquired the skills of critical thinking, rational enquiry, effective communication and better understanding the society from different perspective.

Course Outcome :

CC 1 – History of India (From the Earliest times to C 300 BCE)

After completing the course the students will be able to –

1. Understand the importance of sources for reconstructing the history of Ancient India.

2. Understand the transition of early human from hunter-gatherers to food producers.

3. Analyse the factors responsible for the origins and decline of Harappan Civilization.

4. Discuss various aspects of society, economy, polity and religious practices that are reflected in the Early Vedic and Later Vedic texts.

CC 2 – Social Formations and Cultural Patterns of the Ancient World other than India

After completing the course the students will be able to –

1. Understand the aspects of world prehistory particularly with reference to the debate on the cultural evolution of Human kinds.

2. Delineate the significance of early food production and the beginning of social complexity.

3. Understand the economy, social stratification, state structure and religion of Bronze Age Civilizations.

4. Discuss on the introduction of iron technology and the impact that it had on parts of Central and West Asia.

5. Identify the main historical developments in Ancient Greece and Rome.

CC 3 – History of India (c 300 BCE to c.750 CE)

After completing the course the students will be able to –

1. Delineate the changes in the fields of agriculture, technology, trade, urbanization and society and the major points of changes during the entire period (from 300 BCE to 750 CE).

2. Identify the relation between economical changes and Urbanization during the entire period (from 300 BCE to 750 CE) and correlate it with the other societies.

3. Analyse critically the changes in the *varna/* caste systems and changing nature of gender relations and property rights.

4. Understand the religious and philosophical developments in the period of study especially with regard to the beginnings of Tantricism and the consolidation of the Brahmanical tradition.

5. Write and undertake projects related to literature, science, art and architecture.

CC 4 – Social Formations and Cultural Patterns of the Medieval World other than India

After completing the course the students will be able to –

1. Analyse the principal causes of decline of Roman Empire and understand the different perspective of its historiography.

2. Discuss the religious and cultural development of Medieval Europe and analyse the roll of Church and Monastry during this period.

3. Indentify the characteristic of feudal society and the factors behind its crisis.

4. Understand the beginnings of Judaism and Christianity under Islam.

CC 5 – History of India (c.750 – 1206)

After completing the course the students will be able to –

1. Trace the period of "Early Medieval" which is very important time period in Indian History and its characteristics.

2. Critically assess the major debates among scholars about Feudalism in Indian History.

3. Explain, in an interconnected manner, the processes of state formation, agrarian expansion, proliferation of caste and urban as well as commercial processes.

4. Discuss the major currents of development in the cultural sphere, namely bhakti movement, Puranic Hinduism, Tantricism, Islamic Intellectual Tradition as well as the emergence of a number 'regional' languages and literature.

CC 6 – Rise of the Modern West –I

After completing the course the students will be able to -

1. Critically analysis the theories on transition from feudalism to capitalism and also the problem of existing theories.

2. Critically analysis linkages between Renaissance and Reformation.

3. Understand the linkages between Geographical Discoveries and economical developments in modern West.

4. Explain the process by which National Monarchy developed and European state system emerged.

CC 7 – History of India (c.1206 – 1526)

After completing the course the students will be able to -

1. Discuss different kinds of sources available for writing histories of various aspects of life during the thirteenth to the fifteenth centuries.

2. Understand the political changes along with political structure during this period.

3. Delineate the changes in the fields of agriculture, technology, trade, urbanization and society during the entire period (c. 1206 -1526).

4. Discuss the two major currents of development in the religion and cultural sphere, namely Bhakti movement and Sufi tradition. Also identify the characteristic similarity between those traditions.

CC 8 – Rise of the Modern West – 11

After completing the course the students will be able to –

1. Understand the importance of Printing Revolution, Scientific Revolution and the Revolution in war techniques and their linkages with the rise of Modern West.

2. Explain major economic, social, political and intellectual developments in Europe during the 17^{th} and 18^{th} centuries.

3. Analyse the major issues behind English Revolution and understand its outcomes also.

CC 9 – History of India (c.1526-1605)

After completing the course the students will be able to –

1. Critically evaluate major sources available in Persian and vernacular languages for the period under study.

2. Compare, discuss and examine the varied scholarly perspectives on the issues of the establishment, consolidation, expansion and nature of the Mughal state.

3. Explain the changes and continuities in agrarian relations, land revenue systems along with internal and overseas trade.

CC 10 – History of India (c.1605 – 1750s)

After completing the course the students will be able to –

1. Critically evaluate major sources like Persian and vernacular literary cultures, histories, memoirs and travelogues for the period under study.

2. Describe the major social, economic, political and cultural developments of the times.

3. Explore the visual culture of Mughal period and analyse the larger motives behind the Imperial patronage of art and architecture.

4. Critically examine the major strides that were made in trade, technologies and artisanal activities during this period.

CC 11 – History of Modern Europe (c.1780-1939)

After completing the course the students will be able to –

1. Understand the meaning of "Revolution" and critically analyses its causes and consequences.

2. Trace short-term and long-term repercussions of revolutionary regimes and Empire-building by France.

3. Identify the social and economical changes in Europe as a result of Industrial Revolution.

4. Understand the meaning of Imperialism and the manifestations of imperialist rivalry and expansion in the 19th and early 20th century.

CC 12 – History of India (c.1750s– 1857)

After completing the course the students will be able to –

1. Critically analyse the key developments of 18th century in Indian subcontinent.

2. Explain the major factors behind the expansion and consolidation of Colonial Power and understand the Ideology of colonial state.

3. Identify the linkages between the changes in rural economy and the changes in rural society as well as the issues reflected in the major uprising in the nineteenth century.

4. Familiar with the term "De-industrialization" and "Drain of Wealth" and understand the key debates on the economic impact of colonial Raj.

CC 13 – History of India (c. 1857 – 1964)

After completing the course the students will be able to –

1. Identify the changes in cultural, social and religious aspects in late 19th century and early 20th century.

2. Understand the process of Nation Making over the first half of 20th century in British India.

3. Explain the various trends of anti-colonial struggles in colonial India and understand how Gandhi's politics represented a new model for mobilizing different social groups in the national movement.

4. Critically Analyse the complex developments towards communal violence and Partition.

5. Understand the policy, planning behind the formation of New State.

CC 14 – History of World Politics: (1945-1994)

After completing the course the students will be able to –

1. Familiar with the term "Cold War" and understand the changes in world politics during cold war period.

2. Trace the area of conflict and various alliance groups over the world.

3. Identify the crisis of socialist regimes in East European Countries.

4. Familiar with the term "Globalization" and critically analyse the characteristics and nature of Globalization as well as it merits and demerits.

DSE-A-1 : History of Bengal (c.1757-1905)

After completing the course the students will be able to –

1. Understand the political ups and downs in Bengal throughout the period of study.

2. Identify the changes in cultural, social and religious aspects during this period.

3. Critically analyse the political motivations behind partition of Bengal.

4. Discuss the major protest movements and insurgencies against the Raj.

DSE-A-3 : History of Bengal (c 1905-1947)

After completing the course the students will be able to –

1. Critically analyse the trends of Swadeshi Movement in Bengal.

2. Explore the characteristics of various movements which conducted by different political groups, classes in Bengal during this period.

3. Understand the development of political and communal issues before and after the partition.

DSE-B-1 : History of Modern East Asia – I China (c.1840 – 1949)

After completing the course the students will be able to –

1. Develop an in-depth understanding of China's engagement with the challenges posed by imperialism, and the trajectories of transition from feudalism to a bourgeois/ capitalist modernity.

2. Analyse significant historiographical shifts in Chinese history, especially with reference to the discourses of nationalism, imperialism, and communism.

DSE-B-3 : History of Modern East Asia – II Japan (c.1868 –1945)

After completing the course the students will be able to –

1. Understand the historical process of transition from feudalism to capitalism in Japan.

2. Examine the nature and consequences of Japanese colonialism over China and Manchuria.

3. Understand the emergence and growth of democratic governance and also failure of Democracy and subsequent rise of Militarism in Japan.

SEC –A (2) Understanding Heritage

After completing the course the students will be able to –

1. Understand the different facets of heritage and their significance.

2. Understand the legal and institutional frameworks for heritage protection in India and also the challenges facing it.

3. Examine the implications of the rapidly changing interface between Heritage and History.

4. Understand the importance of Heritage conservation.

SEC –B (2): Art Appreciation: an Introduction to Indian Art

After completing the course the students will be able to –

1. Familiar with the Indian Art from Ancient to Contemporary times. Also understand its diversity and aesthetic richness.

2. Understand the Indian Art as a medium of cultural expression.

Programme Specific Outcome of B.A. History General :

1. The expected outcome to provide students with a sense of how interconnected our present is with the past and how learning about the past provides them with the skills to understand the present.

2. Understand the Historical Changes from earliest times to Modern Period.

3. Understand the importance of collection, documentation and conservation of document, visual and material remains of the past.

4. Acquired the skills of critical thinking, rational enquiry, effective communication and better understanding the society from different perspective.

Course Outcome

CC 1 - History of India from the Earliest Times upto 300 CE

After completing the course the students will be able to –

1. Familier with the term “pre-history” and “proto-history” and understand the characteristics of Paleolithic, Mesolithic and Neolithic cultures.

2. Analyse the factors responsible for the origins and decline of Harappan Civilization.

3. Describe the political, social and economical changes and developments in the period from 1500 BCE to 300 CE.

4. Understand the importance of different types of sources in History writing.

CC 2 - History of India from C.300 to 1206.

After completing the course the students will be able to –

1. Trace the period of "Early Medieval" which is very important time period in Indian History and its characteristics.

2. Critically assess the major debates among scholars about Feudalism in Indian History.

3. Understand the regional powers, their politics as well as the struggle for powers during this period.

CC 3 - History of India from 1206 to1707

After completing the course the students will be able to –

1. Understand the political changes along with political structure during this period.

2. Delineate the changes in the fields of agriculture, technology, trade, urbanization and society during the entire period.

3. Discuss the two major currents of development in the religion and cultural sphere, namely Bhakti movement and Sufi tradition.

CC 4 - History of India; 1707-1950.

After completing the course the students will be able to –

1. Critically analyse the key developments of 18th century in Indian subcontinent.

2. Understand the expansion and consolidation of colonial power as well as the popular resistance in response to it during the period of study.

3. Explain the various trends of anti-colonial struggles in colonial India and understand how Gandhi's politics represented a new model for mobilizing different social groups in the national movement.

4. Critically Analyse the complex developments towards communal violence and Partition.

DSE- A -2 : Some Aspects of European History: C.1780-1945

After completing the course the students will be able to –

1. Understand the Historical developments in Europe form the French revolution to the emergence of Nation State in Europe.

2. Critically analyse the process of unification in Italy and Germany and the political changes in Europe after this unification.

3. Familier with the term "Imperialism" and the manifestations of imperialist rivalry and expansion in the 19th and early 20th century.

DSE-B-2: **Some aspects of Society & Economy of Modern Europe: 15Tth –18 th Century**

After completing the course the students will be able to –

1. Familiar with the term “Feudalism” and identify the factors behind it crisis.

2. Understand the impact of Renaissance and Reformation in European History also identify the relationship between Renaissance and Reformation.

3. Understand the economical and social development of Modern Europe from 15^{th} to 18^{th} century.

SEC-A- 1: Historical Tourism: Theory &Practice

After completing the course the students will be able to –

1. Identify the different types of Heritage and understand the importance of heritage conservation.

2. Familiar with the term “Historical Tourism” and understand the relationship between tourism and history.

SEC-B -1: Museums &Archives in India

After completing the course the students will be able to –

1. Understand the importance of Museum for conservation of visual and material remains of the past.

2. Know the importance of Archives for collection and documentation of important Data and understand how it work.

Department of Philosophy

Raja Peary Mohan College

B. A General in Philosophy

Pogramme Outcome, Programme Specific Outcome and Course Comes
(PO, PSO & Cos)

Programme Outcome:

B.A General

a) Students graduating through B.A. General Programme from this college are expected to develop an analytical skill which will enable them to solve the problem related issues that he/she faces in next level of their career.

b) Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.

c) Students completing the programme become confident in the sense that they feel they are employable.

d) The programme instill among the students the greater values of life to become worthy citizen of the country.

Programme specific Outcome:

B.A. General with Philosophy Programme

- Philosophy is not only an abstract thinking but it preludes the potential of thinking beyond the structural boundaries. The skill of philosophizing will develop the potential to create an out of box thinking. The B. A General with Philosophy programme in Raja Peary Mohan College under the University of Calcutta is an attempt to both introduce and, at the same time, provide an in depth look into one of the most challenging subjects that one can study.
- The core idea of the course is to make the student aware of the foundational issues related to the world around us, whether it be in our life, or regarding mind and matter, or existence, or belief, or religion or science.
- The programme has been covered by the domain of society, religion, ethics and aesthetics. With the special focus on the present day problematics of life and living in society.
- The study of reasoning provides the anatomy of examining thought and argument and will provide an essential skill of reasoning.
- The Programme will be able to think creatively and independently, exploring possibilities beyond those entrenched in prevailing opinion and practice.

Format of the Semesters

Core Courses[Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)) and Students for Philosophy as third subject in Pure General (GE-1)]

Semester 1 CC-G-1-Indian Epistemology and Metaphysics

Semester 2 CC-G-2-Western Epistemology and Metaphysics

Core Courses [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-))]

Semester 3 CC-G-3-Western Logic

Semester 4 CC-G-4-Philosophy of Mind

SKILL ENHANCEMENT COURSE SEC (G)

Semester 3[Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

SEC- A

Option 1.:Buisness Ethics

Semester 4[Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

SEC- B (Any one from the options given below)

Option 1 Man and Environment

DISCIPLINE SPECIFIC ELECTIVE COURSE DSE (G)

Semester 5: [Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

DSE-A (Any one from the options given below)

Option 1 Ethics: Indian and Western

Semester 6: [Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

DSE-B-(Any one from the options given below)

Option 1 Social and Political Philosophy

Semester wise Course Outcomes in B.A General in Philosophy:

Semester 1: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)) and Students for Philosophy as third subject in Pure General (GE-1)]

Core Course- CC(G)-1/GE(H)/GE-1-Indian Epistemology and Metaphysics (Carvaka, Jainism, Buddhism, Nyāya,Vaisesika school of Indian thought)

1. The course will help the students in understanding the significance of Indian philosophical studies in their daily life, how to overcome the stress, how to manage their life and take from challenges in life; hence there will be a focus on the dialectical and analytical method to understand Indian philosophy.

Semester 2: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)) and Students for Philosophy as third subject in Pure General (GE-1)]

Core Course- CC(G)-2/GE(H)/GE-2- Western Epistemology and Metaphysics :

1. The Course is designed to appreciate the profound ideas that sprung from the minds of the great philosophers of the ancient and modern western world.
2. This course seeks to enable the students to witness how philosophers who were either predecessors or contemporaries evaluated the theories of others. It will also make students aware that there is no place for superficial approach to the complex questions in life.

Semester 3: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-))]

Core Course- CC(G)-3/GE(H)/: Western Logic

1. Logic is fundamental to the way human beings communicate. Though our public debate and private reasoning are shaped by logical principles, we are not able to spell them out without a basic training in logic.
2. Logic course helps the students to develop an understanding of the basic concepts of logic and language as well as familiarity with precise models of deductive reasoning. It will also facilitate an understanding to effectively distinguish between rhetoric, fallacious arguments and sound reasoning in real life. Identifying these distinctions is quite significant to preserve one's intellectual sanctity in an increasingly media saturated world with fake news.
3. This course is designed as an introductory course in logic which will bring out the standard forms of Formal and Informal reasoning. It introduces the basic logical concepts and provides a clear understanding of the structure of arguments and the nature of inferential reasoning

SKILL ENHANCEMENT COURSE SEC(G)

SEC- A-Business Ethics:
This course aims to

- Promote understanding of the importance for business and the community of ethical conduct
- Provide the skill with which to recognise and resolve ethical issues in business
- Encourage reflection on the ethical dimension of own decision making in workplace and other setting.

Semester 4: [Syllabus for Students from other Hons[GE (H)], Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-))]

Core Course- CC(G)-4/GE(H)/: Philosophy of Mind.

1. Debates concerning the nature of mind and consciousness are active and ongoing, with implications for philosophy, psychology, artificial intelligence and the neurosciences. It is difficult to understand how minds fit into the physical world and interact with material things. It is hard to explain how minds are capable of representing the world. And it is a deep mystery how conscious experience relates to our bodies and brains. This course will take a philosophical approach to these questions, exploring some of the metaphysical and conceptual issues that underlie psychological and neuroscientific explanations.
2. Reflection on the nature of mental phenomena, mental function and its relationship to the physical body and other mind.
3. At the end of the course, the successful student will be able to do Explain the ordinary notion that the mind causes the body to do various things, and then explain the difficulties anyone will have integrating this notion with the apparent result of the sciences.

DISCIPLINE SPECIFIC ELECTIVE COURSE DSE (G)

Semester 5: [Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

DSE-A Ethics: Indian and Western

1. In the knowledge tradition of India, ethics has its origin in its religious and philosophical thinking. In every religious tradition, good moral conduct is considered essential for a happy and contented life. Without following the path of righteousness no one can attain supreme goal (mokṣa) of life.
2. The course aims to develop an ethical perspective on socio-political and even economic issues where the public discourses and debates are often bereft of ethical/moral considerations and are often plagued with objectivism and materialism.
3. To equip the students with tools and techniques for handling socio political issues that affect them on individual / collective basis. It also inculcates, among students, a larger awareness of public issues and empathy with marginalised issues in society

Semester 6: [Syllabus for Students from Core Course for Pure General Course Students (Philosophy as 1st or 2nd subject (CC-G-)

DSE-B- Applied Ethics and Philosophy of Religion

1. The course objective is to apply the theoretical tools of Ethics in life situations as well as devise ethical resolutions in moral dilemmas as they come up. This will gradually generate an ethical acumen amongst the students of philosophy.
2. Develops an awareness of the main philosophical debates in contemporary philosophy regarding the nature of and existence of God in the Indian and western religions, and about the nature and rationality of religious belief.
3. To familiarize the students with basic concepts of religion and its philosophical significance. To develop a wider vision for contemporary issues in religion.

Department of Philosophy

Raja Peary Mohan College

B. A Honours in Philosophy

Pogramme Outcome, Programme Specific Outcome
and Course Outcomes
(PO, PSO & COs)

Programme Outcome:

B.A Honours

a) Students graduating through B.A. Hons Programme from this college affiliated to the University of Calcutta are expected to develop an analytical skill which will enable them to solve the problem related issues that he/she faces in next level of studies.

b) Students, although at the initial stage after getting admission faces difficulty in their language skill, but when they pass the programme, they are expected to become pretty able to communicate their understanding in the subject.

c) Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon the issues which invite cross discussions.

d) Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.

e) Students completing the programme become confident in the sense that they feel they are employable.

f) The programme instills among the students the greater values of life to become worthy citizen of the country.

Programme Specific Outcome:

B.A. Honours in Philosophy Programme

- Philosophy is not only an abstract thinking but it preludes the potential of thinking beyond the structural boundaries. The skill of philosophizing will develop the potential to create an out of box thinking. The BA (Hons) Philosophy programme in Raja Peary Mohan College under the University of Calcutta is an attempt to both introduce and, at the same time, provide an in depth look into one of the most challenging subjects that one can study.
- Philosophical thinking is not an alienated discourse which subjugates life. Life is panorama of philosophical thinking.Philosophy is vast in scope and intense in analysis and the Honours course tries to provide a taste of the extent of philosophy and the intensity of the argumentation and analysis at the same time.
- The core idea of the Honours course is to make the student aware of the foundational issues related to the world around us, whether it be in our life, or regarding mind and matter, or existence, or belief, or religion or science.
- B.A. Philosophy Honours students will be also able to acquire knowledge that is vital to the discipline of Philosophy, including knowledge of core concepts, distinctions, theories, argumentative techniques, movements, and influential figures, within the core fields of aesthetics, ethics, epistemology, logic, metaphysics, and social & political philosophy with the special focus on the present day problematics of life and living in society. It will introduce students to the great philosophers and their ideas and also how one thinks about

contemporary problems through the lens of their theories. It will give a comprehensive sweep of Indian and Western philosophy. The domain of the history of Indian and Western Philosophy is an aspiring and inspiring discourses on thought and life. It will also make the students aware of the main currents of thought in Ethics. Students can also explore Philosophy of Science, Logic, Feminism and Bio-ethics amongst many other core and optional papers.

- The study of reasoning provides the anatomy of examining thought and argument and will provide an essential skill of reasoning.
- Students of B.A. Honours in Philosophy will be able to reason clearly and carefully, employing the principles of logic to construct cogent arguments in both speech and writing. Their capacity to reason clearly and carefully will be manifest in their use of a) deductive reasoning skills, wherein the conclusion is embedded in the conditions that are known, given, or accepted, and b) inductive reasoning skills, wherein one must reason beyond the conditions that are known, given, or accepted. They will be able to speak and write clearly and cogently.
- With this Programme students will be able to think creatively and independently, exploring possibilities beyond those entrenched in prevailing opinion and practice and will also develop a strong set of critical, imaginative and informed reasoning skills, will be able to understand the nature of the human mind, language, morality, politics, art, logic and will also become aware of the world, environment and speculate 'hereafter'.
- Under Graduate Programme in Philosophy will enrich the potential of knowledge by creating a critical, comprehensive and will ensure the capacity of inquiring mind.
- Upon successful completion of the programme the graduate would demonstrate an ability to understand various philosophical concepts, thoughts, movements and philosophers, an ability to apply the philosophical outlook towards society, politics and human development.

Semester-wise Course for B.A. (Honours) in Philosophy

	Sem-1	**Sem-2**	**Sem-3**	**Sem-4**	**Sem-5**	**Sem-6**
Core Course (CC)	2TH+2TU CC-1&2	2TH+2TU CC-3&4	3TH+3TU CC-5,6 &7	3TH+3TU CC-8,9 &10	2TH+2TU CC-11&12	2TH+2TU CC-13&14
Discipline Specific Elective (DSE)					2TH+2TU DSE–A(1) +B(1)	2TH+2TU DSE–A(2) +B(2)
Skill Enhancement Course (SEC)			1TH+0TU SEC-A(1)	1TH+0TU SEC-B(2)		
Generic Elective (GE)	1TH+1TU GE-1	1TH+1TU GE-2	1TH+1TU GE-3	1TH+1TU GE-4		
Ability Enhancement Compulsory Course (AECC)	1TH+0TU AECC-1	1TH+0TU AECC-2				
Total No. of Courses and Marks	**4 x 100 = 400**	**4 x 100 = 400**	**5 x 100 = 500**	**5 x 100 = 500**	**4 x 100 = 400**	**4 x 100 = 400**
Total Credits	**20**	**20**	**26**	**26**	**24**	**24**

TH = Theory T = Tutorial

- CC/GE/DSE : Each theory and Tutorial Course have 5 and 1 Credit(s) respectively
- GE : Covering two subjects with two courses each; any subject in any semester; CC of a different subject in general course is to be treated as GE for Honours Course
- DSE/SEC : Group (A&B) for specified semesters
- AECC/SEC : Each Course has 2 Credits
- AECC-1 : Communicative English / MIL; AECC-2 : Environmental Studies

Format of the Semesters

Semester 1
CC(H) 1- Indian philosophy - I
CC(H) 2- History of western Philosophy - I
Semester 2
CC (H)3 Indian philosophy - II
CC (H)4 History of Western Philosophy- II
Semester 3
CC(H) 5- Philosophy of Mind
CC (H)6- Social and Political philosophy
CC (H)7 Philosophy of Religion
Semester 4
CC (H) 8 Western Logic – I
CC (H) 9 Western Logic – II
CC(H) 10 Epistemology and Metaphysics (Western)
Semester 5
CC (H) 11 Indian Logic and Epistemology – I
CC (H) 12 Ethics (Indian)
Semester 6
CC (H) 13 Indian Logic and Epistemology – II
CC (H) 14 Ethics (Western Ethics)

Discipline Specific Elective Course –

DSE-A-(1) AND DSC-B-(1) in Semester 5 and DSE-A-(2) AND DSC-B-(2) in Semester 6

DSE A-1- 1.3 Philosophy of language (Indian)
DSE – A- 2- 2.2 Applied Ethics
DSE –B-1-- 1.1 An Enquiry Concerning Human Understanding
DSE –B-2—1.1Swami Vivekananda

Skill Enhancement Course

SEC-A-(1) in Semester 3 and SEC-B-(2) in Semester4

SEC –A-(1)-Man and Environment.
SEC –B-(2)- Philosophy of Human Rights

Semester wise Course Outcomes in B.A Honours in Philosophy:

Semester 1:

CC(H) 1- Indian philosophy - I (Carvaka, Jainism, Buddhism, Nyāya,Vaisesika school of Indian thought)

1. The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to the major schools of Indian philosophy. Focus will be on Carvaka to Vaisesika school of Indian thought through interactive learning where students will engage themselves into rigorous and an analytical examination of key concepts in a manner that enables them for contemporary engagement and reflection .
2. The course will help the students in understanding the significance of Indian philosophical studies in their daily life, how to overcome the stress, how to manage their life and take from challenges in life; hence there will be a focus on the dialectical and analytical method to understand Indian philosophy.
3. After completion of the course one can find out some relative and thoughtful answer regarding the nature and substance of the entire world as well as the universe and this course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

CC(H) 2- History of western Philosophy - I :(Pre Socratic Philosophy, Plato , Aristotle , St. Thomas Aquinas, Descartes, Spinoza, and Leibniz)

1. The Course is designed to appreciate the profound ideas that sprung from the minds of the great philosophers of the ancient and modern western world. The syllabus comprises of philosophers of Pre Socratic Philosophy and philosophers Plato , Aristotle , St. Thomas Aquinas and rationalist and modern western philosophers like Descartes, Spinoza, and Leibniz .
2. This paper seeks to enable the students to witness how philosophers who were either predecessors or contemporaries evaluated the theories of others. It will also make students aware that there is no place for superficial approach to the complex questions in life.
3. After completion of the said course a student can analyse human capacity of reasoning within the classical framework of Indian tradition and this course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

Semester 2

CC (H)3 Indian philosophy - II(Sāmkhya, Yoga, Mīmāmsā, Vedānta school of Indian thought)

1. The objective of this course is to make students familiar with Indian Intellectual traditions. This course will be an Introduction to the major schools of Indian philosophy. Focus will be on Sāmkhya, Yoga, Mīmāmsā, Vedānta school of Indian thought through interactive learning where students will engage themselves into rigorous and an analytical examination of key concepts in a manner that enables them for contemporary engagement and reflection .
2. The course will help the students in understanding the significance of Indian philosophical studies in their daily life, how to overcome the stress, how to manage their life and take from

challenges in life; hence there will be a focus on the dialectical and analytical method to understand Indian philosophy.

3. After completion of the said course a student can analyse human capacity of reasoning within the classical framework of Indian tradition and this course will help the students to prepare themselves for NET/SET/other examination for entry into services.

CC (H)4 History of Western Philosophy- II

1. The paper is designed to appreciate the profound ideas that sprung from the minds of the great philosophers of the modern western world. The discussion will focus on the empiricist school of western philosophy. The syllabus comprises of philosophers like Locke, Berkley Hume and Kant. This paper seeks to enable the students to witness how philosophers who were either predecessors or contemporaries evaluated the theories of others. It will also make students aware that there is no place for superficial approach to the complex questions in life.
2. This course will enable the students to appreciate the intricacies involved in the notion of knowledge and its cognates such as justification. Discussions on the definitions of knowledge and various puzzles associated with it, discussions on foundationalist and coherentistapproaches to justification etc. will help the students to recognise the nuances of the various epistemic puzzles and this course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

Semester 3

CC(H) 5- Philosophy of Mind

1. Debates concerning the nature of mind and consciousness are active and ongoing, with implications for philosophy, psychology, artificial intelligence and the neurosciences. It is difficult to understand how minds fit into the physical world and interact with material things. It is hard to explain how minds are capable of representing the world. And it is a deep mystery how conscious experience relates to our bodies and brains. This course will take a philosophical approach to these questions, exploring some of the metaphysical and conceptual issues that underlie psychological and neuroscientific explanations.
2. To acquaint the student with the problem of philosophy of mind with special reference to mind-body dualism, Parallelism, Behaviourism and Functionalism.
3. Reflection on the nature of mental phenomena, mental function and its relationship to the physical body and other mind.
4. Upon successful completion of this course, students will have the knowledge and skills to: Understand and articulate some of the prominent issues in philosophy of mind, analyse and critically evaluate theories, arguments and presuppositions of prominent figures in philosophy of mind, argue for a philosophical position related to the material covered in the course., engage in philosophical discussion and debate, verbalise interpretations and criticisms of the various ideas discussed throughout the course.
5. At the end of the course, the successful student will be able to do the following:
    i. Explain the ordinary notion that the mind causes the body to do various things, and then explain the difficulties anyone will have integrating this notion with the apparent result of the sciences.

ii. Explain the differences between theories of mind such as substance dualism, property dualism, philosophical behaviorism, identity theory (reductive materialism), functionalism and eliminative materialism.
iii. Present arguments both in favor of and against some of the traditional problems that have arisen for any theory of mind, e.g.., the problem of other minds, the problem of self-consciousness, the problem of free will, the semantic problem, and the methodological problem.

6. Students will also be able to do some of the following:
   i. Review the way in which psychology as a discipline emerged from the philosophical study of mind.
   ii. Critically evaluate some of the following theories: physical identity theories, physical supervenience theories, functionalist theories, epiphenomenalist theories, eliminativist theories, anomalous monist theories, mysterian theories, and dual aspect theories.
   iii. Show the argument(s) for the view, and critically assess the argument(s) for the view that we can establish that there are other minds.
   iv. Review some of the main theories on personal identity, and critically examine these theories.

CC (H)6- Social and Political philosophy :

1. This course aims at studying different range of social and political thinkers, theories and concepts. It would provide a broad survey of fundamental, social and political questions in current context discussing philosophical issues central to political and social thoughts.
2. This course may make students a better citizens by understanding the notions of governance and democracy. It enables them to know rights of Individuals and communities, and to learn to live in cohesive manner in a multicultural setup.
3. The objective of this course is to acquaint the students of philosophy with philosophical aspects of society and politics: Western and Indian
4. Understanding the basic concepts Like:Secularism,Nationalism, Humanism, Equality, Liberty ,sovereignity and the relation between the individual and society

CC (H)7 Philosophy of Religion:

1. Develops an awareness of the main philosophical debates in contemporary philosophy regarding the nature of and existence of God in the Indian and Western religions, and about the nature and rationality of religious belief.
2. To familiarize the students with basic concepts of religion and its philosophical significance. To develop a wider vision for contemporary issues in religion.
3. The students will acquire a general understanding of religious issues .They will learn to think critically about religious issues.
4. By the end of this course, you should be able to:
   i. identify key concepts in the philosophy of religion
   ii. identify the many approaches to understanding religion in anthropology, psychology, sociology, phenomenology and philosophy
   iii. relate ideas about religion and spirituality to the history of politics and contemporary issues
   iv. discuss the issues involved in the debate between science and religion

v. apply the ideas discussed to your personal life and your choices.

Skill Enhancement Course

SEC-A-(1) in Semester 3 - Man and Environment.

1. Upon completion of this lesson, students will be able to:
    i. outline the ways humans impact the environment.
    ii. explain the results of human impact to the environment.
    iii. list strategies to reduce the environmental impact of humans.
    iv. understand the different ways in which ancient people worship nature
    v. demonstrate an awareness of the attitude of respect for nature
    vi. exhibit the intrinsic value of nature, according to western stand points.
    vii. understand the contemporary views of Environmentalist.

Semester 4

CC (H) 8 Western Logic – I

1. Logic is fundamental to the way human beings communicate. Though our public debate and private reasoning are shaped by logical principles, we are not able to spell them out without a basic training in logic.
2. Logic course helps the students to develop an understanding of the basic concepts of logic and language as well as familiarity with precise models of deductive reasoning. It will also facilitate an understanding to effectively distinguish between rhetoric, fallacious arguments and sound reasoning in real life. Identifying these distinctions is quite significant to preserve one's intellectual sanctity in an increasingly media saturated world with fake news.
3. This course is designed as an introductory course in logic which will bring out the standard forms of Formal and Informal reasoning. It introduces the basic logical concepts and provides a clear understanding of the structure of arguments and the nature of inferential reasoning
4. Formal logic enhances the reasoning skills and develops ground for rejecting the wrong arguments on the basis of sound inferences. It creates ground for eliminating superstitious beliefs and creates ways for strong arguments.
5. To acquaint the students with basic logical concepts of both Deductive and Inductive Logic and to develop skills for validating/invalidating syllogisms through rules and Venn Diagram.

CC (H) 9 Western Logic – II

1. This course aims to equip the students with an understanding of the basic logical concepts which helps to enhance their reasoning capacity, proving validity and invalidity of argument forms. They learn various logical tools and methods with the application of rule, axioms and theorems.
2. Developing skill of logical thinking and avoiding errors or fallacious reasonings
3. It enhances the logical reasoning and problem-solving skills. The significance of this paper is that it prepares students to reason out in day to day life situations as well as to develop the skill to clear various competitive examination.
4. As the course enhances the reasoning power of the students, one can select the better chance among the present scopes after completion of the course and this course will help the students

to prepare themselves for higher studies and NET/SET/other examination for entry into services.

CC(H) 10 Epistemology and Metaphysics (Western)

1. The objective of the course in Analytic Philosophy for Honours students is to make them conversant with an important school of Western Philosophy in the 20th century that led to a revolutionary re-conceptualization of the subject matter and methodology of philosophy in terms of linguistic analysis, logic and mathematics. Analytic philosophy is generally seen as the dominant philosophical tradition in the English-speaking world even today.
2. The course in Analytic Philosophy will Introduce the students to the primary thinkers of one of the most important and influential school of thought in Western Philosophy. It will enable students in acquainting them with the complex set of interconnected sub-traditions that Analytic Philosophy ramified into and which became equally influential in the twentieth century,
3. This course will enable the students to appreciate the intricacies involved in the notion of knowledge and its cognates such as justification. Discussions on the definitions of knowledge and various puzzles associated with it, discussions on foundationalist and coherentist approaches to justification etc. will help the students to recognise the nuances of the various epistemic puzzles and this course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

Skill Enhancement Course

SEC-B-(2) in Semester4- SEC –B-(2)- Philosophy of Human Rights

1. The course will provide the students with an understanding of some of the main philosophical debates about human rights, concerning how the concept of human rights should be understood, how human rights can be justified and the moral relevance of human rights.
2. Upon successful completion of this course the student will be able to critically participate in these debates and will have the foundation for understanding new questions arising within the philosophy of human rights.
3. understand the historical growth of the idea of human rights, exhibit the idea of natural law and natural rights as, demonstrated by Thomas Hobbes and John Lock, differentiate natural rights from the fundamental rights and human rights, understand the importance of preamble, fundamental, rights and duties as stated in Indian constitution and understand the contemporary view.

Semester 5

CC (H) 11 Indian Logic and Epistemology – I

1. The objective of this course is to engage the student in a participative framework to critically and creatively look at the dialogical and pluralistic epistemological traditions within the mosaic of what is called the Indian Philosophical Textual Depository. The primary focus will be on the three sources of knowledge and cognitive activity: perception, inference, comparison and verbal testimony.
2. After having done this course, the student is expected to have mastered the art of philosophically reading the given textual excerpts and to understand the issues hermeneutically afresh, keeping in mind the dialogical and pluralistic nuances employed in the epistemic enterprise.
3. Qualified students can easily differentiate valid knowledge from invalid ones on the basis of their learned reasoning capacity and this course will help the students to prepare themselves for higher education studies and NET/SET/other examination for entry into services.

CC (H) 12 Ethics (Indian)

1. The outcome of the course is to understand the basic of Indian ethics which includes Hindu, Jaina and Buddhist ethics.
2. In the knowledge tradition of India, ethics has its origin in its religious and philosophical thinking. In every religious tradition, good moral conduct is considered essential for a happy and contented life. Without following the path of righteousness no one can attain supreme goal (mokṣa) of life.
3. The foundations of Indian ethics can be seen in the metaphysical and theological beliefs in the form of worship, prayers and ideals and principles of the society. In India, there exists an intimate relationship between ethics and religion.
4. After having run through the Indian ethics the students will enumerate various ethical concepts of different Indian philosophical and religious traditions and gain a better orientation from the ethical perspective.

Discipline Specific Elective Course

DSE A-1- 1.3 Philosophy of language (Indian)

1. This course enables students to develop the ability to read and interpret philosophical texts. The study of the Philosophy of Language from the Indian context exposes students to the problems of understanding language, meaning, reference and other related concepts in Indian philosophy.
2. Students are able to know, towards the end of the course, what they learnt and communicate to others their understanding of the fundamental issues in philosophy of language.

DSE –B-1-- 1.1 An Enquiry Concerning Human Understanding:David Hume

1. The Western philosophical tradition forms a key component of the discipline since the domain area borrows plenty of fodder from Western philosophical thinkers. Having been introduced to history of Western Philosophy, the students would now be expected to read and critically examine the basic text of some prominent contemporary

philosophical thinkers in West. One Such text is "An Enquiry Concerning Human Understanding" by David Hume. This would enable the students to get a first- hand exposure to core philosophical issues that bothered these Western philosophers.

2. The idea is to encourage the students towards a comparative trajectory where they probe the similarities and differences between the Western and non-Western stands of thought. Hence, one of the key learning outcomes would be and should be to develop comparative skills. By focusing on individual philosophical thought from original texts, the students would be capable of differentiating between positive and normative worldview

Semester 6

CC (H) 13 Indian Logic and Epistemology – II

1. The objective of this course is to engage the student in a participative framework to critically and creatively look at the dialogical and pluralistic epistemological traditions within the mosaic of what is called the Indian Philosophical Textual Depository. The primary focus will be on the three sources of knowledge and cognitive activity: perception, inference, comparison and verbal testimony.
2. After having done this course, the student is expected to have mastered the art of philosophically reading the given textual excerpts and to understand the issues hermeneutically afresh, keeping in mind the dialogical and pluralistic nuances employed in the epistemic enterprise.
3. Qualified students can easily differentiate valid knowledge from invalid ones on the basis of their learned reasoning capacity and this course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

CC (H) 14 Ethics (Western Ethics)

1. The objective of this course is to acquaint the students of philosophy with moral aspects of Human Existence through the basic teachings of Western ethics and is to introduce students to basic ethical theories which enhance their decision making capabilities. The course is designed to help them achieve clarity and creative approach in a given situation.
2. Understanding the basic value and importance of life with the knowledge of 'ought' and 'is' statements.
3. The course aims to develop an ethical perspective on socio-political and even economic issues where the public discourses and debates are often bereft of ethical/moral considerations and are often plagued with objectivism and materialism.
4. Through theoretical understanding of ethics and its practical application in daily life, it generates ethical awareness/sensitivity necessary for overall wellbeing and inspires the students to contribute voluntarily to the society as a responsible member.
5. To equip the students with tools and techniques for handling socio political issues that affect them on individual / collective basis. It also inculcates, among students, a larger awareness of public issues and empathy with marginalised issues in society

Discipline Specific Elective Course

DSE – A- 2- 2.2 Applied Ethics

1. The course objective is to apply the theoretical tools of Ethics in life situations as well as devise ethical resolutions in moral dilemmas as they come up. This will gradually generate an ethical acumen amongst the students of philosophy.
2. This course is designed to make students philosophically competent about their own decisions, to achieve clarity, develop comprehension skills and reach precision in arguments with reasons. A spectrum of issues ranging from morality, environment, real life situations, moral dilemmas and ongoing philosophical examination of the crisis in different fields of are a part of this course curriculum.
3. After studying the course of Applied Ethics the students should be able to differentiate between normative ethics and applied ethics understand and explain some important issues and problems in practical moral philosophy, solve the daily life's problems by applying ethical principles of normative ethics.

DSE –B-2—1.1Swami Vivekananda

This course is designed to make:

1. To acquaint the students with the recent developments of the long continuing trends of Indian Thought
2. Understanding the thoughts of the Neo-Vedantists like Vivekananda.

PROGRAM OUTCOMES

Students of all undergraduate general degree programs should have acquired the following abilities/ values at the time of graduation:

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

PO2. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

PO3. Effective Citizenship: Demonstrate empathetic 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.

PO4. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

PO5. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

PO6. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio-technological changes.

Program Specific Outcomes (PSO):

1. State the meaning of Philosophical, Psychological and Sociological aspect of foundation in Education.
2. Discuss the nature of Philosophical, Psychological and Sociological aspects of foundation in Education.
3. Explain the scope of Philosophical, Psychological and Sociological aspects of foundation in Education.
4. Discuss the Historical aspect of foundation in Education.
5. Identify the different aspect of Educational Management.
6. Explain the different aspect of Educational Technology.
7. Discuss the different aspect of Educational Statistics.
8. Identify the different aspect of Inclusive Education.
9. Distinguish the difference among different foundations of Education.

Course Outcomes (CO):

1. Discuss the meaning, nature, scope and aims of education.
2. Discuss the meaning and scope of educational Philosophy.
3. Explain the factors of education and their relationships.
4. Describe the knowledge, reality and value of different Indian schools of philosophy namely Sankhya, Yoga, Buddhism and Jainism.
5. Discuss the educational view of different western schools of philosophy namely Idealism, Naturalism, Pragmatism and Realism.
6. Explain the concept of Democracy, Socialism and Secularism.
7. State the educational philosophies of Swami Vivekananda, Rabindranath Tagore, Mahatma Gandhi, Rousseau, Dewey, Froebel and Montessori.
8. Discuss the meaning, nature and scope of Educational Sociology and relation between Education and Sociology.
9. Describe the Social factor and their relation to education.
10. Define social groups, socialization and social institution and agencies of education.
11. Explain the social change and its impact of education.
12. Discuss the concept, nature, scope and uses of Psychology in education.
13. Explain the influence of growth and development in education.
14. Describe the meaning and concept of learning, its theories and factors.
15. Explain the application of learning theories in the classroom situation.
16. Discuss the concept and theories of intelligence and creativity.
17. Explain the concept and development of personality.
18. Discuss the concepts of measurement and evaluation in the field of education.

Department of Economics

Raja Peary Mohan College

B. Sc Honours in Economics

Pogramme Outcome, Programme Specific Outcome and Course Outcomes (PO, PSO & COs)

PROGRAM OUTCOME:

- Foster intellectual curiosity, critical thinking and logical reasoning.
- Develop knowledge of quantitative and qualitative methods for understanding human behavior.
- Provide an introductory understanding of the structures and processes of social institutions and individual behavior within cultures.
- Structure, analyze, evaluate, and support an argument both orally and in writing in the social sciences.
- Interpret, compare, and contrast ideas in the social sciences.
- Demonstrate knowledge of the methods, techniques, concepts, and vocabularies of the social sciences.
- Demonstrate knowledge of historical and contemporary issues in the social sciences.

Programme Specific Outcome in Economics

- Economics revolves around the activities of production, distribution and consumption.
- This branch of Social Science explains how societies, governments, businesses, households, and individuals allocate their scarce resources.
- As a specific discipline, Economics involves study of the basic tools of consumer behaviour, efficiency and equity implications of market interference, including government policy.
- Supply and demand analysis is applied to examine the impact of government regulation, responses of market and the benefits of exchange.
- On an aggregate level, Economics provides knowledge regarding the formulation of broad economic policies that maximize the level of national income, providing economic growth to achieve sustainability, full employment, price stability, external balance and increasing productivity in the long run.
- Besides, the pattern and nature of international trade and its contribution to economic development and the role of public authorities in raising revenue and its spending is also covered.
- It focuses on comprehensive understanding of Indian Economy and the world economy, planning and infrastructure support for developing the economy and the

various economic reforms undertaken from time to time apart from the systematic development of economic theories beginning from pre-modern to modern era.

- The subject develops conceptual models of behaviour to predict responses to changes in policy and market conditions and use rigorous statistical analysis to investigate these changes.
- Economic policy makers contribute to the development of public policies including health care, welfare, education and aim to reduce inequality, pollution and crime.
- Economics enables students to understand the past, present economic conditions of the country and to forecast the future course of changes and development through their knowledge of policies and programmes.

Course structure semester-wise: Economics (Honours)

Semester –I (July to December) :

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–I(ECO-A-CC-1-1-TH-TU)	Introductory Microeconomics[Theory plus Tutorial]	5+1=6	100
Economics Core Course–II(ECO-A-CC-1-2-TH-TU)	Mathematical Methods for Economics-I [Theory plus Tutorial]	5+1=6	100

:**Semester –II (January to June):**

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–III(ECO-A-CC-2-3-TH-TU)	Introductory Macroeconomics[Theory plus Tutorial]	5+1=6	100
Economics Core Course–IV(ECO-A-CC-2-4-TH-TU)	Mathematical Methods for Economics-II [T heory plus Tutorial]	5+1=6	100

Semester –III (July to December) :

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–V(ECO-A-CC-3-5-TH-TU)	Intermediate Microeconomics-I[Theory plus Tutorial]	5+1=6	100
Economics Core Course–VI(ECO-A-CC-3-6-TH-TU)	Intermediate Macroeconomics-I[Theory plus Tutorial]	5+1=6	100
Economics Core Course–VII(ECO-A-CC-3-7-TH-TU)	Statistics for Economics[Theory plus Tutorial]	5+1=6	100
Skill Enhancement Course-I(A Group) (ECO-A-SEC-3-1A-TH)	Data Analysis[Theory]/Rural Development [Theory] [A-Group of SEC consists of two courses. Students will have to select any one	5+1=6	100

	of the two]		

Semester-IV (January to June):

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–VIII(ECO-A-CC-4-8-TH-TU)	Intermediate Microeconomics-II[Theory plus Tutorial]	5+1=6	100
Economics Core Course–IX(ECO-A-CC-4-9-TH-TU)	Intermediate Macroeconomics-II[Theory plus Tutorial]	5+1=6	100
Economics Core Course–X(ECO-A-CC-4-10-TH-TU)	Introductory Econometrics[Theory plus Tutorial]	5+1=6	100
Skill Enhancement Course-II(B Group) (ECO-A-SEC-4-2B-TH)	Research Methodology [Theory]/Managerial Economics [Theory] [B -Group of SEC consists of two courses. Students will have to select any one of the two]	5+1=6	100

Semester –V (July to December) :

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–XI(ECO-A-CC-5-11-TH-TU)	International Economics[Theory plus Tutorial]	5+1=6	100
Economics Core Course–XII(ECO-A-CC-5-12-TH-TU)	Indian Economy[Theory plus Tutorial based Term Paper]	5+1=6	100
Two Discipline Specific Elective(DSE)Courses: DSE-A and DSE- B In Semester V these two courses are denoted as DSE-A(1) and DSE-B(1) One out of two courses from : DSE-A(1) One out of two courses from: DSE-B(1) (ECO-A-DSE-5-A(1)-TH-TU/P) and (ECO-A-DSE-5-B(1)-TH-TU)	DSE-A(1)consists of two courses out of which students will have to select any one and DSE- B(1) consists of two courses out of which students have to select any one.The two courses under DSE-A(1) are Applied Econometrics (AE) : 4(Th) +2 (P)= 6 Economic History of India (1857-1947) (EHI) : 5(Th) +1(Tu) = 6 [Students will have to select any one]The two courses under DSE-B(1) are Comparative Economic Development (1850- 1950) (CED): 5(Th) +1(Tu) = 6Financial Economics (FE) : 5	(5+1)=6 (5+1)= 6 [Or one (4+2)= 6 and one(5+1)= 6]	100+100

	(Th) + 1 (Tu) =6 [Students will have to select anyone]		

Semester –VI (January to June):

Type of Course	Name of the Course	Credit	Marks
Economics Core Course–XIII(ECO-A-CC-6-13-TH-TU)	Public Economics[Theory plus Tutorial]	5+1=6	100
Economics Core Course–XIV(ECO-A-CC-6-14-TH-TU)	Development Economics[Theory plus Tutorial]	5+1=6	100
Two Discipline Specific Elective(DSE)Courses: DSE-A and DSE- B In Semester VI these two courses are denoted as DSE-A(2) and DSE-B(2) One out of two courses from : DSE-A(2) One out of two courses from: DSE-B(2) (ECO-A-DSE-6-A(2)-TH-TU/P) and (ECO-A-DSE-6-B(2)-TH-TU)	DSE-A(2)consists of two courses out of which students will have to select any one and DSE-B(2) consists of two courses out of which students have to select any one.The two courses under DSE-A(2) are Money and Financial Markets (MFM): 5(Th) + 1(Tu) =6Issues in Indian Economy (IIE): 4(Th) +2 (P)= 6 [Students will have to select any one] The two courses under DSE-B(2) are Environmental Economics (EE) : 5 (Th) +1 (Tu) =6Issues in Development Economics (IDE) : 5 (Th) +1 (Tu) =6 [Students will have to select anyone]	(5+1)=6 (5+1)=6[Or one (4+2)=6 and one(5+1)= 6]	100 +100

Course Outcomes:
Semester - I

Introductory Microeconomics
(Core Course - 1)

This is the first core course of Honours in Economics in undergraduate level. It is based on the microeconomics which mainly deals with a particular unit of an economy. It helps the students to learn about the basic principles of microeconomics, the interaction between demand and supply, the concepts of market and elasticity, intervention of Government in

market and the theory of utility.

Mathematical Methods for Economics
(Core Course - 2)

This is the first part of mathematical methods in Economics and the second part will be introduced in second semester. It enriches the students with the mathematical skills and learns them the application of these mathematical concepts in the theory of Economics.

Semester – II

Introductory Microeconomics
(Core Course - 3)

This is the first core course of semester II. It trains the students about the introduction of the Macroeconomics which deals with the economy as a whole. This course learns them about the concepts of the national income of a country; income determination in the Simple Keynesian model in a closed economy and in the classical system and about the macroeconomic foundation.

Mathematical Methods for Economics
(Core Course - 4)

This is the sequence of the core course II of semester I. It is to be taught in semester II. It enables the students to learn about the function of different variables, optimization of linear and non-linear functions, difference equation and differential equations and their applications in microeconomics and macroeconomics.

Semester – III

Intermediate Microeconomics - I
(Core Course - 5)

This is the first core course of semester III and a sequence of core course I of semester I. It trains the students about the behavior of the consumer and producer. It also learns them about the characteristics and equilibrium of a perfectly competitive firm and market both in the short run and long run and also about the input market in perfect competition.

Intermediate Macroeconomics I
(Core Course - 6)

This is the second core course of semester III and a sequence of core course III of semester II. It aims to learn the students about the equilibrium income determination in IS-LM model as well as in the complete Keynesian model and the difference between the Keynesian and classical systems. It also learns them about the money supply, inflation, unemployment and

expectations in an economy.

Statistics for Economics
(Core Course - 7)
This is the third core course of semester III. It learns the students about the variables, diagrams, tables ; measures of Central tendency, dispersion, moments, skewness, kurtosis, correlation and regression. It also teaches them about the theory of probability and probability distribution and theory of sampling and hypothesis testing. It helps the students to grow their knowledge about their future carrier by applying all these measures.

Semester – IV

Intermediate Microeconomics II:
(Core Course - 8)
This course gives the knowledge about market structure. This course also aims to learn the students about the causes of market failure, about the public goods, pareto optimality and moral hazard. It helps the students to grow their knowledge about their future carrier by applying all these measures.

Intermediate Macroeconomics II
(Core Course - 9)
This course gives the knowledge about the Classical theories and Keynesian theories and also focuses on different macroeconomic growth model. This helps the students to analyse the real economy by Appling these theories.

Introductory Econometrics:
(Core Course - 10)
This is the third core course of semester four. This gives the ideas of simple linear regression model, heteroscedasticity, multicollinearity. This also gives the knowledge about different types of statistical data that can enable students to understand the different official statistical data and this course also helps the students to their future research process.

Semester – V

International Economics:
(Core Course - 11)
This is the first core course of semester five. This course lightens up about the different trade theories and about the trade barriers and trade policies. This also gives the idea about the balance of payment situation of the economy. These help the students to understand the open economy.

Indian Economy:
(Core Course - 12)
This core course lightens up about the characteristics of Indian Economy. It also gives the ideas of the population pattern of the economy and the different reforms taken in different sectors. This knowledge actually helps the students to understand the Indian economy properly.

Semester – VI

Public Economics:
(Core Course - 13)
This course focused on the ideas about the public good and private goods and about the different taxation policies of the economy. This course also gives the idea of Public revenue structure and public debt and its effects on the economy. This also helps the students to acquire the knowledge about India economy.

Development Economics:
(Core Course - 14)
This core course gives the knowledge of economic aspect of Development, about the human development index and the nature of poverty and inequality. This course also gives the ideas of different types of unemployment and different growth model. This course will help the students to understand the real economy properly.

Skill Enhancement Course

Semester – III

- **Skill Enhancement Course I – Data Analysis**

This is the first Skill Enhancement Course for Semester III under CBCS system. It is based on introduction of different types of data and their representation .It helps the students to interact with different official sites of data collection and their application by using software like Stata, R , E-views , SPSS etc.

- **Skill Enhancement Course I –Rural Development**

This is the second Skill Enhancement Course for Semester III .Rural development is the process of improving quality of life of people in rural areas. It is a comprehensive term. It focuses on action for the development of areas outside the mainstream urban economic system. It emphasis on various locally produced development strategies for rural areas.

Semester – IV

- **Skill Enhancement Course I –Research Methodology**

This is the sequence of skill enhancement course II for Semester IV .It is an application oriented paper. It is based on the way how a researcher designs his study systematically which gives a valid and reliable result according to their objectives. It is mainly focused on different types of survey methods and different types of methodology which can be used to

get a reliable result .This paper mainly gives an idea how research work can be represented.

- **Skill Enhancement Course I –Managerial Economics**

Managerial Economics is widely applied in organization to deal with different issues. This is the second Skill Enhancement Course for Semester IV. It emphasizes different ways of solving business problems and decision making power of any organization by applying various theories and principles of macroeconomics and microeconomics. We know that Economics is an inevitable part of business so, all the assumptions, strategies, investment decision, forecasting are based on this one single concept**.**

Discipline Specific Elective Course

Semester - V

- **Discipline Specific Elective –Applied Econometrics**

The concept of economics is largely regarded as social science but it is also a mathematical science. Applied Economics is a part of course structure for Semester V students under CBCS system. This includes various models which are applicable for many theoretical issues .It gives an idea of how data can be used for research work through different software usage like Stata, R etc. This part of economics also gives an idea about different types of regression analysis like cross sectional, Time series and Panel data analysis.

- **Discipline Specific Elective--Economic History of India**

This paper is for Semester V students. This an academic study of economic events of the past. This paper gives a detailed story about many issues related history which on the other way related to Economics. This paper, for this semester, mainly focused on impact of British rule on India. It emphasizes many topics like Land policy, monetary policy, Railways, Commercialization of agriculture etc.

- **Discipline Specific Elective--Comparative Economic Development**

This is the Discipline specific paper B(1) for Semester V. This paper gives an overview of comparative economic development that has emerged from transition economics, political economics and economics of central planning. This paper mainly based on comparison of various economic systems, strategies for economic development in capitalist countries with other countries.

- **Discipline Specific Elective—Financial Economics**

This branch of economics is heavily based on microeconomics and basic accounting concepts. This is the part of course structure for Semester V students .It enables economic theory to evaluate how risk, opportunity cost, time can create incentives or others for particular decision making.

Semester - VI

- **Discipline Specific Elective—Money and Financial Market**

Money market is a short term lending market and it is less risky than the capital market. This special paper for Semester VI students specially focused on money market operation. It gives an idea of how this type of market behaves in crisis time period, different policies related to this type of market, their functions etc. This paper aims to take an idea of different types of instruments of money market, banking system , monetary management in an open economy and so many.

- **Discipline Specific Elective---Issues in Indian Economy**

This paper is the part of Semester VI under CBCS system .It is based on the idea of national income, per capita income and other types of sources of income in our economic system. This paper is also included various analysis related to different sources of income by using different official statistics. It also gives an idea about how different types of policies useful in development of various sectors. In this paper three sectors of economy primary, secondary and tertiary are widely discussed with their policy prescription.

- **Discipline Specific Elective---Environmental Economics**

This is the third elective paper for Semester VI students. This is the paper which determines the theoretical or empirical effects of environmental policies on the economy. This paper teaches the basic concept of environmental economy as well as interlinks environment with economy. It also discussed various policies and their implementation to correct different issues which have a bad impact on environment and try to relate it with economics.

- **Discipline Specific Elective---Issues in Development Economics**

This the forth elective paper of Semester VI students. This is a branch of economics which deals with economic aspects of development process in low as well as high or moderate income countries. It is not only focused on different methods of economic growth ,structural changes but also on different policies which can be used to improve the standard of living of mass of the population, health sector, education etc.

Pogramme Outcome, Programme Specific Outcome and Course Outcomes (PO, PSO & COs)

For Economics General

PROGRAM OUTCOME:

- Foster intellectual curiosity, critical thinking and logical reasoning.
- Develop knowledge of quantitative and qualitative methods for understanding human behavior.
- Provide an introductory understanding of the structures and processes of social institutions and individual behavior within cultures.

- Structure, analyze, evaluate, and support an argument both orally and in writing in the social sciences.
- Interpret, compare, and contrast ideas in the social sciences.
- Demonstrate knowledge of the methods, techniques, concepts, and vocabularies of the social sciences.
- Demonstrate knowledge of historical and contemporary issues in the social sciences.

Programme Specific Outcome in Economics

- This branch of Social Science explains how societies, governments, businesses, households, and individuals allocate their scarce resources.

- Supply and demand analysis is applied to examine the impact of government regulation, responses of market and the benefits of exchange.

- On an aggregate level, Economics provides knowledge regarding the formulation of broad economic policies that maximize the level of national income, providing economic growth to achieve sustainability, full employment, price stability, external balance and increasing productivity in the long run.

- It focuses on comprehensive understanding of Indian Economy and the world economy, planning and infrastructure support for developing the economy and the various economic reforms undertaken from time to time apart from the systematic development of economic theories beginning from pre-modern to modern era.

Semester-wise distribution of CC and GE for Economics General :

Semester	Name of the Course	Core Course(CC) for BA/ BSc General students	GE Course for students who have Honours in any subject other than Economic	GE(Economics) Course for BA (General) students who have Core papers other than Economics
I	Introductory Microeconomics	CoreCourse1(Econ)-CC-1(ECO-G-CC-1-1-TH-TU)	Generic Elective Course I (ECO-GE- 1-1-TH-TU)	Generic Elective Course I(ECO-G-GE-1-1-TH-TU)
II	Introductory Macroeconomic	CoreCourse2(Econ)-CC-2(ECO-G-CC-2-2-TH-TU)	Generic Elective Course II(ECO-GE-2-2-TH-TU)	Generic Elective Course II(ECO-G-GE-2-2-TH-TU)
III	Issues in Economic Development and India	CoreCourse3(Econ)-CC-3(ECO-G-CC-3-3-TH-TU)	Generic Elective Course III(ECO-GE-3-3-TH-TU)	Not Applicable
IV	Indian Economic Policies	CoreCourse4(Econ)-CC-4(ECO-G-CC-4-4-TH-TU)	Generic Elective Course IV(ECO-GE-4-4-TH-TU)	Not Applicable

Name of Courses under DSE-A[Candidate will have to select only one] [Relevant for 5th Semester]	Name of the Courses under DSE-B[Candidate will have to select only one] [Relevant for 6th Semester]
Money and Banking (MB)ECO-G-DSE-5-1A/2A-TH-TU	Public Finance (PF)ECO-G-DSE-6-1B/2B-TH-TU
Sustainable Development (SD)ECO-G-DSE-5-1A/2A-TH-TU	Economic History of India (1857-1947)(EHI)ECO-G-DSE-6-1B/2B-TH-TU

Name of the Course under SEC-A[Candidate will have to select only one] [Relevantfor3rd or5th Semesters	Name of the Course for SEC-B[Candidate will have to select only one] [Relevantfor4th or6th Semesters]
Introductory Methods of Field Survey(IMFS)ECO-G-SEC-3-1A-TH/ECO-G-SEC-5-2A-TH	Economic Data Analysis and Report Writing(EDARW)ECO-G-SEC-4-1B-TH/ECO-G-SEC-6-2B-TH
Elementary Rural Development(ERD)ECO-G-SEC-3-1A-TH/ECO-G-SEC-5-2A-TH	Entrepreneurship and Development(ED)ECO-G-SEC-4-1B-TH/ECO-G-SEC-6-2B-TH

Course outcomes for Economics General Core Courses

For Semester – I
Core course – 1 / Generic elective – I

(Introductory Microeconomics)

This is the first core course or generic elective paper in Semester I under CBCS system. It is based on the microeconomics which basically deals with the single unit of an economy. It learns the students about the basic knowledge of economics, supply and demand, utility maximization, theory of production, characteristics and equilibrium of perfectly competitive market and monopoly market and concept of input market. It helps the students to understand the real life situation by applying the all these theories.

For Semester – II
Core course – 2 / Generic elective – II

(Introductory Macroeconomics)

This is the core course or generic elective paper in Semester II. It taught about the macroeconomics which deals with the aggregate economy. It teaches students about national income accounting, Simple Keynesian model, Classical system, supply and demand of money, inflation and some concepts of trade. It learns them to understand about the economy as a whole.

For Semester – III
Core course – 3 / Generic elective – III

(Issues in Economic Development and India)

This is the core course or generic elective paper in Semester III. This paper is based on the economic

development of India. It learns the students about the meaning of economic development; poverty, inequality and development of an economy; concept of dual economy and development strategy of an economy and about various international organizations and their role in development of an economy. This paper taught them about the trend in growth and development and about the present scenario of Indian economy.

For Semester – IV
Core course – 4 / Generic elective – IV

(Indian Economic Policies)

This is the core course or generic elective paper of semester IV. It deals with the Indian economic policies and their impact on the economy. It learns the students about macroeconomic policies and policies and performance of agriculture, industry and foreign trade of Indian economy.

Skill Enhancement Course

Skill Enhancement Course A – Introductory Methods of Field Survey(Semester III/V)

This is the first Skill Enhancement Course for both Semester III and Semester V student's .This part incorporates introduction of different types of data and their advantages and disadvantages. This paper is very useful to understand various methods of data collection and their representation as well as gives an idea about questionnaire.

Skill Enhancement Course A—Elementary Rural Development(Semester III/V)

This is the second sequence of Skill Enhancement Course in Semester III and Semester V syllabus. This paper helps students to understand the basic issues related with rural areas of our country. This paper gives a small introduction of different types of strategies and policies implemented by the government to improve rural areas.

Skill Enhancement Course B—Economic Data Analysis and Report Writing (Semester IV/VI)

This is the first Skill Enhancement Course for Semester IV and Semester VI under CBCS system. It is based on introduction of different types of data and their representation (tabular form and graphical form).It gives an idea about descriptive statistics of Statistics like Central tendency, Dispersion as well as basic idea of correlation and regression analysis. It helps students to write a report or research proposal which is very useful for their future in academic line.

Skill Enhancement Course B—Entrepreneurship and Development(Semester IV/VI)

This is the last course of Semester IV and Semester VI. This paper helps students to understand about basic issues of Entrepreneurship .This paper also includes basic growth strategies of any business farm and also gives idea about sickness in small business**.**

Discipline Specific Elective Course

For Semester - V

- **Discipline Specific Elective – Money and Banking :**

  This course gives the ideas about the different types of money and the reforms taken in the banking sectors and also gives the knowledge about the functions of central bank of India and also focused on the aspects of interest rate, CRR and SLR. This actually helps the students to analyze the effects of monetary policy on the economy.

- **Discipline Specific Elective – Sustanable Development :**

  This course focused on the key environmental issues and problems regarding sustainable development. The course also gives the students a proper idea about the efficient uses and management of different types of resources of the economy.

For Semester - VI

- **Discipline Specific Elective – Public Finance :**

  This course focused on the aspects of public goods and causes of externalities. This also gives the knowledge about the current tax system and government fiscal and monetary policy. This actually helps the students to understand the economic polices properly.

- **Discipline Specific Elective – Economic History of India (1857-1947) :**

  This course gives the knowledge of British colonial effects on different sectors in India and its contributions to the Railway Sector and so on .This actually helps the students to know about the different colonial policies and its effects on the Indian economy.

Annexure -I

PO, PSO, CO of UG program in Mathematics as major subject

Program Outcomes

By the end of a B. Sc. program with Mathematics as major or minor subject, a student will:

PO1: Be able to analyze, test, interpret and form independent judgments in both academic and non-academic contexts

PO2: Recognize and appreciate the connections between theory and applications

PO3: Have an appropriate set of professional skills to ensure a productive career

PO4: Work effectively in a multi-disciplinary environment

PO5: Be prepared for life-long learning

PO6: Exhibit positive attitudes and values toward the discipline, so that they can contribute to an increasingly complex and dynamic society

PO7: Develop effective communication skills in English and regional / national language

PO8: Communicate effectively with whom they are interacting and the society to make effective presentations, and give and receive clear instructions

PO9: Function effectively as an individual, and as a member or leader in diverse teams

Program Specific Outcomes

By the end of B. Sc. program in Mathematics as a major subject, a student will:

PSO1: Be familiar with different areas of Mathematics

PSO2: Construct abstract models using appropriate mathematical and statistical tools

PSO3: Be prepared to use Mathematics, not only in the discipline of Mathematics, but also in other disciplines and in their future endeavors

PSO4: Recognize what constitutes mathematical thinking, including the ability to produce and judge the validity of rigorous mathematical arguments

PSO5: Identify suitable existing methods of analysis, if any, and assess his/her strengths and weaknesses in the context of the problem being considered

PSO6: Develop the skills necessary to formulate and understand proofs and to provide justification PSO7: Think critically and communicate clearly mathematical concepts and solutions to real-world problems

PSO8: Be able to solve problems using a broad range of significant mathematical techniques

PSO9: Engage his/her creativity in the quest for novel or elegant solutions

PSO10: Develop an understanding of the precise language of Mathematics, and be able to integrate mathematical arguments with their critical thinking skills

PSO11: Be a life-long learner who is able to independently expand his/her mathematical or statistical expertise when needed

Semester I

CC1 & CC2: Calculus, Geometry, Vector Analysis & Algebra

Course Outcomes Upon completion of this course, students should be able to:

CO1: Apply the logic theory to practical situations for drawing conclusions

CO2: Analyze statements using truth tables

CO3: Write and interpret mathematical notation and mathematical definitions

CO4: Construct and restate various theorems using logical arguments

CO5: Unravel abstract definitions, create intuition-forming examples or counterexamples, and prove conjectures

CO6: Formulate short proofs using the following methods: direct proof, indirect proof, proof by contradiction, and case analysis

CO7: Apply the logical structure of proofs and work symbolically with connectives and quantifiers to produce logically valid, correct and clear arguments

CO8: Write solutions to problems and proofs of theorems that meet rigorous standards based on content, organization and coherence, argument and support

CO9: Understand the basic theory of sets, perform set operations on finite and infinite collections of sets and be familiar with properties of set operations

CO10: Explain the fundamental ideas of sets and functions

CO11: Establish the relationship between various variables existing in a system

CO12: Determine equivalence relations on sets and corresponding equivalence classes

CO13: Differentiate between various types of functions

CO14: Work with functions and in particular bijections, direct and inverse images and inverse functions

CO17: To introduce the concept of a dependent variable depending on more than two dependent variables and finding partial derivatives

CO18: To find the nth derivatives of functions

CO19: Apply the Leibnitz's theorem for finding nth derivative of product of two functions

CO20: Apply Taylor's and Maclaurin's series for finding series expansions of functions and approximating values

CO21: Understand the concept of indeterminate forms, their occurrence in problems and their evaluation

CO22: Formulate equations from available data and find solutions to real life problems

CO23: Acquire the knowledge of the relationship between coefficients and roots of an equation

CO24: Explain different methods for finding the roots of a given equation

CO25: Apply the theoretic knowledge of different methods for finding the roots of a given equation into practical problems

CO26: Acquire the knowledge of different techniques of transforming equations to convenient forms

CO27: Explain different methods like Descartes Method, Cardan's method, Ferrari's method in theory of equations

CO28: Develop skill in locating the position of roots and determining their character

CO29: Understand how to analyze and synthesize given data to solve problems in geometry

CO30: Understand the basic ideas of conics

CO31: Explain the ideas of conics and their various applications

CO32: Find the equation to tangent, normal at a point on a conic

CO33: Apply the properties of conics to solve problems in real life situations

CO34: Explain the ideas of conics to explain many natural phenomenon

CO35: Find the polar equation of a line, circle , tangent and normal to conics

CO36: acquire the basic knowledge of vector differentiation and vector integration

CO37: Determine and apply, the important quantities associated with scalar fields, such as partial derivatives of all orders, the gradient vector and directional derivative

CO38: Determine and apply, the important quantities associated with vector fields such as the divergence, curl, and scalar potential

CO39: Acquire the basic knowledge of Circular and Hyperbolic Functions of a Complex Variable

CO40: Familiarized with real and imaginary parts of a circular and hyperbolic functions of a complex variable

CO41: Distinguish between the various methods for separating complex numbers in various forms into real and imaginary parts

CO 42: Understand how to separate a complex function into its real and imaginary parts

CO43: Understand various types of numbers and their properties

CO44: Acquire the basic knowledge of Number Theory

CO45: Apply the knowledge of Number Theoretic Problems in practical situations

Semester II

CC3 &CC4: Real Analysis & Group Theory

Course Outcomes Upon completion of this course, students should be able to:

Course Outcomes Upon completion of this course, students should be able to:

CO1: Explain the basic idea of real numbers

CO2: Describe fundamental properties of the real numbers that lead to the formal development of real analysis

CO3: Describe the real line as a complete, ordered field

CO4: Determine the basic topological properties of subsets of the real numbers

CO5: Describe the terms limit and limit points of a set and explains closed and open sets

CO6: Differentiate between countable and uncountable sets and examples for them

CO7: Explain the idea about sequences and monotone property

CO8: Acquire the basic knowledge of convergence and divergence

CO9: Use the knowledge of convergence into problems

CO10: Demonstrate an understanding of limits and how they are used in sequences, series

CO11: Apply various theorems on the existence of limits of sequences and their evaluation

CO12: Use the definitions of convergence as they apply to sequences, series, and functions

CO13: Apply the knowledge of convergence to problems and the various theorems on convergence, absolute convergence and non-absolute convergence

CO14: Comprehend rigorous arguments developing the theory underpinning real analysis

CO15: Construct rigorous mathematical proofs of basic results in real analysis

CO16: Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems

CO17: Produce rigorous proofs of results that arise in the context of real analysis

CO18: Demonstrate understanding of and the ability to verify relationships between operations satisfying various properties (e.g. commutative property)

CO19: Demonstrate understanding of and the ability to work within various algebraic structures

CO20: Assess properties implied by the definitions of groups and rings

CO21: Acquire the basic knowledge and the structure of Group, Subgroup and Cyclic Groups

CO22: Explain the significance of the notion of a normal subgroup, and of a simple group

CO23: Analyze and demonstrate examples of subgroups, normal subgroups and quotient groups

CO24: Use Lagrange's Theorem to analyze the cyclic subgroups of a group

CO25: Acquire the notion of permutations and operations on them

CO26: Prove Cayley's theorem and understand its applications

CO27: Explain the terms isomorphism and homomorphism

CO28: Develop an idea about Isomorphism, homomorphism and automorphism

CO29: Understand homomorphism, inner automorphism and their properties

CO30: Understand Cayley's theorem and its applications

Semester III

CC V, CC VI,CC VII & SEC-I:

Theory of Real Functions, Ring Theory, Linear Algebra, Ordinary Differential Equation & Multivariate Calculus, Programming with C

Course Outcomes Upon completion of this course, students should be able to:

CO1: Explain Continuity and Discontinuity of various functions in different contexts

CO2: Differentiate Uniform continuity from continuity and related theorems

CO3: Understand the meaning of derivative of a function

CO4: Acquire skill in applying the various techniques of differentiation and applications

CO5: Understand theorems associated with differentiability

CO6: Gain knowledge of L' Hospital Rule and evaluation of limits

CO7: Expand functions using Taylor Series

CO8: Describe the concepts and applications of derivatives and higher order derivatives

CO9: Understand the ideas of derivatives and higher order derivatives

CO10: Acquire the concept of finding partial derivatives and associated rules

CO11: Develop competency in applying the idea of partial derivatives

CO12: Expand functions using Taylor's and Maclaurin's series, Leibnitz theorem and use their applications

CO13: Acquire the concept of asymptotes and envelopes

CO14: Describe the characteristics of a ring, quotient rings and ideals

CO15: Understand Quotient Rings, Ideals and their existence with examples

CO16: Differentiate between Ring Ideals and Quotient Rings and also their properties

CO17: Familiarize with Rings, Integral Domains, Fields and Divisors of Zero

CO18: Familiarize with the concepts of Ideals and factor rings and homeomorphisms and factor rings

CO19: Acquire the knowledge of a matrix, basic operations, rank and determinant of a matrix

CO20: Understand the various applications of the theory of matrices to a wide variety of problems

CO21: Understand various methods for determining rank of a matrix

CO22: Acquire knowledge of invertible matrices and their properties

CO23: Recognize the concepts of the terms span, linear independence, basis, dimension, and apply these concepts to various vector spaces and subspaces

CO24: Introduce the new terms Basis and Dimension

CO25: Acquire the knowledge of ordered basis

CO26: Analyze vectors in Rn geometrically and algebraically

CO27: Analyze finite and infinite dimensional vector spaces and subspaces over a field and their properties, including the basis structure of vector spaces

CO28: Solve a System of Linear equations using the inverse of a matrix

CO29: Distinguish between consistent and inconsistent system of equations

CO30: Use matrix algebra and the relate matrices to linear transformations

CO31: Understand the concept of linear transformations and their properties

CO32: Use the definition and properties of linear transformations and matrices of linear transformations and change of basis, including kernel, range and isomorphism

CO33: Familiarize with transition matrices

CO34: Determine the Kernel of linear transformations and nullity of associated vector spaces

CO35: Compute with the characteristic polynomial and equation of a given square matrix

CO36: Familiarize characteristic roots and characteristic vectors

CO37: Determine eigen spaces, as well as the geometric and the algebraic multiplicities of an eigen value and apply the basic diagonalization result

CO38: Determine potency and index of nilpotency

CO39: Apply Cayley- Hamilton Theorem to problems for finding the inverse of a matrix and higher powers of matrices without using routine methods

CO40: Develop skill in finding the partial derivatives of functions of several variables and various rules associated

CO 41: Apply the chain rule for functions of several variables

CO 42: Use the Lagrange multiplier method to find extrema of functions with constraints

CO43: Apply the knowledge of Lagrange multipliers in finding the extreme values of functions

CO44: Make a comparative study of the extreme values of functions of a single independent variable with functions of several independent variables

CO45: Identify, analyze and subsequently solve physical situations whose behavior can be described by ordinary differential equations

CO46: Understand the order, degree and various standard forms of differential equations

CO47: Determine solutions to first order separable differential equations

CO48: Determine solutions to first order linear differential equations

CO49: Explain an integrating factor, which may reduce the given differential equation into an exact one and eventually provide its solutions

CO50: Familiarize the orthogonal trajectory of the system of curves on a given surface

CO51: Determine solutions to first order exact differential equations

CO52: Determine solutions to second order linear homogeneous differential equations with constant coefficients

CO53: Understand the basic knowledge of complimentary function and particular integral

CO54: Determine solutions to second order linear non-homogeneous differential equations with constant coefficients

CO55: Evaluate and apply linear differential equations of second order (and higher)

CO56: Obtain power series solutions of differential equations

CO57: Develop the ability to apply differential equations to significant applied and/or theoretical problems

CO58: Investigate the qualitative behavior of solutions of systems of differential equations

CO59: Identify and obtain the solution of Clairaut's equation

CO 60: Understand and apply the programming concepts of C for solving mathematical problems

CO 61: Apply to find greatest common divisors, generate random numbers, and understand Cartesian geometry and algebraic concepts through programming.

CO 62: Represent the outputs of programs visually in terms of well formatted text and plots.

Semester IV

CC VIII, CC IX, CCX & SEC-II

Riemann Integration, Series of Functions, Partial Differential Equation, Multivariate Calculus-II, Mechanics & Mathematical Logic

CO1: Understand partitions and their refinement

CO2: Understand Integrability and theorems on integrability

CO3: Acquire the idea about Riemann Integrability and Riemann Integration

CO4: Understand various theorems associated with Riemann Integration

CO5: Develop a knowledge about Riemann Integration and applies into problems

CO6: Determine the Riemann integrability of a bounded function and prove a selection of theorems concerning integration

CO7: Explain convergence of a series

CO8: Develop skill in checking the uniform convergence of series using various tests of convergence

CO9: Distinguish between Pointwise convergence and Uniform Convergence

CO10: Illustrate the convergence properties of power series

CO11: Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability

CO12: Determine the limit point of a series of functions

CO13: Understand convergence of different types improper integrals

CO 14: Understand the uses of improper integrals in various situations

CO15: Understand necessary conditions for the equilibrium of particles acted upon by various forces and learn the principle of virtual work for a system of coplanar forces acting on a rigid body.

CO16: Determine the centre of gravity of some materialistic systems and discuss the equilibrium of a uniform cable hanging freely under its own weight.

CO19: Deal with the kinematics and kinetics of the rectilinear and planar motions of a particle including the constrained oscillatory motions of particles.

CO 20: Learn that a particle moving under a central force describes a plane curve and know the Kepler's laws of the planetary motions, which were deduced by him long before the mathematical theory given by Newton.

CO 21: Calculate line integrals along piecewise smooth paths; interpret such quantities as work done by a force

CO22: Acquire the basic ideas of double and triple integral

CO23: Apply the techniques of double and triple integral to various problems of finding length of plane curves, surface areas and volumes of surfaces of revolution

CO24: Change variables in multiple integrals

CO25: Familiarized with different three dimensional surfaces and their properties

CO26: Evaluate line, surface, double and triple integrals and use these integrals to verify the seminal integral theorems (Green's theorem in the plane, Gauss' divergence theorem and Stokes' theorem)

CO27: Be familiar with the modeling assumptions and derivations that lead to PDEs

CO28: Describe the origin of partial differential equation and distinguish the integrals of first order linear partial differential equation into complete, general and singular integrals

CO29: Familiarize with the various techniques of finding the solution of the differential equation $P/dx = Q/dy = R/dz$

CO30: Acquire the idea of Lagrange's method for solving the first order linear partial differential equations

CO31: Recognize the major classification of PDEs and the qualitative differences between the classes of equations

CO32: Be competent in solving linear PDEs using classical solution methods

Semester V

CC XI, CCXII, DSE- A(1) & DSE-B(1)

Probability& Statistics, Group Theory-II & Linear Algebra-II, Advanced Algebra, Linear Programming & Game Theory

CO 1: Understand the basic concepts of probability.

CO 2: Appreciate the importance of probability distribution of random variables and to know the notion of central tendency.

CO 3: Establish the joint distribution of two random variables in terms their correlation and regression.

CO 4: Understand central limit theorem which shows that the empirical frequencies of so many natural populations exhibit normal distribution.

CO 5: Study entropy and information theory in the framework of probabilistic models.

CO 6: Understand distributions in the study of the joint behavior of two random variables.

CO 7: Establish a formulation helping to predict one variable in terms of the other that is,

Correlation and linear regression.

CO8: Understand central limit theorem, which establish the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.

CO 9: Understand the basic concepts of group actions and their applications.

CO 10: Recognize and use the Sylow theorems to characterize certain finite groups

CO 11: Know the fundamental concepts in ring theory such as the concepts of ideals, quotient rings, integral domains, and fields.

CO 12: Learn in detail about polynomial rings, fundamental properties of finite field extensions, and classification of finite fields.

CO13: Define a LPP in standard form and Canonical form

CO14: Identify a feasible solution, a basic feasible solution and an optimal solution using simplex method

CO15: Understand the new term LPP

CO16: Formulate and model a linear programming problem from a word problem and solve them graphically in 2 and 3 dimensions, while employing some convex analysis

CO17: Place a Primal linear programming problem into standard form and use the Simplex Method or The Big M Method to solve it

CO18: Formulate and solve a number of classical linear programming problems and such as the minimum spanning tree problem, the assignment problem, (deterministic) dynamic programming problem, the transportation problem, the maximal flow problem, or the shortest-path problem, while taking advantage of the special structures of certain problems

CO19: Use dual simplex method to find optimal solutions

CO20: Understand duality theorems and dual simplex method

CO21: Identify the advantages of duality method

CO22: Apply the theorems on duality to problems appropriately

CO23: Use dual simplex method to find optimal solutions

CO24: Find the dual, and identify and interpret the solution of the Dual Problem from the final tableau of the Primal problem

CO25: Explain the concept of complementary slackness and its role in solving primal / dual problem pairs

CO 26: Be able to modify a Primal Problem, and use the Fundamental Insight of Linear Programming to identify the new solution, or use the Dual Simplex Method to restore feasibility

CO27: Acquire the knowledge of Transportation and Assignment problems

CO28: Understand various methods of solving Transportation and Assignment Problems

CO29: Explain the Transportation Problem and formulate it as an LPP and hence solve the problem CO18: Determine that an Assignment Problem is a special case of LPP and hence solve by Hungarian method

CO30: Become familiar with various terms and rules used in the Theory of Games

CO31: Identify the various methods and theories of games

Semester VI

CC XIII, CCXIV, DSE-A (2), DSE-B (2)

Metric Space & Complex Analysis, Numerical Methods & Numerical Methods Lab, Fluid Statics & Elementary Fluid Dynamics, Point Set Topology

Course Outcomes Upon completion of this course, students should be able to:

CO1: Understand the basic concepts of open sets, closed sets, Cantor sets and metric spaces

CO2: Understand the various properties of metric spaces

CO3: Become familiar with convergence in metric spaces and theorems on convergence

CO4: Explore various properties of complete metric spaces and relate them with convergence of sequences

CO5: Understand and applies the knowledge of metric spaces various contexts

CO6: Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers

CO7: Write complex numbers in polar form

CO8: Introduce elementary complex functions

CO9: Find all integral roots and all logarithms of nonzero complex numbers

CO10: Evaluate exponentials and integral powers of complex numbers

CO11: Define and analyze limits and continuity for complex functions as well as consequences of continuity

CO12: Determine whether a given function is differentiable, and if so find its derivative

CO13: Use differentiation rules to compute derivatives

CO14: Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations

CO15: Conceive the concepts of analytic functions and will be familiar with the elementary complex functions and their properties

CO16: Apply the concept and consequences of analyticity and the Cauchy-Riemann equations and of results on harmonic and entire functions including the fundamental theorem of algebra

CO17: Use antiderivatives to compute line integrals

CO18: Understand the basic methods of complex integration and its application in contour integration

CO19: Understand the theory and techniques of complex integration

CO20: Find parameterizations of curves, and compute complex line integrals directly

CO 21: Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem

CO 22: Use Cauchy’s integral theorem and formula to compute line integrals

CO23: Evaluate complex contour integrals directly and by the fundamental theorem and applying the Cauchy integral formula

CO24: Express complex-differentiable functions as power series

CO25: Analyze sequences and series of analytic functions and types of convergence

CO26: Identify the isolated singularities of a function and determine whether they are removable, poles, or essential

CO27: Compute Laurent series at an isolated singularity, and determine the residue

CO28: Apply the theory into application of the power series expansion of analytic functions C

CO29: Represent functions as Taylor, power and Laurent series, classify singularities and poles, find residues and evaluate complex integrals using the residue theorem

CO 30: Obtain numerical solutions of algebraic and transcendental equations

CO 31: Find numerical solutions of system of linear equations and check the accuracy of the solutions. CO 27: Learn about various interpolating and extrapolating methods

CO 32: Solve initial and boundary value problems in differential equations using numerical method

CO 30: Apply various numerical methods in real life problems.

CO 32: Understand the reduction of force system in three dimensions to a resultant force acting at a base point and a resultant couple. I

CO 33: Learn about a nul point, a nul line, and a nul plane with respect to a system of forces acting on a rigid body together with the idea of central axis.

CO 34: Know the inertia constants for a rigid body and the equation of momental ellipsoid together with the idea of principal axes and principal moments of inertia to derive Euler's dynamical equations.

CO 35: Study the kinematics and kinetics of fluid motions to understand the equation of continuity in Cartesian, cylindrical polar and spherical polar coordinates which are used to derive Euler's equations and Bernoulli's equation.

CO 36: Deal with two-dimensional fluid motion using the complex potential and also to understand the concepts of sources, sinks, doublets and the image systems of these with regard to a line and a circle.

CO 37: define the notion of topology, construct various topologies on a general set which is not empty by using different kinds of techniques, compare these topologies and identify the special subsets of the topology that are called base and subbase which generate elements of the topology.

CO 38: define the notion of topology.

CO 39: construct various topologies on a general set, compare them if it is possible.

CO 40: explain the notion of base and subbase and identify that a subset of a topology is a base or a subbase for this topology.

CO 41: construct topologies which accept a given family of sets base or subbase.

CO 42: use the set of functions which are defined on a same set, constructs the weak topology on the domain of these functions.

CO 43:constructthe subspace topology which is defined on subsets ofthe topological space by using the topology of a given topological space, construct the product topology on the cartesian product of topological spaces by using given two or more topological spaces and construct the quotient topology on a family of sets which is decomposed by an equivalence relation.

CO 44: define the subspace topology.

CO 45: construct the product topology on product spaces.

CO 46: construct the quotient topology.

CO 47: define and categorize the separation axioms which separate a point from another point, a point from a set that does not contain this point and a set from another set.

CO 48: express T_1, T_2, T_3 and T_4 separation axioms and use them to prove various properties.

CO 49: solve hydrostatic problems.

CO 50: describe the physical properties of a fluid.

CO 51: calculate the pressure distribution for incompressible fluids.

CO 52: calculate the hydrostatic pressure and force on plane and curved surfaces.

CO 53: demonstrate the application point of hydrostatic forces on plane and curved surfaces.

CO 54: formulate the problems on buoyancy and solve them.

CO 55: describe the motion of fluids.

CO 56: describe the principles of motion for fluids.

CO 57: describe the areas of velocity and acceleration.

CO 58: formulate the motion of fluid element.

CO59: identify derivation of basic equations of fluid mechanics and apply

CO 60: identify how to derive basic equations and know the related assumptions.

CO 61: apply the equation of the conservation of mass.

CO 62: apply the equation of the conservation of momentum

CO 63: apply the equation of the conservation of energy

CO 64: Understand different types of error in numerical computation, its derivation and elimination

CO 65: Know the use of different difference operators and their relations.

CO 66; Understand the use of different interpolation problem and different numerical differtian and integration formula

CO 67: Know the use of different numerical formulae to solve algebraic and transcendental equation

CO 68: Apply Numerical analysis which has enormous application in the field of Science and some fields of Engineering.

CO 69: Familiar with finite precision computation.

CO 70: Familiar with numerical solutions of nonlinear equations in a single variable.

CO 71: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.

CO 72 Familiar with calculation and interpretation of errors in numerical method. 6. Familiar with programming with numerical packages like C+, C++, FORTRAN 99.

Annexure-II

PO, PSO, CO of UG program in Mathematics as Minor Subject

Program Specific Outcomes

On the completion of B.Sc. course with Mathematics as minor subject, students will be able to:

P S O 1:- Solve complex problems by critical understanding analysis and synthesis.

P S O 2:- Demonstrate & understand the common body of knowledge in mathematics and demonstrate the ability to apply analytical & theoretical skill to model & to solve the mathematical problem.

P S O 3:- Use basic definition in linear & Abstract Algebra & Real Analysis and to simple consequence of this definition.

P S O 4:- Critically interpret data, write reports and apply the basic rules of evidence.

P S O 5:- Provide a systematic understanding of the concepts and theories of mathematics and its application in the real word – to an advance level and enhance carrier prospects in a huge array of field.

Program Outcomes

By the end of a B. Sc. program with Mathematics as minor subject, a student will:

PO1: Be able to analyze, test, interpret and form independent judgments in both academic and non-academic contexts

PO2: Recognize and appreciate the connections between theory and applications

PO3: Have an appropriate set of professional skills to ensure a productive career

PO4: Work effectively in a multi-disciplinary environment

PO5: Be prepared for life-long learning

Course Outcome

Semester-I

Algebra-I, Differential Calculus-I, Differential Equation-I & Coordinate Geometry

On the completion of Semester-I of UG course with Mathematics as minor subject, students will be able to:

C O 1:- Understand the concepts of hyperbolic and inverse hyperbolic function, de-movers theorem and its application.

C O 2:- Study and understand definition of the limit of function, basic properties of limits, continuous functions and classification of discontinuities.

C O 3:- Study second orders linear differential equations with constant coefficients, Homogeneous linear ordinary differential equations reducible to homogeneous differential equations.

CO4: Differentiate between various types of functions

CO5: To introduce the concept of a dependent variable depending on more than two dependent variables and finding partial derivatives

CO6: To find the nth derivatives of functions

CO7: Apply the Leibnitz's theorem for finding nth derivative of product of two functions

CO8: Formulate equations from available data and find solutions to real life problems

CO9: Acquire the knowledge of the relationship between coefficients and roots of an equation

CO10: Explain different methods for finding the roots of a given equation

CO11: Apply the theoretic knowledge of different methods for finding the roots of a given equation into practical problems

CO12: Acquire the knowledge of different techniques of transforming equations to convenient forms

CO13: Explain different methods like Descartes Method, Cardan's method, Ferrari's method in theory of equations

CO14: Develop skill in locating the position of roots and determining their character

CO15: Understand how to analyze and synthesize given data to solve problems in geometry

CO16: Understand the basic ideas of conics

CO17: Explain the ideas of conics and their various applications

CO18: Find the equation to tangent, normal at a point on a conic

CO19: Apply the properties of conics to solve problems in real life situations

Semester-II

Differential Calculus-II,
Differential Equation-II,
Vector Algebra &Discrete Mathematics

On the completion of Semester-II of UG course with Mathematics as minor subject, students will be able to:

CO1: Apply Taylor's and Maclaurin's series for finding series expansions of functions and approximating values

CO2: Understand the concept of indeterminate forms, their occurrence in problems and their evaluation.

CO3: Explain the idea about sequences and monotone property

CO4: Acquire the basic knowledge of convergence and divergence

CO5: Use the knowledge of convergence into problems

CO6: Demonstrate an understanding of limits and how they are used in sequences, series

CO7: Apply various theorems on the existence of limits of sequences and their evaluation

CO8: Use the definitions of convergence as they apply to sequences, series, and functions

CO9: Apply the knowledge of convergence to problems and the various theorems on convergence, absolute convergence and non-absolute convergence

CO10: Understand various types of numbers and their properties

CO11: Acquire the basic knowledge of Number Theory

CO12: Apply the knowledge of Number Theoretic Problems in practical situations

CO13: Develop the ability to apply differential equations to significant applied and/or theoretical problems

CO14: Investigate the qualitative behavior of solutions of systems of differential equations

CO 15: Develop the ability to solve 1st order partial differential equation using Lagrange's method and Charpit's Method

CO16: Develop the ability to apply partial differential equations to significant applied and/or theoretical problems.

CO17: acquire the basic knowledge of vectors, linear dependence, independence, scalar product and vector product of vectors and it application in geometry and mechanics.

Semester –III

Integral Calculus, Numerical Methods
&Linear Programming, C programing language

On the completion of Semester-III of UG course with Mathematics as minor subject, students will be able to:

CO 1: Understand the concept of definite integral and limit of a sum as definite integral

CO 2: Know the recurrence relation in integration sum functions

CO3: Understand convergence of different types improper integrals

CO 4: Understand the uses of improper integrals, beta and gamma functions in various situations

CO 5: Know the concept and use of double integral

CO 6: Know use of definite integral in finding length, area and volume

CO 7: Understand different types of error in numerical computation, its derivation and elimination

CO 8: Know the use of different difference operators and their relations.

CO 9; Understand the use of different interpolation problem and different numerical differtian and integration formula

CO 10: Know the use of different numerical formulae to solve algebraic and transcendental equation

CO11: Understand the new term LPP

CO12: Define a LPP in standard form and Canonical form

CO13: Identify a feasible solution, a basic feasible solution and an optimal solution using simplex method

CO14: Formulate and model a linear programming problem from a word problem and solve them graphically in 2 dimension.

CO15: Use dual simplex method to find optimal solutions

CO16: Understand duality theorems

CO17: Place a Primal linear programming problem into standard form and use the Simplex Method or The Big M Method to solve it

CO 18: Acquire the knowledge of Transportation and Assignment problems

CO19: Understand various methods of solving Transportation and Assignment Problems

CO 20: Understand and apply the programming concepts of C for solving mathematical problems

CO 21: Apply to find greatest common divisors, generate random numbers, and understand Cartesian geometry and algebraic concepts through programming.

CO 22: Represent the outputs of programs visually in terms of well formatted text and plots.

Semester –IV

Algebra-II, Computer Science & Programming, Probability & Statistics

On the completion of Semester-IV of UG course with Mathematics as minor subject, students will be able to:

CO1: Demonstrate understanding of and the ability to work within various algebraic structures

CO2: Assess properties implied by the definitions of groups and rings

CO3: Acquire the basic knowledge and the structure of Group, Subgroup

CO4: Describe the characteristics of a ring and subring, integral domain, field and subfield

CO5: Compute with the characteristic polynomial and equation of a given square matrix and know the use of Caley Hamilton's theorem

CO6: Familiarize eigen values and eigen vectors of a square matrix

CO7: Determine eigen spaces, as well as the geometric and the algebraic multiplicities of an eigen value and apply the basic diagonalization result

CO 8: Know the history of computer.

CO 9: Understand the difference between high level and machine language

CO 10: Have the idea and use of positional number system, bit, and byte.

CO 11: Know how to write algorithm and flowchart for solving different real life problems

CO 12: Know how to write FORTRAN 77/99 programme for solving simple mathematical problem

CO 13: Understand the basic concepts of probability.

CO14: Appreciate the importance of probability distribution of random variables and to know the notion of central tendency.

CO 15: Establish the joint distribution of two random variables in terms their correlation and regression.

CO 16: Understand central limit theorem which shows that the empirical frequencies of so many natural populations exhibit normal distribution.

CO 17: Study entropy and information theory in the framework of probabilistic models.

CO 18: Understand distributions in the study of the joint behavior of two random variables

CO 19: Establish a formulation helping to predict one variable in terms of the other that is,

Correlation and linear regression.

CO 20: Understand central limit theorem, which establish the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.

Semester V/VI

Particle Dynamics

On the completion of Semester-V/VI of UG course with Mathematics as minor subject, students will be able to:

CO1: Understand and use basic terms for the description of the motion of particles, vector functions and the fundamental laws of Newtonian mechanics

CO 2: Solve mechanics problems in one dimension that involve one or more of the forces of gravity, friction and air resistance

CO 3: Understand the concept of terminal speed, and use it in solving mechanics problems in one dimension

CO 4: Apply Newton's second law in vector form to problems in more than one dimension

CO 5: Solve problems relating to the motion of a projectile in the absence of air resistance.

CO 6: Apply Kepler's law of motion in solving planetary motion

CO 7: understand motion under inverse square law

Student Learning Outcomes (Chemistry)

Program outcomes, program specific outcomes and course outcomes

Program outcomes:

After completion of graduation degree in chemistry, students gained the theoretical as well as practical knowledge of handling chemicals. Also they expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc. Afford a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective. Achieve the skills required to succeed in graduate school, professional school and the chemical industry like cement industries, agro product, Paint industries, Rubber industries, Petrochemical industries, Food processing industries, Fertilizer industries etc. Got exposures of a breadth of experimental techniques using modern instrumentation. Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life. Understand the concept of chemistry to inter relate and interact to the other subject like mathematics, physics, biological chemistry etc. Learn the laboratory skills and safely to transfer and interpret knowledge entirely in the working environment.

Course outcomes:

Raja Peary Mohan College, Uttarpara, Hooghly,**SYLLABUS UNDER CBCS PATTERN**w.e.f. 2017-18 B.Sc. CHEMISTRY – PROGRAMME STRUCTURE

SEM	CODE*	PAPER	BRIEF DESCRIPTION
1	CEMA-CC-1-1-TH	INORGANIC CHEMISTRY-1 ORGANIC CHEMISTRY -1A	Acid-base and redox reactions Basics of Organic Chemistry
	CEMA-CC-1-1-P	PRACTICALS	
	CEMA-CC-1-2-TH	PHYSICAL CHEMISTRY-1 ORGANIC CHEMISTRY -1B	Kinetic theory, Chemical kinetics, Stereochemistry
	CEMA-CC-1-2-P	PRACTICALS	
2	CEMA-CC-2-3-TH	ORGANIC CHEMISTRY -2	Reaction Mechanism
	CEMA-CC-2-3-P	PRACTICALS	
	CEMA-CC-2-4-TH	INORGANIC CHEMISTRY-2	Chemical Bonding
	CEMA-CC-2-4-P	PRACTICALS	
3	CEMA-CC-3-5-TH	PHYSICAL CHEMISTRY-2	Chemical Thermodynamics
	CEMA-CC-3-5-P	PRACTICALS	
	CEMA-CC-3-6-TH	INORGANIC CHEMISTRY-3	s and p Block Elements
	CEMA-CC-3-6-P	PRACTICALS	
	CEMA-CC-3-7-TH	ORGANIC CHEMISTRY -3	Alkenes, Alkynes, Carbonyls
	CEMA-CC-3-7-P	PRACTICALS	
4	CEMA-CC-4-8-TH	ORGANIC CHEMISTRY - 4	Organic Synthesis, Spectroscopy

	CEMA-CC-4-8-P	PRACTICALS	
	CEMA-CC-4-9-TH	PHYSICAL CHEMISTRY- 3	Applications of Thermodynamics, Quantum Mechanics
	CEMA-CC-4-9-P	PRACTICALS	
	CEMA-CC-4-10-TH	INORGANIC CHEMISTRY-4	Coordination Chemistry, d & f elements
	CEMA-CC-4-10-P	PRACTICALS	
5	CEMA-CC-5-11-TH	PHYSICAL CHEMISTRY -4	Quantum Chemistry, Statistical Thermodynamics
	CEMA-CC-5-11-P	PRACTICALS	
	CEMA-CC-5-12-TH	ORGANIC CHEMISTRY -5	Cyclic Compounds, Biomolecules
	CEMA-CC-5-12-P	PRACTICALS	
6	CEMA-CC-6-13-TH	INORGANIC CHEMISTRY-5	Bioinorganic and Organometallic Chemistry
	CEMA-CC-6-13-P	PRACTICALS	
	CEMA-CC-6-14-TH	PHYSICAL CHEMISTRY -5	Molecular Spectroscopy, Photochemistry
	CEMA-CC-6-14-P	PRACTICALS	

The Course code indicates subject-type of course-semester number-paper number-theory /practical [e.g. CEMA-CC-1-1-TH/P stands for Chemistry HonoursCore Course- First Semester- Paper 1- Theoretical /Practical]

** **Practicals are based on the corresponding theoretical papers.**

Discipline Specific Courses (DSE):

For Semester 5

Any One from the following

DSE-A1:MOLECULAR MODELLING & DRUG DESIGN

DSE-A2: APPLICATIONS OF COMPUTERS IN CHEMISTRY

Any One from the following

DSE-B1: INORGANIC MATERIALS OF INDUSTRIALIMPORTANCE

DSE-B2: NOVEL INORGANIC SOLIDS

For Semester 6

Any One from the following

DSE-A3: GREEN CHEMISTRY AND CHEMISTRY OF NATURAL PRODUCTS

DSE-A4: ANALYTICAL METHODS IN CHEMISTRY

Any One from the following

DSE-B3:POLYMER CHEMISTRY

DSE-B4: DISSERTATION

SKILL ENHANCEMENT COURSES (SEC)

SEC-A For Semester 3 [Any one]

SEC 1 – MATHEMATICS AND STATISTICS FOR CHEMISTS

SEC 2 – ANALYTICAL CLINICAL BIOCHEMISTRY

SEC-B For Semester 4 [Any one]

SEC 3 – PHARMACEUTICALS CHEMISTRY

SEC4 - PESTICIDE CHEMISTRY

The core courses would fortify the students with in-depth subject knowledge concurrently; the discipline specific electives will add additional knowledge about applied aspects of the program as well as its applicability in both academia and industry. Generic electives will introduce integration among various interdisciplinary courses. The skill enhancement courses would further add additional skills related to the subject as well as other than subject. In brief the student graduated with this type of curriculum would be able to disseminate subject knowledge along with necessary skills to suffice their capabilities for academia, entrepreneurship and Industry

Core course –1

Course Description:

This course covers fundamental principles and laws of chemistry. Topics include extra nuclear structure of atom, Acid-base and redox reactions, Basics of Organic Chemistry:Bonding and Physical Properties, General Treatment of Reaction Mechanism I, Stereochemistry I, General Treatment of Reaction Mechanism II, Kinetic Theory and Gaseous state, Transport processes, Chemical kinetics, Stereochemistry. Application of key concepts including electronegativity, bonding (ionic and covalent), hybridization of atomic orbitals, and molecular orbital theory to organic systems.Laboratory experiments and computer-based exercises augment and reinforce the basic principles of organic mixture separation, BP determination, discussed in lecture as well as provide practical examples.

Course Objectives:

- To understand fundamental principles of extra nuclear structure of atom, Acid-base and redox reactions, Basics of Organic Chemistry.
- To understand Basics of Organic Chemistry related to bonding and physical properties, General Treatment of Reaction Mechanism, preliminary concept of stereochemistry and General Treatment of Reaction Mechanism.
- To understandKinetic Theory and Gaseous state, Transport processes, Chemical kinetics, Stereochemistry.

Recommended Books/References:

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry,*5th Ed.*,* Wiley India Pvt. Ltd., 2008.
2. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry* Oxford, 1970.
3. Day, M.C. and Selbin, J. *Theoretical Inorganic Chemistry*, ACS Publications, 1962.

4. Atkin, P. *Shriver & Atkins' Inorganic Chemistry,* 5th Ed., Oxford University Press (2010).
5. Cotton, F.A., Wilkinson, G. and Gaus, P.L., *Basic Inorganic Chemistry 3rdEd.;*Wiley India.
6. Sharpe, A.G., *Inorganic Chemistry*, 4th Indian Reprint (Pearson Education) 2005.
7. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, Principles ofStructure and Reactivity 4th Ed.,* Harper Collins 1993, Pearson,2006.
8. Atkins, P.W. & Paula, J. *Physical Chemistry*, Oxford Press, 2006.
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford University Press (1998).
10. Winter, M. J., The Orbitron, http://winter.group.shef.ac.uk/orbitron/ (2002). An illustrated gallery of atomic and molecular orbitals.
11. Burgess, J., *Ions in solution: basic principles of chemical interactions.* Ellis Horwood (1999).
12. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson, 2009.
13. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For organic(TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry,* Pearson Education, 2003.
4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
5. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
6. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *Qualitative Organic Analysis,* CBS Publishers and Distributors.
7. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009).
8. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical Organic Chemistry,5th Ed.,* Pearson (2012).
9. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.
10. Carey, F. A., Guiliano, R. M. *Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
11. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London, 1994.
12**.** Nasipuri, D. *Stereochemistry of Organic Compounds,* Wiley Eastern Limited.
13. Clayden, J., Greeves, N. & Warren, S. *Organic Chemistry,* Second edition, Oxford University Press, 2012.
14. Keeler, J., Wothers, P. *Chemical Structure and Reactivity – An Integrated approach*, Oxford University Press.
15. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.
16.Fleming, I. *Molecular Orbitals and Organic Chemical Reactions*, Reference/Student Edition, Wiley, 2009.
17. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
18. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, OxfordUniversity Press, 2005.
19. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
20. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *Qualitative OrganicAnalysis,* CBS Publishers and Distributors.
21. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education(2009).

22. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical OrganicChemistry,5th Ed.,* Pearson (2012).
23. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.

Physical Chemistry(TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition Oxford University Press
7. Maron, S. &Prutton*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, Elsevier
10. Laidler, K. J. *Chemical Kinetics*, Pearson
11. Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
12. Rakshit, P.C., *Physical Chemistry* Sarat Book House
13. Moore, W. J. *Physical Chemistry*, Orient Longman
14. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
15. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
16. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)
17. Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
18. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
19. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
20. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

Course Outcome (COs):

Upon successful completion students should be able to: Apply the fundamental principles of measurement, matter, atomic theory, chemical periodicity, the fundamentals of acid/base equilibria, including pH calculations, buffer behavior, acid/base titrations, and their relationship to electrophiles and nucleophiles, general chemical reactivity, the "gas laws" governing the physical/chemical behavior of gases, the basic (colligative) properties of solutions and solution chemistry to subsequent courses in science, the hybridization and geometry of atoms and the three-dimensional structure of organic molecules as well as stereochemistry.

Core course –2

Course Description: This course covers organic Stereochemistry, General Treatment of Reaction Mechanism, Substitution and Elimination Reactions, Chemical bonding, Radioactivity.

Course Objectives:

- To understand the concept of organic reactions mechanism and stereochemistry.

- To recognize the type of organic reactions
- To understand the bonding models, structures, radio activities,

Recommended Books/References:

For Organic (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt.Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry,* Pearson Education, 2003.4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw HillEducation, 2012.
5. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London,1994.
6**.** Nasipuri, D.*Stereochemistry of Organic Compounds,* Wiley Eastern Limited.
7. Clayden, J., Greeves, N. &Warren, S. *Organic Chemistry,* Second edition, OxfordUniversityPress, 2012.
8. Keeler, J., Wothers, P.*Chemical Structure and Reactivity – An Integrated approach*,Oxford University Press.
9. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.10.Fleming, I. *Molecular Orbitals and Organic Chemical Reactions*,Reference/StudentEdition,Wiley, 2009.
11. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
12. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, OxfordUniversityPress, 2005.
13. Maskill, H., *Mechanisms of Organic Reactions*, Oxford Chemistry Primer,OxfordUniversity Press.
1.Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 1: *Small scalePreparations,* CBS Publishers and Distributors.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* PearsonEducation(2009).
3. Furniss, B.S., Hannaford, A.J., Smith, P.W.G. &Tatchell, A.R. *PracticalOrganic Chemistry, 5th Ed.* Pearson (2012).
4. Ahluwalia, V.K. &Aggarwal, R. *Comprehensive Practical Organic Chemistry:Preparation and Quantitative Analysis,* University Press (2000).
5. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry, 5thEd.,*Wiley India Pvt. Ltd., 2008.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesOfStructure and Reactivity 4th Ed.,* Harper Collins 1993, Pearson, 2006.
3. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry*Oxford, 1970.
4. Porterfield, H. W., *Inorganic Chemistry,* Second Edition, Academic Press, 2005.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*, Saunders:Philadelphia, 1980.
6. Cotton, F.A., Wilkinson, G., &Gaus, P.L. *Basic Inorganic Chemistry 3rdEd.;*Wiley India.

7. Gillespie, R. J. and Hargittai, I., The VSEPR Model of Molecular Geometry,Prentice Hall (1992).
8. Albright, T., *Orbital interactions in chemistry,* John Wiley and Sons (2005).
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
10. Miessler, G. L., Fischer, P. J., Tarr, D. A., *Inorganic Chemistry,* Pearson, 5thEdition.
11. Kaplan, I., *Nuclear Physics,* Addison-Wesley Publishing Company Inc. London,1964.
12. Friedlander, G., Kennedy, J. W., Macias, E. S. And Miller, J. M., *Nuclear andRadiochemistry*, Wiley, 1981.
1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson,2009.
2. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

Course Outcome (COs): Students will gain an understanding of the reactivity and stability of an organic molecule based on structure, including conformation and stereochemistry, Chemical bonding of inorganic compounds, the fundamentals of nuclear decay, the properties of an atomic nucleus that make it unstable and undergo nuclear decay, how various radiation detection instruments are constructed and become familiar with the electronic circuitry that is necessary for their operation, how alpha spectrometry can be used to detect and identify alpha particles, how gamma spectrometry can be used to detect and to identify gamma photons, how the neutron capture cross-section varies among atomic isotopes and how nuclear activation analysis can be used to identify small quantities of various isotopes, how radiopharmaceuticals are produced for the treatment of disease and understand why different radioisotopes are chosen to treat different diseases.

Core course –3

Course Description: This course covers Chemical Thermodynamics and Electrochemistry, Chemical periodicity, Chemistry ofs and p Block Elements,Noble Gases, Inorganic Polymers, Coordination Chemistry, Alkenes, Alkynes, Carbonyls, Addition to C≡C, Aromatic Substitution, Organometallics.

Course Objectives:

- To understand the concept of Chemical Thermodynamics.
- To recognize s and p Block Elements
- To understand Alkenes, Alkynes, Carbonyls,

Recommended Books/References:

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India

5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
11. Rakshit, P.C., *Physical Chemistry*,Sarat Book House
12. Moore, W. J. *Physical Chemistry*, Orient Longman
14. Denbigh, K. *The Principles of Chemical Equilibrium*,Cambridge
15. Zemansky, M. W. &Dittman, R.H. *Heat and Thermodynamics*, Tata-McGraw-Hil
16. Glasstone, S. An Introduction to Electrochemistry, East-West Press.
17. Klotz, I.M., Rosenberg, R. M.*ChemicalThermodynamics:Basic Concepts andMethods* , 7th Edition, Wiley
1. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
2. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
3. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)4.Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
5. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
6. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For Inorganic (TH &P)

1. Lee, J. D. *Concise Inorganic Chemistry, 5th Ed.,* Wiley India Pvt. Ltd., 2008.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesofStructure and Reactivity 4th Ed.,* Harper Collins 1993, Pearson, 2006.
3. Douglas, B.E. and McDaniel, D.H. *Concepts & Models of Inorganic Chemistry*Oxford, 1970.
4. Porterfield, H. W., *Inorganic Chemistry,* Second Edition, Academic Press, 2005.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*, Saunders:Philadelphia, 1980.
6. Cotton, F.A., Wilkinson, G., &Gaus, P.L. *Basic Inorganic Chemistry 3rd Ed.;*Wiley India.
7. Gillespie, R. J. and Hargittai, I., The VSEPR Model of Molecular Geometry,Prentice Hall (1992).
8. Albright, T., *Orbital interactions in chemistry,* John Wiley and Sons (2005).
9. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
10. Miessler, G. L., Fischer, P. J., Tarr, D. A., *Inorganic Chemistry,* Pearson, 5thEdition.
11. Kaplan, I., *Nuclear Physics,* Addison-Wesley Publishing Company Inc. London,1964.
12. Friedlander, G., Kennedy, J. W., Macias, E. S. And Miller, J. M., *Nuclear andRadiochemistry*,Wiley, 1981.
3. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson, 2009.
4. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

For Organic Chemistry (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd.

(Pearson Education).2. Morrison, R. N. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt.
Ltd. (Pearson Education).
3. Sykes, P. *A guidebook to Mechanism in Organic Chemistry,* Pearson Education, 2003.
4. Carey, F. A., Guiliano, R. M.*Organic Chemistry*, Eighth edition, McGraw Hill Education, 2012.
5. Loudon, G. M. *Organic Chemistry*, Fourth edition, Oxford University Press, 2008.
6. Norman, R.O. C., Coxon, J. M. *Principles of Organic Synthesis*, Third Edition, Nelson Thornes, 2003.
7. Clayden, J., Greeves, N. &Warren, S. *Organic Chemistry,* Second edition, Oxford UniversityPress, 2012.
8. Graham Solomons, T.W., Fryhle, C. B. *Organic Chemistry,* John Wiley & Sons, Inc.
9. Smith, J. G. *Organic Chemistry*, Tata McGraw-Hill Publishing Company Limited.
10. March, J. *Advanced Organic Chemistry*, Fourth edition, Wiley.
11. Jenkins, P. R., *Organometallic Reagents in Synthesis*, Oxford Chemistry Primer, Oxford University Press.
12. Ward, R. S., *Bifunctional Compounds*, Oxford Chemistry Primer, Oxford University Press.

1. Bhattacharyya, R. C, *A Manual of Practical Chemistry.*
2. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *Qualitative Organic Analysis,* CBS Publishers and Distributors.
3. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education (2009).4.Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical Organic Chemistry,5th Ed.,* Pearson (2012).
5. Dutta, S, *B. Sc. Honours Practical Chemistry*, Bharati Book Stall.
6. Arthur, I. Vogel, *Quantitative Organic Analysis,* Pearson
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015

Course Outcome (COs): how to handle their understanding of the application of mathematical tools to calculate thermodynamic and kinetic properties, the relationship between microscopic properties of molecules with macroscopic thermodynamic observables, the derivation of rate equations from mechanistic data, the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics, the limitations and uses of models for the solution of applied problems involving chemical thermodynamic and kinetics. To gather verse knowledge regarding s and p Block Elements and are introduced to the concepts of functional groups, nomenclature, stereochemistry, and reaction mechanisms. The systematic chemistry of alkanes, alkenes, alkynes, alkyl halides, alcohols,carboxylic acid, amines, ethers and dyes and pigments are discussed

Core course –4

Course Description: This course covers Organic Nitrogen compounds, Rearrangements, Synthesis, Organic Spectroscopy, Applications of Thermodynamics, Phase Equilibrium,

Foundation ofQuantum Mechanics, Crystal Structure and Coordination Chemistry of d & f elements, Lanthanoids and Actinoids, Reaction Kinetics and Mechanism

Course Objectives:

- To understand the concept of Organic Nitrogen compounds,Synthesis, Organic spectroscopy.
- To understandApplications of Thermodynamics, Quantum Mechanics, Phase Equilibrium
- To understand Coordination Chemistry, Lanthanoids and Actinoids, Reaction Kinetics and Mechanism and chemistry of d & f elements.

Recommended Books/References:

For Organic (TH &P)

1. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
2. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistryof Natural Products*), Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
3. Norman, R.O. C., Coxon, J. M. *Principles of Organic Synthesis*, Third Edition,Nelson Thornes, 2003.
4. Clayden, J., Greeves, N., Warren, S., *Organic Chemistry,* Second edition, OxfordUniversity Press 2012.
5. Silverstein, R. M., Bassler, G. C., Morrill, T. C. *Spectrometric Identificationof Organic Compounds*, John Wiley and Sons, INC, Fifth edition.
6. Kemp, W. *Organic Spectroscopy*, Palgrave.
7. Pavia, D. L. *et al. Introduction to Spectroscopy,* 5th Ed. Cengage Learning India Ed.(2015). 8. Dyer, J. *Application of Absorption Spectroscopy of Organic Compounds*, PHIPrivate Limited
9. March, J. *Advanced Organic Chemistry*, Fourth edition, Wiley.
10. Harwood, L. M., *Polar Rearrangements*, Oxford Chemistry Primer, OxfordUniversity Press.
11. Bailey, Morgan, Organonitrogen Chemistry, Oxford Chemistry Primer, OxfordUniversity Press.
12. Warren, S. *Organic Synthesis the Disconnection Approach*, John Wiley and Sons.
13. Warren, S., *Designing Organic Synthesis*, Wiley India, 2009.
14. Carruthers, W. *Modern methods of Organic Synthesis,* Cambridge University Press.
15. Willis, C. A., Wills, M., *Organic Synthesis*, Oxford Chemistry Primer, OxfordUniversity Press
1. Vogel, A. I. *Elementary Practical Organic Chemistry,* Part 2: *QualitativeOrganic Analysis,* CBS Publishers and Distributors.
2. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education(2009).
3. Furniss, B.S., Hannaford, A.J., Smith, P.W.G., Tatchell, A.R. *Practical OrganicChemistry,* 5th Ed., Pearson (2012).
4. Clarke, H. T., *A Handbook of Organic Analysis (Qualitative and Quantitative)*,Fourth Edition, CBS Publishers and Distributors (2007). 5. *Practical WorkbookChemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015.

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Atkins, P. W. *Molecular Quantum Mechanics*, 5th edition ,Oxford
11. Levine, I. N. *Quantum Chemistry*, 7th Edition, Pearson India
12. Sannigrahi A.B, Quantum Chemistry,2nd Edition, Books and Allied Pvt Ltd.
13. Denbigh, K. *The Principles of Chemical Equilibrium* Cambridge UniversityPress
14. Zemansky, M. W. &Dittman, R.H. *Heat and Thermodynamics*, Tata-McGraw-Hil.
1. Viswanathan, B., Raghavan, P.S. *Practical Physical Chemistry* Viva Books(2009)
2. Mendham, J., A. I. Vogel's Quantitative Chemical Analysis 6th Ed., Pearson
3. Harris, D. C. *Quantitative Chemical Analysis*. 9th Ed., Freeman (2016)
4. Palit, S.R., De, S. K. *Practical Physical Chemistry* Science Book Agency
5. Levitt, B. P. edited *Findlay's Practical Physical Chemistry* Longman Group Ltd.
6. Gurtu, J. N., Kapoor, R., *Advanced Experimental Chemistry* S. Chand & Co. Ltd.
7. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University ofCalcutta, 2015.

For Inorganic (TH &P)

1. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, Principles OfStructure and Reactivity 4th Ed.,* Harper Collins 1993, Pearson,2006.

2. Greenwood, N.N. &Earnshaw A. *Chemistry of the Elements*, Butterworth-Heinemann, 1997.
3. Cotton, F.A., Wilkinson, G., Murrillo, C. A., Bochmann, M., *AdvancedInorganic Chemistry 6th Ed. 1999.,*Wiley.
4. Miessler, G. L. & Donald, A. Tarr. *Inorganic Chemistry* 4th Ed., Pearson, 2010.
5. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*,Saunders: Philadelphia, 1980.
6. Mingos, D.M.P., *Essential trends in inorganic chemistry*. Oxford UniversityPress (1998).
1. Mendham, J., *A. I. Vogel's Quantitative Chemical Analysis* 6th Ed., Pearson,2009.
2. *Inorganic Synthesis*, Vol. 1-10.

Course Outcome (COs): How to design syntheses of organic molecules, how to determine the structure of organic molecules using IR and NMR spectroscopic techniques,the use of nuclear magnetic resonance spectroscopy, mass spectrometry and infrared spectroscopy for organic structure elucidation and concept of organic nitrogen compounds.The application of mathematical tools to calculate thermodynamic and kinetic properties, the relationship between microscopic properties of molecules with macroscopic thermodynamic observables, the derivation of rate equations from mechanistic data, the use of simple models for predictive understanding of physical phenomena associated to chemical thermodynamics and kinetics, the limitations and uses of

models for the solution of applied problems involving chemical thermodynamic and kinetics.the limitations of classical mechanics at molecular length scales, the differences between classical and quantum mechanics, the connection of quantum mechanical operators to observables, probabilities, amplitudes, averages, expectation values, and observables, how molecular phenomena can be related to model problemshow to interpret spectra, the connection between common approximation methods and standard chemical frameworks (Born-Oppenheimer approximation, molecular orbitals, for example), molecular-level critical thinking skills, and the bonding models, structures, reactivates, and applications of coordination complexes.Also aim of this course is to teach the student the chemistry of complexes. So, learning the coordinate bond theory is one of the aims. The student must learn geometrical, optical, linkage, coordinate isomer and Jahn-teller distortion with electronic spectra of TM complexes.

Core course –5

Course Description: This course covers Quantum Chemistry, Statistical Thermodynamics,Numerical Analysis, Carbocyles and Heterocycles and Cyclic Stereochemistry, Pericyclic reactions, Carbohydrates, Biomolecules.

Course Objectives:

- To understand the concept Quantum Chemistry, Statistical Thermodynamics,
- To understand the Cyclic Compounds, Pericyclic reactions, Carbohydrates andBiomolecules.

Recommended Books/References:

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition McGraw-Hill India
2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A Molecular Approach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition Oxford University Press
7. Levine, I. N. *Quantum Chemistry*, 7th Edition,Pearson India
8. Maron, S. &Prutton*Physical Chemistry*
9. Ball, D. W. *Physical Chemistry*, Thomson Press
10. Mortimer, R. G. *Physical Chemistry*, Elsevier
11.Glasstone, S. & Lewis, G.N. *Elements of Physical Chemistry*
12. Rakshit, P.C., *Physical Chemistry* Sarat Book House
14. Klotz, I.M., Rosenberg, R. M. *Chemical Thermodynamics:Basic Concepts and Methods*,Wiley
15. Sannigrahi A.B, Quantum Chemistry,2nd Edition, Books and Allied Pvt Ltd.
16. Atkins, P. W. *Molecular Quantum Mechanics*, 5th edition ,Oxford
17. Moore, W. J. *Physical Chemistry*, Orient Longman

18. Nash, L. K. *Elements of Statistical Thermodynamics*, Dover
19. V. Rajaraman, Computer Oriented Numerical Methods, PHI Learning, 2013
20. V. Rajaraman, Computer Programming in FORTRAN 77, Prentice Hall, 1997
21. Martin Cwiakala, Schaum's Outline of Programming with FORTRAN 77, 1995
1. McQuarrie, D. A. *Mathematics for PhysicalChemistry.* University Science Books (2008)
2. Mortimer, R. *Mathematics for Physical Chemistry*. 3rd Ed. Elsevier (2005)
3. Yates, P. *Chemical Calculations*. 2nd Ed. CRC Press (2007)
4. Harris, D. C. *Quantitative Chemical Analysis*. 6th Ed., Freeman (2007) Chapters 3-5
5. Let us C, YashvantKanetkar, BPB Publication, 15th Edition, 2016

For Organic (TH &P)

1. Clayden, J., Greeves, N., Warren, S. *Organic Chemistry,* Second edition, Oxford University Press 2012.
2. Eliel, E. L. &Wilen, S. H. *Stereochemistry of Organic Compounds*, Wiley: London.
3. Nasipuri, D. *Stereochemistry of Organic Compounds,* Wiley Eastern Limited.
4. Fleming, I. *Molecular Orbitals and Organic Chemical reactions*, Reference/Student Edition, Wiley, 2009.
5. Fleming, I. *Pericyclic Reactions*, Oxford Chemistry Primer, Oxford University Press. 6. Gilchrist, T. L. &Storr, R. C. *Organic Reactions and Orbital symmetry*, Cambridge University Press.
7. Finar, I. L. *Organic Chemistry (Volume 1)*, Dorling Kindersley (India) Pvt. Ltd.(Pearson Education).
8. Finar, I. L. *Organic Chemistry* (*Volume 2: Stereochemistry and the Chemistry of Natural Products*), Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
9. Morrison, R. T. & Boyd, R. N. *Organic Chemistry*, Dorling Kindersley (India) Pvt. Ltd. (Pearson Education).
10. Loudon, G. M. *Organic Chemistry,* Fourth edition, Oxford University Press.
11. James, J., Peach, J. M. *Stereochemistry at a Glance*, Blackwell Publishing, 2003.
12. Robinson, M. J. T., *Stereochemistry*, Oxford Chemistry Primer, Oxford University Press, 2005.
13. Davis, B. G., Fairbanks, A. J., *Carbohydrate Chemistry*, Oxford Chemistry Primer, Oxford University Press.
14. Joule, J. A. Mills, K. *Heterocyclic Chemistry*, Blackwell Science.
15. Acheson, R.M. *Introduction to the Chemistry of Heterocyclic compounds,* John Wiely& Sons (1976).
16. Gilchrist, T. L. *Heterocyclic Chemistry*, 3rd edition, Pearson.
17. Davies, D. T., *Heterocyclic Chemistry*, Oxford Chemistry Primer, Oxford University Press
1. *Practical Workbook Chemistry (Honours), UGBS, Chemistry*, University of Calcutta, 2015
2. Furniss, B.S.; Hannaford, A.J.; Smith, P.W.G.; Tatchell, A.R. *Practical Organic Chemistry, 5th Ed.,* Pearson (2012).
3. Mann, F.G. & Saunders, B.C. *Practical Organic Chemistry,* Pearson Education.

Course Outcome (COs): The student should have the following learning outcomes through knowledge on different classical and quantum mechanical distribution functions, statistical mechanics and the approximations making a statistical description possible apply the theory to understand gases and crystals and in addition be able to construct microscopic models and from

these derive thermodynamic observablesdescribe the importance and consequences of quantum mechanics for macroscopic particle systems.This course able to predict the stereochemistry & products of the Pericyclic reactions and how to apply various disconnection approaches & the retrosynthesis of organic compounds in designing of new compounds,students should be able to identify the main types of pericyclic reactions, to understand and to apply the Woodward-Hoffmann rules, to determine if a pericyclic reaction is thermally or photochemically allowed and to predict its regioselectivity and its stereoselectivity.

Core course –6

Course Description: This course covers Theoretical Principles in Qualitative Analysis, Bioinorganic Chemistry, Organometallic Chemistry, Catalysis by Organometallic Compounds, Molecular Spectroscopy, Photochemistry and Theory of reaction rate, Surface phenomenon, Dipole moment and polarizability**.**

Course Objectives:

- To understand the concept of Theoretical Principles in Qualitative Analysis, Bioinorganic Chemistry.
- To understand the Organometallic Chemistry, Catalysis by Organometallic Compounds
- To understand theMolecular Spectroscopy, Photochemistry and Theory of reaction rate, Surface phenomenon, Dipole moment and polarizability**.**

Recommended Books/References:

For Inorganic (TH &P)

1. Lippard, S.J. & Berg, J.M. *Principles of Bioinorganic Chemistry* PanimaPublishing Company 1994.
2. Huheey, J. E.; Keiter, E.A. &Keiter, R.L. *Inorganic Chemistry, PrinciplesofStructure and Reactivity 4th Ed.,* Harper Collins 1993, Pearson,2006.
3. Greenwood, N.N. &Earnshaw A. *Chemistry of the Elements*, Butterworth-Heinemann, 1997.
4. Cotton, F.A., Wilkinson, G., Murrillo, C. A., Bochmann, M., *AdvancedInorganic Chemistry 6th Ed. 1999.,*Wiley.
5. Bertini, I., Gray, H. B., Lippard, S.J., Valentine, J. S., Viva, 2007.
6. Basolo, F, and Pearson, R.C. *Mechanisms of Inorganic Chemistry*, John Wiley& Sons, NY, 1967.
7. Purecell, K.F. and Kotz, J.C., *An Introduction toInorganic Chemistry*,Saunders: Philadelphia, 1980.
8. Powell, P. *Principles of Organometallic Chemistry*, Chapman and Hall, 1988.

9. Collman, J. P. *et al. Principles and Applications of OrganotransitionMetalChemistry*. Mill Valley, CA: University Science Books, 1987.
10. Crabtree, R. H. *The Organometallic Chemistry of the Transition Metals*. NewYork, NY: John Wiley, 2000.

For Physical (TH &P)

1. Levine, I. N. *Physical Chemistry*, 6th Edition , McGraw-Hill India2. Castellan, G. W. *Physical Chemistry*, Narosa
3. McQuarrie, D. A. & Simons, J. D. *Physical Chemistry: A MolecularApproach*, Viva Press
4. Kapoor K.L, A Text Book Of Physical Chemistry , McGraw Hill India
5. Engel, T. & Reid, P. *Physical Chemistry*, 3rd Edition ,Pearson India
6. Atkins, P. W. & Paula, J. de *Atkins' Physical Chemistry*, 10th Edition, OxfordUniversity Press
7. Maron, S. &Prutton ,*Physical Chemistry*
8. Ball, D. W. *Physical Chemistry*, Thomson Press
9. Mortimer, R. G. *Physical Chemistry*, 2nd Edition, Elsevier
10. Banwell, C. N. Fundamentals of Molecular Spectroscopy, Tata-McGraw-Hill
11. Barrow, G. M. Molecular Spectroscopy, McGraw-Hill
12. Hollas, J.M. Modern Spectroscopy, Wiley India
13. McHale, J. L. Molecular Spectroscopy, Pearson Education
14. Wayne, C. E. & Wayne, R. P. Photochemistry, OUP
15. Brown, J. M. Molecular Spectroscopy, OUP

Course Outcome (COs): The learning objective is that students acquire foundation knowledge of the biochemistry of selected and predominantly trace, elements.Understand typical roles and chemistry of the elements, in particular the metal ions, essential for living systems, e.g. structural, recognition, sensor roles and redox and non-redox catalytic roles. Rationalize the role of specific metal ions in metalloenzymes for catalyzing energetically and stereo- and enantio-selectively difficult reactions, Assess the viability of the reaction mechanisms proposed for the biological activation of the small molecules through and comparisons to known chemistry of the elements. Describe basic principles in the use of optical, vibrational and magnetic resonance, Mössbauer spectroscopies, X-ray diffraction and fluorescence, electrochemical and other selected methods for the characterization of biomolecular compounds containing any element of the periodic system. Propose spectroscopic and other techniques appropriate for investigation of specific metalloenzymes.

Students acquireknowledge 1. the selection rule for infrared-active transitions. 2. Determine the vibrations for a triatomic molecule and identify whether they are infrared-active. 3. Determine whether the molecular vibrations of a triatomic molecule are Raman active. 4. Explain the difference between Stokes and anti-Stokes lines in a Raman spectrum. 3. Justify the difference in intensity between Stokes and anti-Stokes lines. 5. Draw the Stokes and anti-Stokes lines in a Raman spectrum of a compound when given the energies of the different transitions. 6. Students will be able to analyse the hybridization of given compounds. 7. Students will be able to Draw character table and point groups.

Course Description:DSE-A-3: GREEN CHEMISTRY AND CHEMISTRY OFNATURAL PRODUCTS

Knowledge and understanding:

Students learn the basic principles of green and sustainable chemistry. They must be able to do and understand stoichiometric calculations and relate them to green process metrics. They learn alternative solvent media and energy sources for chemical processes

Environmental science is the study of patterns and processes in the natural world and their modification by human activity. To understand current environmental problems, we need to consider physical, biological and chemical processes that are often the basis of those problems. This course will give you the skills necessary to address the environmental issues we are facing today by examining scientific principles and the application of those principles to natural systems. This course will survey some of the many environmental science topics at an introductory level, ultimately considering the sustainability of human activities on the planet.

Course Objectives:

- To consider how the natural and built environments shape and are shaped by multiple socio-cultural and political factors.
- To think across and beyond existing disciplinary boundaries, mindful of the diverse forms of knowledge and experience that arise from human interactions with the world around them.
- To live responsibly and appreciate the environmental and cultural histories of the places they inhabit.
- To cultivate compassion, curiosity, collaboration, and hope.
- To nurture knowledge, respect, and love for the natural and human communities of central Maine, the place where they spend four formative years of their lives.
- To develop skills of analysis and communication, bearing in mind disciplinary traditions and diverse publics.

Course Outcome (COs):

The Environmental Studies major prepares students for careers as leaders in understanding and addressing complex environmental issues from a problem-oriented, interdisciplinary perspective. Students:

- Master core concepts and methods from ecological and physical sciences and their application in environmental problem solving.
- Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
- Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as interdisciplinary scholars and/or practitioners.

Industrial Chemistry
Course Description: DSE-BINORGANIC MATERIALS OFINDUSTRIALIMPORTANCE:

The course is designed to teach you the essential skills and knowledge involved in industrial chemistry. The course content is wide ranging with limited detailed theory and includes some factual information that simply will need to be memorized. A key skill emphasized is problem solving, both quantitative and qualitative. The topic also cover the paints, pigments varnishes, ceramics, galss, cements, soaps, detergents, refractories, ferti;ozers, adhesives, enamels, explosives and different industries.

Course Objectives:

The specific objectives of Industrial Chemistry program are to:

- ❖ Make the students well-grounded in the principles and through knowledge of scientific techniques of industrial Chemistry.
- ❖ Educate and train Chemists to acquire a meaningful picture of Chemical industries.
- ❖ Prepare students for professional participation in Chemical industries so as to adapt themselves to jobs which are problem solving
- ❖ Train students to be result-oriented in the chemical, petrochemical, biochemical and allied technological fields.

Course Outcome (COs):

- ❖ Industrial Chemistry is designed to provide graduates with the skills, knowledge and learning tools required to carry out professional research, and development and production activities in the field of chemistry, including the following sectors: health, food, cosmetics, the environment and energy.

Polymer Chemistry
Course Description: DSE-B-3: POLYMER CHEMISTRY:

Polymer Chemistry is a course that introduces students to Polymer science, engineering and technology, where types of polymer, reactions to form polymer, polymerization mechanisms, structures, properties and applications.

Course Objectives:

The aim of the course is to familiarise students with electrochemical processes occurring in the solid state:

- ❖ The subject provides an introduction to polymer science with respect to synthesis, polymerization kinetics and network formation/gelation of macomolecules formed by step-growth and chain-growth polymerization.
- ❖ Polymer structure/conformation and transitions from liquid (melt, solutions) to solid (polymer crystals and –glass) states are discussed using equilibrium thermodynamics, kinetics and free volume considerations.
- ❖ Polymer solubility/miscibility and phase diagrams are determined using thermodynamic parameters. Molecular weight determination of polymers is shown using osmotic pressure, viscosimetry and size exclusion chromatography (SEC).
- ❖ An overview of mechanical and rheological properties of polymers is also given. Specialized synthesis for flow assurance industry.

Course Outcome (COs):

After studying this course, you should be able to:

- ❖ isolate the key design features of a product which relate directly to the material(s) used in its construction
- ❖ indicate how the properties of polymeric materials can be exploited by a product designer
- ❖ describe the role of rubber-toughening in improving the mechanical properties of polymers
- ❖ identify the repeat units of particular polymers and specify the isomeric structures which can exist for those repeat units
- ❖ Estimate the number- and weight-average molecular masses of polymer samples given the degree of polymerisation and mass fraction of chains present.
- ❖ Differentiate between natural and man-made polymers.
- ❖ Explain polymerization methods.
- ❖ understand polymerization kinetics
- ❖ Uses of polymers.

Course Description: SEC 3 – PHARMACEUTICALS CHEMISTRY

The course includes theoretical studies in the field of Medicinal Chemistry. It also includes physical chemical factors, diagnostic medical instruments such as ECG, EEG, CT, etc. Also, it includes disease and treatment.

Course Objectives:

The main objectives of this master in medicinal chemistry are:

- ❖ Understanding of the basic biological and pharmacological interactions by using both natural products and total synthesis of bioactive molecules.
- ❖ Use of corresponding knowledge for the development of biologically and clinically active drugs.
- ❖ It will include advanced courses in natural products, organic synthesis, medicinal chemistry; fundamentals of cell biology, molecular biology, drug design, and analytical methods.

Course Outcome (COs):

The main objectives of this master in medicinal chemistry are:

- ❖ Understanding of the basic biological and pharmacological interactions by using both natural products and total synthesis of bioactive molecules.
- ❖ Use of corresponding knowledge for the development of biologically and clinically active drugs.
- ❖ It will include advanced courses in natural products, organic synthesis, medicinal chemistry; fundamentals of cell biology, molecular biology, drug design, and analytical methods.

DEPARTMENT OF CHEMISTRY

The Outcomes of UG Course, B. Sc. in Chemistry

At the completion of B. Sc. in Chemistry the students are able to:

After completion of degree, students gained the theoretical as well as practical knowledge of handling chemicals. Also they expand the knowledge available opportunities related to chemistry in the government services through public service commission particularly in the field of food safety, health inspector, pharmacist etc**.** Afford a broad foundation in chemistry that stresses scientific reasoning and analytical problem solving with a molecular perspective. Achieve the skills required to succeed in graduate school, professional school and the chemical industry like cement industries, agro product, Paint industries, Rubber industries, Petrochemical industries, Food processing

industries, Fertilizer industries etc. Got exposures of a breadth of experimental techniques using modern instrumentation.Understand the importance of the elements in the periodic table including their physical and chemical nature and role in the daily life. Understand the concept of chemistry to inter relate and interact to the other subject like mathematics, physics, biological science etc. Learn the laboratory skills and safely to transfer and interpret knowledge entirely in the working environment.

PO, PSO and CO of UG Physics syllabus under CBCS

HONOURS :

CC-1 Mathematical Methods

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC- 2 Mechanics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 3 Electricity and Magnetism

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 4 Waves and Optics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 5 Mathematical methods II

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC – 6 Thermal Physics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC -7 Modern Physics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC -8 Mathematical methods III

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 9 Analog Electronics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 10 Quantum Mechanics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 11 Electromagnetic Theory

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 12 Statistical Physics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC - 13 Digital electronics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

CC – 14 Solid State physics

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

DSE A1 - Advanced Mathematical Methods or Laser & Fibre Optics

PO - Fundamental understanding of the field , application of basic physical concepts and skills in related field of specialisation .

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

DSE A2 - Nanomaterials or Advanced Classical Dynamics

PO - Fundamental understanding of the field , application of basic physical concepts and skills in related field of specialisation .

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

DSE B1 - Astronomy and Astrophysics or Nuclear Physics

PO - Fundamental understanding of the field , application of basic physical concepts and skills in related field of specialisation .

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

DSE B2 - Communication Electronics or Advanced Statistical Mechanics

PO - Fundamental understanding of the field , application of basic physical concepts and skills in related field of specialisation .

PSO - Skills in mathematical modelling and ability to use in physical problem

CO - Procedural knowledge for professional subject.

SEC A- 1 - Scientific Writing

PO - Fundamental understanding and working knowledge.

PSO - Develop technical communication skill.

CO - Procedural knowledge for professional subject.

SEC A- 2 - Renewable Energy

PO - Skills in performing analysis and interpretation of data.

PSO - Linkage with related discipline .

CO - Developing awareness about nature.

SEC B- 1 - Arduino

PO - Developing ability to learn computer language.

PSO - Developing ICT skill.

CO - Procedural knowledge for professional subject.

SEC B- 2 Electrical Circuit Network Skill

PO - Fundamental understanding of the field , application of basic physical concepts

PSO - Skills in designing electrical circuits.

CO - Procedural knowledge for professional subject.

DEPARTMENT OF COMPUTER SCIENCE

Raja Peary Mohan College
B.Sc. with Computer Science
Programme Outcome , Programme Specific Outcome and Course Outcomes(PO , PSO ,Cos)

Aims of Bachelor of Science Programmes in ComputerScience

The Bachelor of Science degree in Computer Science emphasizes problem solving in the context of algorithm development and software implementation and prepares students for effectively using modern computer systems in various applications. The curriculum provides required computer science courses such as programming languages, data structures, computer architecture and organization, algorithms, database systems, operating systems, and software engineering; as well as elective courses in artificial intelligence, computer-based communication networks, distributed computing, information security, graphics, human-computer interaction, multimedia, scientific computing, web technology, and other current topics in computer science. The main aim of this Bachelor's degree is to deliver a modern curriculum that will equip graduates with strong theoretical and practical backgrounds to enable them to excel in the workplace and to be lifelong learners. The purpose of the BS programs in computer science are twofold: (1) to prepare the student for a position involving the design, development and implementation of computer software/hardware, and (2) to prepare the student for entry into a program of postgraduate study in computer science/engineering and related fields.

The Bachelor of Science program with Computer Science as one subject (BSc with CS) and the Bachelor of Science Honours programme in Computer Science (BSc(Hons) in CS) focus on the concepts and techniques used in the design and development of software systems. Students in this program explore the conceptual underpinnings of Computer Science -- its fundamental algorithms, programming languages, operating systems, and software engineering techniques. In addition, students choose from a rich set of electives that includes data science, computer graphics, artificial intelligence, database systems, computer architecture, and computer networks, among other topics. A generous allotment of free electives allows students to combine study in computer science with study in auxiliary fields to formulate a program that combines experiences across disciplines.

Programme Outcome:

The present Learning Outcome-based Curriculum Framework for bachelor's degrees in CS is intended to facilitate the students to achieve the following.

- To develop an understanding and knowledge of the basic theory of Computer Science and Information Technology with good foundation on theory, systems and applications such as algorithms, data structures, data handling, data communication and computation.
- To develop the ability to use this knowledge to analyze new situations
- To acquire necessary and state-of-the-art skills to take up industry challenges. The objectives and outcomes are carefully designed to suit to the above-mentioned purpose.
- The ability to synthesize the acquired knowledge, understanding and experience for a better and improved comprehension of the real-life problems
- To learn skills and tools like mathematics, statistics, physics and electronics to find the solution, interpret the results and make predictions for the future developments.

The undergraduate program in Computer Science is presently being offered though the courses designed for granting the following degrees by various colleges and universities in India. All the courses are of 3-year duration spread over six semesters.

i. B.Sc (Honours) Computer Science
ii. B.Sc with Computer Science

B. Sc. with Computer Science

B.Sc. or Bachelor of Science with Computer Science is a general multidiscipline bachelor programme. The programme has a balanced emphasis on three science subjects, one of which is computer science. A student studying B.Sc. with Computer Science is required to choose two other subjects from a pool of subjects which include Physics, Mathematics, Statistics, Electronics, Chemistry. Different institutions offer different choice of combinations of subjects. Most popular combinations are Physics and Mathematics, Physics and Electronics, Mathematics and Electronics, but there are also combinations like Statistics and Economics or Commerce and Economics along with Computer Science.

---

1. Course Structures

Structure of B.Sc. with CS

The B.Sc. programme with CS as one of the subjects consists of 132 credits in accordance with the Choice Based Credit System (CBCS) approved by the UGC with 1 weekly -contact-hour for each credit for theory/tutorials and 2 weekly-contact-hours for each credit of laboratory work.

Credit-wise Distribution - Out of 132 credits, 108 credits are equally divided among CS (denoted as A in the following table) and two other auxiliary subjects, denoted as B and C, (36 credits each). 36 credits for each subject are further distributed as 24 credits for Core Compulsory Courses (CC) and 12 credits for Discipline Specific Electives (DSE). There are 8 credits for Ability Enhancement Compulsory Courses. SEC's will have 16 credits.

Course-wise Distribution - There are 4 CC courses for each subject (CS and two auxiliary subjects). Each CC course is of 6 credits (4 Theory + 2 Practicum). Similarly, there are 2 DSE papers, each of 6 credits. There are 4 Skill Enhancement Courses (SEC) each of 4 credits with a total of 16 credits. 16 credits of SEC are distributed as 8 credits (2 courses) for subject A (CS) and 4 credits for each of two auxiliary subjects, subjects B and C (one courses for each subject). There are two AECC namely, Environ mental Sciences and Languages/ Communications with 4 credits.

Semester-wise Distribution – BSc with CS is a 3-Yr programme with 6 semesters. In each semester, there will be 22 credits. For each of first four semesters, there will be 3 CC, one each for subjects A, B and C accounting to 18 credits. Similarly, for semesters 5 and 6, there will be 3 DSE in each semester and one DSE for each of three subjects (a, B and C). Two AECC will be offered in first two semesters. SEC will be offered in semesters 3, 4, 5 and 6 and a student is required to take any one SEC from a pool of options. However, in semesters 3 and 4, SEC for the auxiliary subjects will be offered and in semesters 5 and 6, SEC for CS will be offered.

The scope of the present proposal is to design CS courses. There are 4 CC courses for CS, 2 DSE courses and 2 SEC (CS related elective). A student can take more than 132 credits in total (but not more than 148 credits) to qualify for the grant of the B.Sc. (CS) degree after completing them successfully as per rules and regulations of the HEI.

Computer Science General (CMSG) Syllabus

Courses	Topics	Credit
CMS-G-CC-1-1-TH Sem-1-Core Course-1 Theory	Computer Fundamentals and Digital Logic Design	04
CMS-G-CC-1-1-P Sem-1-Core Course-1 Practical	Word Processing, Spreadsheet, Presentation and Web design by HTML	02
CMS-G-CC-2-2-TH Sem-2- Core Course-2 Theory	Algorithm and Data Structure	04
CMS-G-CC-2-2-P Sem-2-Core Course-2 Practical	Programming with C	02
CMS-G-CC-3-3-TH Sem-3- Core Course-3 Theory	Computer Organization	04
CMS-G-CC-3-3-P Sem-3-Core Course-3 Practical	Programming using PYTHON	02
CMS-G-CC-4-4-TH Sem-4- Core Course-4 Theory	Operating Systems	04
CMS-G-CC-4-4-P Sem-4-Core Course-4 Practical	Shell Programming (Linux)	02
Skill Enhancement Courses (SEC-A & B): Any one topic to be opted from SECA either in Semester-3 or in Semester-5. Any one topic to be opted from SECB either in Semester-4 or in Semester-6.		
CMS-G-SEC-A-X-1-TH	Communication, Computer Network and Internet	02
CMS-G-SEC-A-X-2-TH	Software Engineering	02
CMS-G-SEC-B-X-1-TH	Multimedia and its Applications	02
CMS-G-SEC-B-X-2-TH	Information Security	02
Discipline Specific Elective- A (DSE- A): Candidate has to opt any 2 of the following topics		
CMS-G-DSE-A-5-1-TH	Data base Management System (DBMS)	04
CMS-G-DSE-A-5-1-P	DBMS Lab using SQL	02
CMS-G-DSE-A-5-2-TH	Operation Research	04
CMS-G-DSE-A-5-2-P	Operation Research Lab using C	02
CMS-G-DSE-A-5-3-TH	Computer Graphics	04
CMS-G-DSE-A-5-3-P	Computer Graphics Lab using C	02
Discipline Specific Elective- B (DSE- B): Candidate has to opt any 2 of the following topics		
CMS-G-DSE-B-6-1-TH	Embedded Systems	04
CMS-G-DSE-B-6-1-P	Embedded Systems Lab.	02
CMS-G-DSE-A-6-2-TH	Object Oriented Programming	04
CMS-G-DSE-A-6-2-P	Object Oriented Programming by Java	02
CMS-G-DSE-A-6-3-TH	Computational Mathematics	04
CMS-G-DSE-A-6-3-P	Computational Mathematics Lab using C	02

Semester wise Course Outcomes in B.Sc with Computer Science

Semester –I

CMS-G-CC-1-1-TH: Computer Fundamentals and Digital Logic Design Core Course- 1: Theory: 60 Hours

General Concepts:

1. To make students understand the basic structure, operation and characteristics of digital computer.
2. To familiarize the students with arithmetic and logic unit as well as the concept of the concept of pipelining.
3. To familiarize the students with hierarchical memory system including cache memories and virtual memory.
4. To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

CMS-G-CC-1-1-P: Word Processing, Spreadsheet, Presentation and Web design by HTML Core Course- 1: Practical: 40 Hours

General Concepts:

1. To understand basics of the Internet and World Wide Web
2. To acquire knowledge and skills for creation of web site considering both client and server-side programming
3. To learn basic skill to develop responsive web applications
4. To understand different web extensions and web services standards
5. To understand basic concepts of Search Engine Basics.
6. To learn Web Service Essentials.
7. To learn Rich Internet Application Technologies.

Semester –II

CMS-G-CC-2-2-TH: Algorithms & Data Structure

Core Course- 2: Theory: 60 hours

ALGORITHMS

1. To learn good principles of algorithm design;
2. To learn how to analyze algorithms and estimate their worst-case and average- case behavior (in easy cases);
3. To become familiar with fundamental data structures and with the manner in

which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles;

4. To learn how to apply their theoretical knowledge in practice (via the practical component of the course).

DATA STRUCTURES

1. To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles
2. To have a knowledge of complexity of basic operations like insert, delete, search on these data structures.
3. Ability to choose a data structure to suitably model any data used in computer applications.
4. Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc.
5. Ability to assess efficiency tradeoffs among different data structure implementations.
6. Implement and know the applications of algorithms for sorting, pattern matching etc.

CMS-G-CC-2-2-P: Programming with C

Core Course- 2: Practical: 40 hours

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable data structures and operations.

Semester –III

CMS-G-CC-3-3-TH: Computer Organization

Core Course- 3: Theory:60 hours

1. To make students understand the basic structure, operation and characteristics of digital computer.
2. To familiarize the students with arithmetic and logic unit as well as the concept of the concept of pipelining.
3. To familiarize the students with hierarchical memory system including cache memories and virtual memory.
4. To make students know the different ways of communicating with I/O devices and standard I/O interfaces.

CMS-G-CC-3-3-P: Programming using Python

Core Course- 3: Practical: 40 hours

1. Develop and Execute simple Python programs.
2. Structure a Python program into functions.

3. Using Python lists, tuples to represent compound data
4. Develop Python Programs for file processing

Semester –IV

CMS-G-CC-4-4-TH: Operating Systems

Core Course- 4: Theory: 60 hours

OPERATING SYSTEM

1. Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2. To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time.
3. Understanding of design issues associated with operating systems.
4. Understand various process management concepts including scheduling, synchronization, and deadlocks.
5. To have a basic knowledge about multithreading.
6. To understand concepts of memory management including virtual memory.
7. To understand issues related to file system interface and implementation, disk management.
8. To understand and identify potential threats to operating systems and the security features design to guard against them.
9. To have sound knowledge of various types of operating systems including Unix and Android.
10. Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.

CMS-G-CC-4-4-P: Shell Programming (Linux)

Core Course- 4: Practical: 40 hours

1. Learn to develop simple algorithms and flow charts to solve a problem.
2. Develop problem solving skills coupled with top down design principles.
3. Learn about the strategies of writing efficient and well-structured computer algorithms/programs.
4. Develop the skills for formulating iterative solutions to a problem.
5. Learn array processing algorithms coupled with iterative methods.
6. Learn text and string processing efficient algorithms.
7. Learn searching techniques and use of pointers.
8. Understand recursive techniques in programming.

Semester –III to VI

Skill Enhancement Courses (SEC-A & B): Choices : Semesters-3 to 6		
Courses	**Topics**	**Credit**
CMS-G-SEC-A-X-1-TH	Communication, Computer Network and Internet	02
CMS-G-SEC-A-X-2-TH	Software Engineering	02
CMS-G-SEC-B-X-1-TH	Multimedia and its Applications	02
CMS-G-SEC-B-X-2-TH	Information Security	02

CMS-G-SEC-A-X-1-TH: Communication, Computer Network and Internet Skill Enhancement

Course – A (SEC-A-1): Choice-1: Theory: 40 hours

1. Understand the structure of Data Communications System and its components. Be familiarize with different network terminologies.
2. Familiarize with contemporary issues in network technologies.
3. Know the layered model approach explained in OSI and TCP/IP network models
4. Identify different types of network devices and their functions within a network.
5. Learn basic routing mechanisms, IP addressing scheme and internetworking concepts.
6. Familiarize with IP and TCP Internet protocols.
7. To understand major concepts involved in design of WAN, LAN and wireless networks.
8. Learn basics of network configuration and maintenance.
9. Know the fundamentals of network security issues.

CMS-G-SEC-A-X-2-TH: Software Engineering

Skill Enhancement Course – A (SEC-A-2): Choice-2: Theory: 40 hours

1. Basic knowledge and understanding of the analysis and design of complex systems.
2. Ability to apply software engineering principles and techniques.
3. To produce efficient, reliable, robust and cost-effective software solutions.
4. Ability to work as an effective member or leader of software engineering teams.
5. To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.

CMS-G-SEC-B-X-1-TH: Multimedia and its Applications

Skill Enhancement Course – B (SEC-B-1): Choice-1: Theory: 40 hours

1. To familiarize the students with the image fundamentals and mathematical transforms necessary for image processing.
2. To make the students understand the image enhancement techniques
3. To make the students understand the image restoration and reconstruction procedures.
4. To familiarize the students with the image segmentation procedures.

CMS-G-SEC-B-X-2-TH: Information Security

Skill Enhancement Course – B (SEC-B-2): Choice-2: Theory: 40 hours

1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
2. Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

Semester – V & VI

Discipline Specific Elective Courses (DSE-A & B): Choices: Semesters-5&6

Discipline Specific Elective- A (DSE- A): Candidate has to opt any 2 from the following topics		
CMS-G-DSE-A-5-1-TH	Data base Management System (DBMS)	04
CMS-G-DSE-A-5-1-P	DBMS Lab using SQL	02
CMS-G-DSE-A-5-2-TH	Operation Research	04
CMS-G-DSE-A-5-2-P	Operation Research Lab using C	02
CMS-G-DSE-A-5-3-TH	Computer Graphics	04
CMS-G-DSE-A-5-3-P	Computer Graphics Lab using C	02
Discipline Specific Elective- B (DSE- B): Candidate has to opt any 2 from the following topics		
CMS-G-DSE-B-6-1-TH	Embedded Systems	04
CMS-G-DSE-B-6-1-P	Embedded Systems Lab.	02
CMS-G-DSE-B-6-2-TH	Object Oriented Programming	04
CMS-G-DSE-B-6-2-P	Object Oriented Programming by Java	02
CMS-G-DSE-B-6-3-TH	Computational Mathematics	04
CMS-G-DSE-B-6-3-P	Computational Mathematics Lab using C	02

Semester – V

CMS-G-DSE-A-5-1-TH: Database Management System

Discipline Specific Elective Course – A (DSE-A-1): Choice-1: Theory: 60 hours

1. Gain knowledge of database systems and database management systems software.
2. Ability to model data in applications using conceptual modeling tools such as ER Diagrams and design data base schemas based on the model.
3. Formulate, using SQL, solutions to a broad range of query and data update problems.
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5. Be acquainted with the basics of transaction processing and concurrency
6. Familiarity with database storage structures and access techniques.
7. Compare, contrast and analyze the various emerging technologies for database systems
8. Analyze strengths and weaknesses of the applications of database technologies to various subject areas.

CMS-G-DSE-A-5-1-P: DBMS Lab using SQL

Discipline Specific Elective Course – A (DSE-A-1): Choice-1: Practical: 40 hours

Students are required to practice the concepts learnt in the theory by designing and querying a database for a chosen organization (Like Library, Transport etc). The teacher may devise appropriate weekly lab assignments to help students practice the designing , querying a database in the context of example database.

CMS-G-DSE-A-5-2-TH: Operation Research

Discipline Specific Elective Course – A (DSE-A-2): Choice-2: Theory: 60 hours

1. Operations research (OR) is an analytical method of problem-solving and decision-making that is useful in the management of organizations. In operations research, problems are broken down into basic components and then solved in defined steps by mathematical analysis.
2. The process of operations research can be broadly broken down into the following steps:
3. Students have to Identify a problem that needs to be solved.
4. Constructing a model around the problem that resembles the real world and variables.]
5. Using the model to derive solutions to the problem.
6. Testing each solution on the model and analyzing its success.
7. Implementing the solution to the actual problem.

8. Operations research include statistical analysis, management science, game theory, optimization theory, artificial intelligence and network analysis. All of these techniques have the goal of solving complex problems and improving quantitative decisions.

CMS-G-DSE-A-5-2-P: Operation Research (O.R.) Lab. using C/ Python

Discipline Specific Elective Course – A (DSE-A-2): Choice-2: Practical: 40 hours

Students are required to practice the concepts learnt in the theory .

CMS-G-DSE-A-5-3-TH: Computer Graphics

Discipline Specific Elective Course – A (DSE-A-3): Choice-3: Theory: 60 hours

1. Acquire familiarity with the concepts and relevant mathematics of computer graphics.
2. Ability to implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.
3. Describe the importance of viewing and projections.
4. Ability to design basic graphics application programs.
5. Familiarize with fundamentals of animation and Virtual reality technologies
6. Be able to design applications that display graphic images to given specifications.
7. To understand a typical graphics pipeline.

CMS-A-DSE-A-5-3-P: Computer Graphics Lab using C

DSE-A: Choice-3: Practical: 02 Credit: 40 hours

The students are required to create interactive graphics applications in C using graphics application programming interfaces and demonstrate geometrical transformations. The lab material includes implementation of line drawings, circle drawing, ellipse drawing as well as different geometrical transformations.

Semester –VI

CMS-G-DSE-B-6-1-TH: Embedded Systems

Discipline Specific Elective Course – B (DSE-B-1): Choice-1: Theory: 60 hours

1. Give the overview of Microcontroller 8051.
2. Give the overview of Microcontroller 8052
3. Give the overview of Microcontroller 8031

CMS-A-DSE-B-6-1-P: Embedded Systems Lab.

CMS-A-DSE-B-6-1-P: Embedded Systems Lab.

DSE-A: Choice-3: Practical: 02 Credit: 40 hours

Students are required to practice the concepts learnt in the theory .

CMS-G-DSE-B-6-2-TH: Object Oriented Programming

Discipline Specific Elective Course – B (DSE-B-2): Choice-2: Theory: 60 hours

1. Learn the concepts of data, abstraction and encapsulation
2. Be able to write programs using classes and objects, packages.
3. Understand conceptually principles of Inheritance and Polymorphism and their use and program level implementation.
4. Learn exception and basic event handling mechanisms in a program
5. To learn typical object-oriented constructs of specific object oriented programming language

CMS-A-DSE-B-6-2-P: Object Oriented Programming by Java

DSE-B: Choice-2: Practical: 02 Credit: 40 hours

1. Knowledge of the structure and model of the Java programming language,
2. Use the Java programming language for various programming technologies
3. Develop software in the Java programming language,
4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

CMS-G-DSE-B-6-3-TH: Computational Mathematics

Discipline Specific Elective Course – B (DSE-B-3): Choice-3: Theory: 60 hours

1. Understand the fundaments of procedural and functional programming;
2. Understand Matlab data types and structures;
3. Be able to set up simple real-life numerical problems such that they can be solved and visualized using basic codes in Matlab;
4. Be ready to use advanced coding in Matlab in their subsequent studies

CMS-G-DSE-B-6-3-P: Computational Mathematics Lab.

Discipline Specific Elective Course – B (DSE-B-3): Choice-3: Practical: 40 hours

Students are required to practice the concepts learnt in the theory .

Department of Zoology

Raja Peary Mohan College

B. Sc. General in Zoology

Pogramme Outcome, Programme Specific Outcome and Course Comes
(PO, PSO & Cos)

Programme Outcome:

B.Sc. General

a) Students graduating through B.Sc. General Programme from this college are expected to develop analytical skills which will enable them to solve problem-based issues that they face in the next level of their career.

b) Students graduating from this college in this programme are expected to be able to relate the real-life aspects of environment, specifically the animal world and associated issues surrounding them, with what they have learnt in their books and in the classrooms.

c) Students completing the programme are expected to be confident and self-reliant in the sense that they feel they are employable.

d) The programme will impart among the students the advanced knowledge in biological science in specific regard to Zoology along with instilling greater values of life to become worthy citizen of the country.

Programme specific Outcome:

B.Sc. General with Zoology Programme

- Zoology is not only about studying animal diversity for the sake of pursuing graduate level education; rather it gives an enormous opportunity to appreciate the variety and variability of life forms surrounding us along with an in-depth idea about the persistent human-animal relation/interaction in the backdrop of environment which is quintessential for survival. The B.Sc. General program with Zoology as one of the subjects in Raja Peary Mohan College under the University of Calcutta is an attempt to both introduce and, at the same time, provide an in depth look into one of the most interesting as well as challenging subjects of biology that one can study.
- The core idea of the course is to make the student aware of the foundational aspects related to the animal world around us, appreciate the diversity in life forms, how organisms interact with one another and how they hold relevance to the human life by interacting/affecting/benefitting in various ways.
- The program covers multiple aspects of animal biology and spans from classical zoology to cellular, biochemical and molecular aspects of physiology and pathology. The course also provides exposure to economic zoology, medical entomology as well as clinical diagnostics to help students acquire a comprehensive knowledge while providing them options to explore different aspects of the subject from which they can choose to continue further higher levels of education and/or select appropriate career options.
- The courses included in the program offer multiple avenues which can be used in the future for selecting suitable career including academia, research, independent entrepreneurship and or employment in public/private sectors in the fields of aquaculture, sericulture, apiculture animal husbandry, agricultural and medical entomology, public health etc.

- The program will help students to think creatively and independently, develop analytical skills and explore possibilities beyond those entrenched in prevailing opinion/s and practice/s.

Format of the Semesters

Core Courses [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)) and Students for Zoology as third subject in Pure General (GE-1)]
Semester 1: CC1/GE1- Animal Diversity
Semester 2: CC2/GE2- Comparative Anatomy & Developmental Biology

Core Courses [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-))]
Semester 3: CC 3/GE3- Physiology and Biochemistry
Semester 4: CC 4/GE4- Genetics and Evolutionary Biology

SKILL ENHANCEMENT COURSE SEC (G)
Semester 3 [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
SEC- A (1): Apiculture

Semester 4 [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
SEC- B (1): Aquarium Fish Keeping

Semester 5 [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
SEC-A (1): Sericulture

Semester 6 [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
SEC-B (1): Medical Diagnosis

DISCIPLINE SPECIFIC ELECTIVE COURSE DSE (G)

Semester 5: [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
DSE-A (1): Applied Zoology

Semester 6: [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]
DSE-A (1): Biology of Insect

Semester wise Course Outcomes in B.Sc. General in Zoology:

Semester 1: [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)) and Students for Zoology as third subject in Pure General (GE-1)]

Core Course- CC1/GE1- Animal Diversity

1. The course will help to gain a comprehensive insight about various aspects of non-chordate and chordate biology (including basis of animal classification and taxonomy), be able to identify and differentiate animals based on their morphological characters and systemic organization, learn about evolution of animals from protozoa to higher life forms, formation of body plans and development of complex organ systems from unicellular origin.
2. The course will help the students to learn about the evolution, development and functioning of typical processes like locomotion in protozoa, circulatory and excretory strategies in porifera, invertebrate respiratory system, development of segmentation and water vascular system. These will help students to appreciate the development of complex tissue grade organ systems in the higher life forms.
3. The course will help to develop interest in the broad concepts in invertebrate and vertebrate biology along with keen interest in pursuing advanced studies in the field of classical zoology, animal taxonomy and biodiversity.

Semester 2: [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-))

Core Course- CC2/GE2- Comparative Anatomy & Developmental Biology

1. The course is designed such that students will gain insight into the processes leading to early embryonic development including production of gametes, fertilization, cleavage and gastrulation using echinoderm and amphibia as model examples of developmental biology. The course will help to learn about the development of germ layers and body plan along with the regulatory processes involved therein.
2. The course will help to learn about the developmental diversity involved in the evolution of major organ systems in the vertebrates including digestive, respiratory, circulatory, urinogenital and integumentary systems along with understanding the functional similarities and dissimilarities of the various organ systems which in turn will help to establish deeper perception of the basis of evolution of organ systems in response to changing demands as life evolved from aquatic to terrestrial forms.
3. The course will help to gain logical and consistent understanding of animal evolution from the perspective of organ system development which will thereby help to develop keen interest in pursuing advanced studies in the field of animal development, molecular taxonomy and evolution.

Semester 3: [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)) and Students for Zoology as third subject in Pure General (GE-1)]

Core Course- CC 3/GE3- Physiology and Biochemistry

1. Knowledge about physiology and biochemistry is fundamental for understanding and appreciating the basis of existence and functionality of life forms. The course has been designed such that the students will gain deeper understanding of the different complex physiological systems in the animals and their coordinated functioning to maintain systemic homeostasis.
2. The course will help to learn about vital processes like origin of impulse and its propagation across different nerve fibers, synaptic transmission, muscle contraction and associated responses as well as to understand the vital physiological processes like respiration, digestion, excretion and reproduction in relation to the concerned anatomical structures.
3. The course will also help to learn about the regulatory systems including endocrine and nervous systems along with functioning of the feedback loops to control the physiological processes. Further the students will gain knowledge about the basic pathways of cellular metabolism from the perspective of biological molecules including protein, carbohydrate and lipid metabolism and learn about the basics of enzyme function, derive and quantify the rates of enzyme action, learn about the modes of enzyme action and enzyme inhibitors.
4. The course envisages to motivate the students relate the theoretical knowledge on enzyme biochemistry and conceptualize the same in real life situations like understanding the basis for action of medicines which often modulate enzyme activities within the system. This in turn will help to develop ideas and analytical aptitude among students for pursuing higher studies on glycobiology, protein chemistry and even structural biology which have immense relevance on human health and diseases.

SKILL ENHANCEMENT COURSE SEC(G)

SEC- A (1): Apiculture

This course aims to help the students

- To understand the significance of beekeeping as an economically viable industry and
- To learn about the bee diversity and be able to identify bees based on morphological characters, understand the biology and behavior of bees and gain insight into the social structure and organization of bee colonies, acquire knowledge about parasites affecting the bees along with concerned strategies for efficient rearing of disease-free bees and maintaining productive apiaries..
- To learn techniques of bee rearing, apiary management, strategies of honey collection along with commercializing the products obtained from apiculture including honey, bee wax, propolis, pollen, etc. as well as learn about optimization techniques based on changing climate and geographical regions for augmentation of productions associated with apiculture.
- To be aware of the opportunities and employment in apiculture industry in public and private as well as to invest upon as independent entrepreneur.

Semester 4: [Syllabus for Students from other Hons [GE (H)], Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)) and Students for Zoology as third subject in Pure General (GE-1)]

Core Course- CC 4/GE4- Genetics and Evolutionary Biology

1. The course will help to generate understanding and ideas to apply the Mendelian principles in experimental studies while learning the basis of genetic disorders along with understanding the causes and their effects of alteration in structure and number of chromosomes by various kinds of mutations.
2. The course will further help to learn about the basis of genetic material exchange at the molecular level by linkage and crossing over through DNA recombination and gain insight into the basis of sex differentiation and dosage compensation in animals using fruit fly as an example.
3. The students will learn about the origin and evolution of life forms which will help them develop interest in theories, hypothesis and debates related to evolution along with harnessing in-depth knowledge on the diversity and relationships in animal world as well as an understanding of the phylogeny, basis of speciation and the evolutionary processes leading to selection of highly evolved life forms.

SKILL ENHANCEMENT COURSE SEC(G)
SEC- B (1): Aquarium Fish Keeping

This course aims to help the students

- To understand the significance of aquarium fish keeping as an economically viable industry, specifically fish-based cottage industry.
- To learn about the fish diversity, be able to identify exotic and endemic aquarium fishes based on morphological characters and understand the biology and behavior of commercially relevant aquarium fishes for enhanced rearing.
- To develop skills and learn techniques of fish rearing, management of aquarium and ornamental fisheries, strategies for commercialization including fish handling, packaging and transportation as well as formulation of fish feeds with high nutrition value and most importantly be aware about the prospect and employment opportunities in aquarium fish-based small-scale industry in public and private as well as to invest upon as independent entrepreneur.

Semester 5: [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]

SKILL ENHANCEMENT COURSE SEC(G)
SEC- A (1): Sericulture

This course aims to help the students

- To understand the significance of sericulture as an economically viable cottage industry.
- To gain an idea of the history of sericulture and silk route along with understanding and recognizing the various species of silk moths in India, and exotic and indigenous races.
- To gain a thorough knowledge about the techniques involved in silkworm rearing and silk reeling.

- To generate awareness about the various opportunities and employable skills in sericulture industry both in the public as well as private sectors and most importantly to learn how to develop entrepreneurial skills needed for self-employment in mulberry and seed production and be apprised about practicing sericulture as a profit-making enterprise.

DISCIPLINE SPECIFIC ELECTIVE COURSE DSE (G)

DSE-A (1): Applied Zoology

This course aims to help the students

- To understand and generate the concept of different species interaction in the environment and generate ideas about the diseases, transmission, prevention and control of diseases with emphasis on the pathogenicity of Protozoan and the Helminthic parasites.
- To study about the epidemiology of diseases: their transmission, prevention, prophylaxis and control along with learning about the different pests and their strains.
- To understand the difference between various types of pests and extent of damage caused to the crops, fruits, vegetables, stored grains as well as gain knowledge about insects of medical and economic importance.
- To understand the significance of animal husbandry, poultry farming and fish technology as economically viable animal-based cottage industries.
- To learn about maintenance of cattle and poultry, techniques for synchronization of estrus cycle and artificial insemination in cattle, management of poultry breeding stocks and broilers, as well as processing and preservation of eggs.
- To learn about the techniques used for genetic improvements in aquaculture industry, strategies for induced breeding in fishes and transportation of fish seed.
- To generate awareness about the various opportunities and employable skills in animal husbandry, poultry farming and fish technology both in the public as well as private sectors and most importantly to learn how to develop entrepreneurial skills needed for self-employment as well as practicing animal husbandry, poultry farming or fish technology as a profit-making enterprise.

Semester 6: [Syllabus for Students from Core Course for Pure General Course Students (Zoology as 1st or 2nd subject (CC-G-)]

SKILL ENHANCEMENT COURSE SEC(G)

SEC-B (1): Medical Diagnosis

This course aims to help the students

- To generate a firm knowledge about the various infectious, non-infectious and lifestyle diseases, tumors and clinical strategies for their diagnosis.
- To understand the use of histopathology and biochemistry in clinical diagnostics and learn about the molecular diagnostic tools and their relation to precision medicine.
- To develop skills in various types of tests and staining procedure involved in hematology, clinical biochemistry and the basics of instrument handling.

- To learn the different scientific approaches/techniques used in the clinical laboratories to investigate various diseases as well as acquire knowledge about the different non-invasive imaging techniques commonly used in clinical diagnostics.
- To familiarize the students with clinical diagnostics and present the subject before them as a prospective career option along with raising awareness about the biochemical and histopathological health parameters and especially acquainting them with basis of clinical diagnosis which holds immense relevance in the day to day life from the perspective of crisis-management during health emergencies.

DISCIPLINE SPECIFIC ELECTIVE COURSE DSE (G)

DSE-A (1): Biology of Insect

This course aims to help the students

- To develop awareness about the causative agents and control measures of many commonly occurring diseases caused by insects.
- To gain an understanding about the favorable breeding conditions for the insect vectors and improvise strategies to manage the insect vectors population below threshold levels for the sake of public health and other medical aspects.
- To modulate and undertake measures or start awareness programs for maintenance of hygienic conditions, avoidance of contact from vector and destruction of breeding spots in the vicinity of houses and cattle shed by public health education campaign.
- To educate the students about potential damage/health complications arising from clinically relevant insects and thereby spread social awareness for the sake of community health.

Department of Zoology

Raja Peary Mohan College

B.Sc. Honours in Zoology

Pogramme Outcome, Programme Specific Outcome and Course Outcomes
(PO, PSO & COs)

Programme Outcome:

B.Sc. Honours

a) Students graduating through B.Sc. Hons. Programme from this college affiliated to the University of Calcutta are expected to develop analytical skills which will enable them to solve problem-based issues which they will face in next level of career.

b) Students, although at the initial stage after getting admitted to the course often face difficulty in language and communication skills, but when they pass out, they are expected to develop good communication skills and overcome the vernacular issues so as to be pretty adept in expressing their understanding of the subject.

c) Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon the issues inviting cross discussions.

d) Students graduating from this college in this programme are expected to be able to relate the real-life aspects of environment, specifically the animal world and associated issues surrounding them, with what they have learnt in their books and in the classrooms.

e) Students completing the programme are expected to be confident and self-reliant in the sense that they feel they are employable.

f) The programme will impart among the students the advanced knowledge in biological science in specific regard to Zoology along with instilling greater values of life to become worthy citizen of the country.

Programme Specific Outcome:

B.Sc. Honours in Zoology Programme

- Zoology is not only about studying animal diversity for the sake of pursuing graduate level education; rather it gives an enormous opportunity to appreciate the variety and variability of life forms surrounding us along with an in-depth idea about the persistent human-animal relation/interaction in the backdrop of environment which is quintessential for survival. The B.Sc. Honours program in Zoology in Raja Peary Mohan College under the University of Calcutta is an attempt to both introduce and, at the same time, provide an in depth look into one of the most interesting as well as challenging subjects of biology that one can study.
- The core idea of the course is to make the students aware of the foundational aspects related to the animal world around us, appreciate the diversity in life forms, how organisms interact with one another and how they hold relevance to the human life by interacting/affecting/benefitting us in various ways.
- The program covers multiple aspects of animal biology and spans from classical zoology to cellular, biochemical and molecular aspects of physiology and pathology. The course also provides exposure to economic zoology, medical entomology as well as clinical diagnostics to help students acquire a comprehensive knowledge while providing them options to explore different aspects of the subject from which they can choose to continue further higher levels of education and/or select appropriate career options.

- The courses included in the program offer multiple avenues which can be used in the future for selecting suitable career including academia, research, independent entrepreneurship and or employment in public/private sectors in the fields of aquaculture, sericulture, apiculture animal husbandry, agricultural and medical entomology, public health etc.
- The program will help students to become self-reliant, mature and think creatively as well as independently while developing analytical skills and exploring possibilities beyond those entrenched in prevailing opinion/s and practice/s.
- Students successfully completing the course are expected to develop a keen interest in pursuing higher studies in either the mother subject or any one of the specialized subjects, taught in the course, to ultimately choose a dynamic career in academia and research thereby contributing to the benefit of themselves as well as the nation.
- Apart from academia and research, a student successfully completing the course is equally trained to choose a career in business in the private sector (as an independent entrepreneur) or in the public sector (cottage industry-initiatives of the Govt.) primarily based on agricultural zoology, animal husbandry, sericulture, pisciculture, apiculture, ornamental fisheries and many other relevant fields. In short, studying Zoology provides ample career options to a student to independently move forward in life and earn a respectable living.

Semester-wise Course for B.Sc. (Honours) in Zoology

	Sem-1	**Sem-2**	**Sem-3**	**Sem-4**	**Sem-5**	**Sem-6**
Core Course (CC)	2TH+2TU CC-1&2	2TH+2TU CC-3&4	3TH+3TU CC-5,6 &7	3TH+3TU CC-8,9 &10	2TH+2TU CC-11&12	2TH+2TU CC-13&14
Discipline Specific Elective (DSE)					2TH+2TU DSE–A(1) +B(1)	2TH+2TU DSE–A(2) +B(2)
Skill Enhancement Course (SEC)			1TH+0TU SEC-A(1)	1TH+0TU SEC-B(2)		
Generic Elective (GE)	1TH+1TU GE-1	1TH+1TU GE-2	1TH+1TU GE-3	1TH+1TU GE-4		
Ability Enhancement Compulsory Course (AECC)	1TH+0TU AECC-1	1TH+0TU AECC-2				
Total No. of Courses and Marks	**4 x 100 = 400**	**4 x 100 = 400**	**5 x 100 = 500**	**5 x 100 = 500**	**4 x 100 = 400**	**4 x 100 = 400**
Total Credits	**20**	**20**	**26**	**26**	**24**	**24**

TH = Theory T = Tutorial

- CC/GE/DSE : Each theory and Tutorial Course have 5 and 1 Credit(s) respectively
- GE : Covering two subjects with two courses each; any subject in any semester; CC of a different subject in general course is to be treated as GE for Honours Course
- DSE/SEC : Group (A&B) for specified semesters
- AECC/SEC : Each Course has 2 Credits
- AECC-1 : Communicative English / MIL; AECC-2 : Environmental Studies

Format of the Semesters

Semester 1

CC1- Non Chordata – I (Protists to Pseudocoelomates)
CC2- Molecular Biology

Semester 2

CC3- Non Chordata – II (All Coelomate Phyla)
CC4- Cell Biology

Semester 3

CC5- Chordata
CC6- Animal Physiology: Controlling & Co-ordinating System
CC7- Fundamentals of Biochemistry

Semester 4

CC8- Comparative Anatomy of Vertebrate
CC9- Animal Physiology: Life sustaining system
CC10- Immunology

Semester 5

CC11- Ecology
CC12- Principle of Genetics

Semester 6

CC13- Developmental Biology
CC14- Evolutionary Biology

Discipline Specific Elective Course –
DSE- A-(1) AND DSE- B-(1) in Semester 5 and DSE- A-(1) AND DSE- B-(1) in Semester 6

- **DSE- A-1- Parasitology**
- **DSE- B-1- Endocrinology**
- **DSE- A-1- Animal Biotechnology**
- **DSE – B-1- Animal Behaviour & Chronology**

Skill Enhancement Course

- **SEC- A-(1) in Semester 3 and SEC-B-(1) in Semester 4**
- **SEC- A-(1)- Apiculture**
- **SEC- B-(1)- Aquarium Fisheries**

Semester wise Course Outcomes in B.Sc. Honours in Zoology:

Semester 1

CC1- Non Chordata – I (Protists to Pseudocoelomates)

1. The course will help to gain a comprehensive insight about various aspects of non-chordate biology (including basis of animal classification and taxonomy), be able to identify and differentiate non-chordates based on their morphological characters and systemic organization, learn about evolution of animals from protozoa to higher life forms, formation of body plans and development of complex organ systems from unicellular origin.
2. The course will help the students to learn about the evolution, development and functioning of typical processes like locomotion in protozoa, circulatory and excretory strategies in porifera along with the basis of intra-specific and interspecific animal interactions that impact biodiversity. These will help students to appreciate the development of complex tissue grade organ systems in the higher life forms
3. The students will further learn about coral reefs and aquatic biodiversity which are crucial components of marine ecosystem and thereafter be able to describe economic, ecological and conservational significance/relevance of various animals in human life.
4. It will also help to gather comprehensive knowledge about the biology of worms which carry immense agricultural and medical relevance due to their multiple roles as parasites, symbionts, etc.
5. The course will help to develop interest in the broad concepts in invertebrate biology along with keen interest in pursuing advanced studies in the field of classical zoology, animal taxonomy and biodiversity. After completion of the course one can find out some relative and thoughtful answer regarding the evolution of life forms, how lower non-chordates survive in nature and interact with other animals. This course will help the students to prepare themselves for higher studies and NET/SET/other examination for entry into services.

CC2- Molecular Biology

1. The course is designed to gain a comprehensive knowledge about the molecular basis of life, appreciate how a cell functions in order to survive and propagate.
2. The students will learn about the biomolecules, their structure, function and interactions. How gene expression occurs, the basis of gene expression regulation, cellular quality control strategies for repairing DNA damage and cope up with stress are quintessential factors to understand.
3. They will understand the basis of Central Dogma of life, how it operates differentially in the prokaryotes and eukaryotes and also develop idea about epigenetic factors regulating gene expression.
4. This paper seeks to enable the students gain knowledge about the basic tools of molecular biology for performing basic experiments and thereupon developing a basic sense/ orientation for pursuing career in biomedical research. This will help them to learn how to frame questions in molecular biology for pursuing advanced studies.

Semester 2

CC3- Non Chordata – II (All Coelomate Phyla)

1. The course is designed such that students will gain insight into non-chordate developmental processes including insect metamorphosis, evolution of body plan in higher non-chordates like coelom development, metameric segmentation.

2. The course will teach the students to appreciate the development and functioning of invertebrate organ systems which is essential for gaining comprehensive idea on the evolutionary pathways leading to development of complex organs in the chordates.
3. The course will help to gain information about the connecting links and affinities between non-chordates and chordates to trace the evolutionary trajectories in the animal kingdom as well as to know about the highly developed biological caste system, social structure and functional organization prevalent within the arthropods. This will help to appreciate the evolutionary history of complex interactions within the animals.
4. After completion of the said course a student will gain logical and consistent understanding of the broad concepts in Zoology along with deeper understanding of the non-chordate biodiversity which will help to develop keen interest in pursuing advanced studies in the field of classical zoology, animal taxonomy and biodiversity and prepare themselves for NET/SET/other examination for entry into services.

CC4- Cell Biology

1. The paper is designed to provide a comprehensive knowledge about the structure and function of cells, major sub-cellular compartments including cytoplasm, nucleoplasm and mitochondrial matrix.
2. The students will learn and appreciate inter-organellar crosstalk in maintaining cellular metabolic homeostasis along with getting acquainted with major signaling pathways, the sub-cellular events of molecular signaling leading to cell division and death, anterograde and retrograde signaling within cells, etc.
3. The course will further help the students to learn the vital metabolic events including the operation of mitochondrial respiratory chain and ATP production to maintain cellular bioenergetic homeostasis.
4. This course will enable the students to develop ideas and analytical aptitude for conducting experimental studies required for basic and translational work in the fields of cancer, metabolic diseases, stem cell biology, cloning and developmental biology, etc.

Semester 3

CC5- Chordata

1. The paper has been designed such that the students will gain deeper understanding of the different classes of chordates, level of organization and evolutionary relationship between different sub-phyla classes and sub-classes within and across the phyla.
2. The students will learn about the basis of chordate evolution from the protochordates to higher vertebrates while understanding the development of vital organ systems in the chordates including pharynx, respiratory organs, feeding apparatus, exoskeletal derivatives as well as types of metamorphosis involved in developmental process.
3. The course will further help the students to learn about the physical basis of specialized adaptations and movements including echolocation and flight in mammals and birds respectively.
4. The main essence of the paper design is to instill among the students a sense of appreciation about the diversity of chordates so as to develop interest in the broad concepts in vertebrate biology which will further help them to grow keen interest in pursuing advanced studies in the field of classical zoology, animal taxonomy and biodiversity.

CC6- Animal Physiology: Controlling & Co-ordinating System

1. This course aims at providing deeper understanding of the different complex physiological systems in the animals and their coordinated functioning to maintain systemic homeostasis.

2. The students will learn about the regulatory systems including endocrine and nervous systems along with functioning of the feedback loops to control the physiological processes while being able to identify different types of animal tissues and develop basic idea about the vital processes like synaptic transmission, hormonal secretion and associated responses.
3. The course will help the students to comprehend and analyze problems in physiology and biochemistry which is fundamental to the understanding of animal biology while relating to the theoretical knowledge and translating them in real life situations like designing strategies for healthy life style.
4. The objective of this course is to help students conceptualize about homeostatic imbalances i.e. how physiological processes adapt changing external and internal stimuli in order to maintain health and integrity.
5. At the end of this course the students are expected to develop ideas and analytical aptitude for pursuing higher studies, conducting experiments pertaining to research on physiology including the fields of cancer, metabolic diseases, stem cell biology, cloning and developmental biology, etc.

CC7- Fundamentals of Biochemistry

1. The paper is designed such that the students gain knowledge about cellular metabolism from the perspective of biological molecules, learn about the structure of major biomolecules including proteins, carbohydrates, lipids, and nucleic acids along with pathways leading to their synthesis and regulation.
2. The course aims at providing a comprehensive understanding of the basics of cellular bioenergetics, anabolic and catabolic processes operating for maintaining cellular physiological homeostasis.
3. The students will further learn about the basics of enzyme function, derive and quantify the rates of enzyme action, learn about the modes of enzyme action and enzyme inhibitors.
4. After completing this course, the students are expected to be able to relate to the theoretical knowledge on enzyme biochemistry and translate them in real life situations like understanding the basis for action of medicines which often modulate enzyme activities within the system.
5. The course design keeps in mind that the students pursuing the program develop ideas and analytical aptitude for pursuing higher studies on glycobiology, protein chemistry and even structural biology which have immense relevance on human health and diseases.

Skill Enhancement Course

SEC-A-(1) in Semester 3 - Apiculture

This course aims to help the students

- To understand the significance of beekeeping as an economically viable industry and
- To learn about the bee diversity and be able to identify bees based on morphological characters, understand the biology and behavior of bees and gain insight into the social structure and organization of bee colonies, acquire knowledge about parasites affecting the bees along with concerned strategies for efficient rearing of disease-free bees and maintaining productive apiaries..
- To learn techniques of bee rearing, apiary management, strategies of honey collection along with commercializing the products obtained from apiculture including honey, bee wax, propolis, pollen, etc. as well as learn about optimization techniques based on changing climate and geographical regions for augmentation of productions associated with apiculture.
- To be aware of the opportunities and employment in apiculture industry in public and private as well as to invest upon as independent entrepreneur.

Semester 4

CC8- Comparative Anatomy of Vertebrate

1. The paper is designed such that the students can learn about the developmental diversity involved in the evolution of major organ systems in the vertebrates including digestive, respiratory, circulatory, urinogenital, integumentary, skeletal and nervous systems.
2. The students will understand and appreciate the functional similarities and dissimilarities of the various organ systems which will help to establish deeper understanding of the basis of evolution of organ systems in response to changing demands as life evolved from aquatic to terrestrial forms.
3. The course aims at providing a comprehensive understanding of the basis of evolution of complex nervous system and brain development which underlies the evolution of behavior and cognitive abilities in the higher mammals.
4. After completing this course, the students will gain logical and consistent understanding of the vertebrate evolution from the perspective of organ system development which will help to develop keen interest in pursuing advanced studies in the field of animal development, molecular taxonomy and evolution.

CC9- Animal Physiology: Life sustaining system

This course aims to help the students

- To learn about molecular and functional basis of vital physiological processes in vertebrates like hematopoiesis, blood clotting along with the basis of blood grouping in humans.
- To be able to correlate the vertebrate anatomy with the concerned physiological processes involved therein including appreciation of structure function relation to meet the physiological requirements.
- To understand the basis of thermoregulation and osmoregulation along with correlating the environmental factors determining/modulating the functional diversity of these processes across different animals residing in various ecosystems.
- To be able to relate to the theoretical knowledge with the real-life situations including biodiversity, habitat-specific distribution of animals and conservational strategies guided by animal physiological requirements.
- To develop ideas and analytical aptitude for pursuing higher studies in the fields of animal physiology, human clinical complications and conservation.

CC10- Immunology

1. The objective of the course is to provide comprehensive insight of the immune system along with knowledge about immune cell diversity and organs contributing to systemic production of immune cells and molecules.
2. This course will enable the students to understand the basis of different types of immune responses including allergy and auto-immune responses along with learning about antigenic diversity and basis of inflammation as the major immunological response.
3. The course will further help the students to gain insight into the basis of acquired immunity mainly through active & passive immunization along with strategies for vaccine development.
4. The students will learn about the diverse factors involved in immunological signaling, associated regulatory factors and complex interplay of diverse immune cells and biological macromolecules modulating immunogenic responses.
5. The course amins at providing a comprehensive knowledge about the basic tools of molecular immunology for performing basic experiments and thereupon developing a basic sense/ orientation for pursuing career in biomedical research. It will help students to learn how to frame questions in molecular immunology for pursuing advanced studies while preparing themselves for higher studies and NET/SET/other examination for entry into services.

Skill Enhancement Course

SEC-B-(1) in Semester 4- Aquarium Fisheries

This course aims to help the students

- To understand the significance of aquarium fish keeping as an economically viable industry, specifically fish-based cottage industry.
- To learn about the fish diversity, be able to identify exotic and endemic aquarium fishes based on morphological characters and understand the biology and behavior of commercially relevant aquarium fishes for enhanced rearing.
- To develop skills and learn techniques of fish rearing, management of aquarium and ornamental fisheries, strategies for commercialization including fish handling, packaging and transportation as well as formulation of fish feeds with high nutrition value and most importantly be aware about the prospect and employment opportunities in aquarium fish-based small-scale industry in public and private as well as to invest upon as independent entrepreneur.

Semester 5

CC11- Ecology

1. The objective of this course is to provide the students a comprehensive idea about the biotic and abiotic interactions between organisms and the environment in which they live, function and expand by giving birth to their progenies.
2. The course is designed such that the students will get a deeper insight into the community structure, population dynamics of various species while at the same time learning about various types of intra- and inter-specific interactions that underlie the community interactions, kinds of food chains operating in the different types of ecosystem as well as the chemico-biological and nutrient cycles operating as a source for supply of raw materials for production and consumption.
3. The students will also learns about the status of animals and plants in the ecosystem from the point of view of abundance, exploitation and conservation so that they can contribute in the future to prevent species extinction due to over-exploitation They will learn about the various agencies like The International Union for Conservation of Nature and World Wide Fund; how they operate for conducting species monitoring and conservation, what is meant by Red Data book, how species are enlisted in different IUCN categories based on their abundance and what will be the impact of species extinction from the ecosystem.
4. After completion of this course, students are expected
    - To have a clear idea about the functional and evolutionary biology of ecology.
    - To present ecology as a scientific study and an exciting field while being able to analyze a biological problem, derive a testable hypothesis and design experiments and put them into practice.
    - To solve environmental problems involving human-animal interactions and solve ecological problems pertaining to local and global level.

CC12- Principle of Genetics

1. The outcome of this course is to help the students generate understanding and ideas to apply the Mendelian principles in experimental studies while gaining deeper insight into the causes and their effects of alteration in structure and number of chromosomes.
2. The students will learn about the basic principles of mutation and the diseases caused by the different kinds of mutation while knowing about the molecular methods and conventional techniques for gene manipulation in biological systems.

3. Successful completion of this course will lead to generation of aptitude and analytical skills among students in the fields of biomedical research including genetic engineering, cell culture, cloning, genetic disorders, etc.

Discipline Specific Elective Course in Semester 5

DSE A-1- Parasitology

1. This course enables students to understand and develop concepts about species interaction in the environment in regards to host-parasite relation/interactions while learning about diseases, modes of transmission, prevention and strategies for control of diseases.
2. The students will develop a deep understanding of the pathogenicity of Protozoan and the Helminthic parasites, study about the epidemiology of the diseases: their transmission, virulence and pathogenicity of pathogenic micro-organisms, their prevention, prophylaxis and control of the diseases.
3. The course provides an opportunity to study the causative agents, pathogenesis and treatment strategies for important diseases like malaria, leishmaniasis, trypanosomiasis, toxoplasmosis, schistosomiasis, cysticercosis, filariasis etc. while evaluating the significance of incidence, prevalence and epidemiology in microbiological diagnostic activities.
4. The course amins at providing a comprehensive knowledge about the basic tools of molecular parasitology for performing basic experiments and thereupon developing a basic sense/ orientation for pursuing career in biomedical research. It will help students to learn how to frame questions in molecular immunology for pursuing advanced studies while preparing themselves for higher studies and NET/SET/other examination for entry into services.

DSE B-1- Endocrinology

The course will help the students

- To understand neurohormones and neurosecretions.
- To study the hypothalamo and hypophysial axis in detail.
- To understand about different endocrine glands and their disorders.
- To understand the mechanism of hormone action, and the pharmacological actions of different drugs in regulating this mechanism of action.

Semester 6

CC13- Developmental Biology

1. The objective of this course is to develop among the students a generalized understanding of how a multicellular organism is evolved from a single celled fertilized zygote, and appreciate the molecular intricacies underlying the processes.
2. The students will learn and understand the different changes in opinion and knowledge that has taken place over the course of time in the field of developmental biology from the beginning of 19^{th} century.
3. The course will help to learn about the developmental diversity involved in the evolution of major organ systems in the vertebrates along with understanding the functional similarities and dissimilarities of the various organ systems which in turn will help to establish deeper perception of the basis of evolution of organ systems in response to changing demands as life evolved from aquatic to terrestrial forms.

4. The course also provides a good opportunity to develop knowledge about tissue-specific developmental gene expressions, determination of cell lineages along with critically appreciating the concept of potency and commitment of cells during the course of development.
5. The course will help to gain logical and consistent understanding about the evolutionary history of the taxa based on overall developmental affinities as well as from the perspective of organ systems which will thereby help to develop keen interest in pursuing advanced studies in the field of animal development, molecular taxonomy and evolution.
6. The students will also learn about the relevance of developmental biology in medicine or its role in development of diseases as well as develop concepts on *in vitro* fertilization, stem cell transplantation and basics of regenerative medicine.

CC14- Evolutionary Biology

This course is designed for the students

- To understand the evolution of universe and the generation of life forms.
- To encourage them develop interest in theories, hypothesis and debates related to evolution of mankind while harnessing in-depth knowledge on the diversity and relationships in animal world.
- To develop a complete understanding of the phylogeny and adaptations of life forms in animal world while gaining a precise understanding of the processes and theories of evolutionary biology.
- To help the student gain firm base of construction of phylogenetic trees using taxonomic tools along with harnessing in-depth knowledge on the diversity and relationships in animal world as well as develop an understanding of the phylogeny, basis of speciation and the evolutionary processes leading to selection of highly evolved life forms.

.

Discipline Specific Elective Course in Semester 6

DSE- A- 1- Animal Biotechnology

1. The course is developed such that the students gain an understanding of the techniques of biotechnology; like DNA isolation, PCR, transformation, restriction, digestion etc.
2. The students will learn how to formulate strategies to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniques learned during this course.
3. The course will ensure that students develop a strong foundation of the ethical and social issues raised regarding the generation of genetically modified organisms (GMOs).
4. The students are expected to pursue higher studies in the field, while preparing themselves for higher studies and NET/SET/other examination for entry into services. It is also expected that students utilize this knowledge and learn to frame questions in molecular biology and recombinant DNA technology for pursuing advanced studies and therein design scientific projects for experimental research.

DSE- B-1- Animal Behaviour & Chronology

This course is designed in a way that will help students:

- To learn the different kinds of theoretical and practical techniques used to study ethology.
- To develop skills, understanding and experience and to understand all the aspects of ethology.
- To consider and evaluate the behaviors of animals including human in the ecological world and the urban world too.

- To objectively understand and evaluate information about animal behavior and ecology encountered in our daily lives.
- To develop a profound idea about animal behavior while developing interest for pursuing in the field of ethology for higher studies in the future.

PROGRAMME OUTCOME
INTRODUCTION
The B.Sc. - Botany honours programme is designed to equip students with essential knowledge and technical skills to study plants in a holistic manner. Students would be trained in all areas of plant biology using a unique combination of core and elective papers with significant interdisciplinary components. Students would be exposedt cutting-edge latest technologies that are currently used in the study of plant life forms all over the world, their evolution and interactions with other organisms within the ecosystem. Students would also become aware of the social and environmental significance of plants and their relevance to the national economy.

Choice Based Credit System:
The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system
and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.
Outline of Choice Based Credit System:
1. Core Course: A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
2. Elective Course: Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.
2.1 Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute mayalso offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
2.2 Dissertation/Project: An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course
on his own with an advisory support by a teacher/faculty member is called dissertation/project.
2.3 Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.
P.S.O:-
P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.
3. Ability Enhancement Courses (AEC)/Competency Improvement Courses/Skill Development Courses/Foundation Course: The Ability Enhancement (AE) Courses may be of two kinds: AE Compulsory Course (AECC) and AE Elective Course (AEEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement. They ((i) Environmental Science,(ii) English/MIL Communication) are mandatory for all

disciplines. AEEC courses are value based
and/or skill-based
3.1 AE Compulsory Course (AECC): Environmental Science, English Communication/MIL Communication.
3.2 AE Elective Course (AEEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instruction.
Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper..

PROGRAMME SPECIFIC LEARNING OUTCOME BASED CURRICULUM FRAMEWORK:-
Nature and extent of the B.Sc Honours Botany Programme Content: Botany is the broad discipline encompassing various subjects involved with the study of
plants. The B.Sc Botany (H) Programme imparts knowledge on various fields of plant biology through teaching, interactions and practical classes. Present trend has been shifted to frontier areas of plant sciences at the cost of traditional botany. There is need to maintain a balance of the traditional botany and modern science and applied approach. This syllabus has been drafted to enable the learners to prepare them for future employment in various fields including academics
as well as competitive exams.
Students would gain wide knowledge as follow:
1. Diversity of plant forms and microbes their habitat, morphology, and reproduction.
2. Genetics, cell and molecular biology of plants, biochemistry, plant physiology
3. Fungi and disease causing microbes and fungi
4. Embryology, palaeobotany, pallinology, medical ethnobotany
5. Economic value of plants and their use in Biotechnology etc.

C.O. :-
COURSE LEARNING OBJECTIVES
The progamme is designed to equip students with essential knowledge and technical skills to study plants and related subjects in a holistic manner. hteh main aim is to train the learners in all areas of plant biology using appropriate combinations of core and elective papers with significant inter-disciplinary components. Students would be exposed to cutting-edge latest technologies that are currently used in the study of plant life forms, their evolution and interactions with other organisms within the ecosystem in all prime international universities. Students would also become aware of the social and environmental significance of plants and their relevance to the national economy.
COURSE LEARNING OUTCOMES
1. Students will be able to understand and explain different specializations of Botany such as systematics, evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology, anatomy, reproduction, genetics, cell and molecular biology of plants, biotechnology
2. Students will be trained in various analytical techniques of plant biology, use of plants as industrial resources or as support system for human livelihood and will be well versed with the use of transgenic technologies for both basic and applied research in plants.
3. Students will be able to identify various life forms of plants, design and execute experiments related to basic studies on evolution, ecology, developmental biology, physiology, biochemistry, plant interactions with microbes and insects, morphology,

anatomy, reproduction, genetics,microbiology, molecular biology, recombinant DNA technology, transgenic technology. Students are also familiarized with the use of bioinformatics tools and databases and in the application of statistics to biological data.
4 Students will acquire core competency in the subject Botany and in allied subject areas. They will be able to use the evidence based comparative studies approach to explain the evolution of organism and understand the genetic diversity and its significance.
5. The students will be able to explain various physiological and metabolic processes unique to plants. They would be able to elaborate on the concepts of gene, genome and the cellular and molecular processes of replication, transcription and translation, cell cycle control, RNA Processing and so on..
6. They will be able to understand adaptation, development and behavior of different forms of life.The students will get an understanding of functioning of ecosystem and tracing the energy pyramids through nutrient flow.
7. Students will be able to demonstrate the experimental techniques and methods in plant.sciences and have innovative research ideas. .

Programme specific outcome

At the end of the course in physiology students are expected to :

1. gain ability to apply basic principles of chemistry and physics to physiological systems

2. understand the functions of important physiological systems like the cardio-respiratory, endocrinological, nervous, renal, reproductive and metabolic systems

3. understand how these separate systems interact to yield integrated physiological responses to challenges such as exercise, fasting, ascent to high altitude or decent to deep sea, exposure to pathogens, fear, stress to maintain homeostasis

4. comprehend the basic understanding of genetics, molecular biology, microbiology, nutrition and dietetics, pharmacology

5. be able to perform, analyse and report on experiments and observations in physiology;

6. develop a capacity to identify public health challenges faced by the society and suggest measures to overcome it

7. understand the mechanisms of techniques and instrumentations used to investigate/assess health and disease

8. be equipped with life and employability skills necessary for careers in research, teaching, and professions allied to Medicine and industry

9. become literate digitally and acquire ability to use digital sources, and apply various platforms to convey and explain concepts of physiology.

Course Outcomes

CC--1. Cellular Basis of Physiology, Genetics & Enzymes

This course would enable the students to relate the structure of cellular organelles to their functions and understand the organization of cells to tissues, the organization of nucleic acids to chromatin in the nucleus.

This course also offers an insight into the activities of enzymes which are the regulators of any chemical reactions in the biological system with emphasis on diagnostic enzymes.

CC--2. Biophysical Principles and Chemistry of Biomolecules

This course would enable the students to apply basic principles of chemistry and physics to biological systems and understand working principles of instruments used to study biological substances. Students would learn the chemistry of biomolecules of importance in details. It also gives an opportunity to students to learn basic technical skills required in biomedical research and laboratory based professions like the preparation and handling of laboratory reagents, pH measurements, qualitative identification of physiologically important biochemical substances.

This course endows the ability to think laterally and in an integrating manner and develop an interdisciplinary approach.

CC--3. Cell Signalling & Nerve-muscle Physiology

The course would develop a molecular understanding of the complex system of communication that governs basic cellular activities and coordinates cell actions. The ability of cells to perceive and correctly respond to their microenvironment is the basis of development, tissue repair, and immunity as well as normal tissue homeostasis.

The students would be able to critically reflect on ionic movement leading to the action potential or impulse in excitable tissues of nerve and muscle. They would also be able to discriminate between the structural and functional properties of skeletal, cardiac and smooth muscles and mechanism of action of muscles. Experiment according to ethical protocols on both animal tissue and human subjects are taught to illustrate basic properties of nerve/muscle function.

CC--4. Nervous System

The course enables students to outline the organisation of the human nervous system and describe the structures and functions of the different parts of brain and the spinal cord. Students would be able to role played by peripheral and autonomic nervous system in the maintenance of homeostasis. They gain insight into the modern concepts of pain, sleep, learning, memory, and emotion and molecular chemistry of neurotransmitters of importance.

Students also gain knowledge about the brain imaging techniques of CT scan and MRI in health and diseases.

CC--5. Blood and Body Fluids

At the end of this course students should be able to discuss the anatomy, functional organization and characteristics of the haemopioetic system and blood and body fluids, explain the formation and functions of blood constituents, describe the biochemical basis of blood groups and illustrate their relevance in blood transfusion and explain the pathophysiology of common haematological disorders.

The students would also be able to perform haematological tests and interpret the findings.

CC--6. Cardiovascular System

The students would be able to describe the anatomy of the heart and vascular system and histology of cardiac muscle and blood vessels; the origin and propagation of cardiac impulse. They would also be able to analyse the pressure and volume changes during the cardiac cycle, the regulation, factors affecting and measurement of cardiac output. They would be able to explain the factors leading to cardiovascular homeostasis – neural and chemical control of cardiac functions. They would be able to describe the common diagnostic tests for cardiovascular function like the ECG and Echocardiography. They would be able to discuss the causes of heart block, cardiac arrhythmias & myocardial infarctions, atherosclerosis, hypertension.

They would gain hands on training on measurement of blood pressure, study of the effect of sympathetic and parasympathetic stimulation on amphibian heart, preliminarily interpret the data of ECG.

CC--7. Respiratory System

The student should be able to discuss the structure function relation of respiratory organs, understand the mechanics of breathing and the regulation of it by higher brain centers, explain the biophysical laws governing exchange of gases in the lungs and transport to the tissues and the pathophysiological reasons underlying various respiratory disorders.

The students would able to do and interpret spirometry and critically explain the pneumographic recording of impact of various physiological activities on chest movements.

CC--8. Digestion and Metabolism

The students would be able to explain the structure function relation of different parts of the digestive tract, the breakdown of food into simpler absorbable forms, would be able to categorize the transport of simpler compound across the mucosal membrane. Students would also be able to explain the pathophysiology of several disorders related to digestion like gall bladder stone, jaundice, peptic ulcer etc. They would learn critically the metabolism of the major nutrients like carbohydrate, lipid, proteins, nucleic acids and the mechanism of energy generation from nutrients. Students would be able to explain the enzymatic dysfunctions related to different metabolic disorders.

They would gain the technical knowledge of demonstrating the effects of sympathetic and parasympathetic nervous system on the movement of intestine in a mammalian model. They would also learn to quantitate amino acids by titrimetic method.

CC--9. Molecular Biology

Students would gain in depth knowledge of the processes constituting the central dogma of life namely transcription, translation and DNA synthesis. They would be able to explain mutation and relation between mutation and generation of oncogenes in the development of cancer. They would be able to comprehend the basic concepts of recombinant DNA technology and its uses in cure by gene therapy. The students would be able to describe the working principle and uses of common molecular techniques like chromatography, electrophoresis, ultracentrifugation and RIA, ELISA. They would also be understand the principles of Western, Northern and Southern blotting techniques and Polymerase chain reaction.
The students would be able to estimate colorimetrically molecules of bio medical importance like serum protein, blood glucose and urea and separate biomolecules from mixtures by paper chromatography

CC--10. Nutrition and Dietetics Public Health

From this part, at the end of the course the students are enriched with the knowledge about dietary sources, daily requirements, biochemical functions of several vitamins such as Thiamin, Riboflavin, Niacin, Pyridoxine, Pantothenic Acid, Biotin,Cyanocobalamin, Folic Acid, Ascorbic Acid, Inositol. Vitamins A, D, E and K and minerals such as sodium, potassium, calcium, phosphorus, iron, zinc, iodine and fluoride. They also possess good idea about dietary requirements of carbohydrate, protein, lipid and other nutrients as well as formulation of balanced diet for adult man,adult woman,lactating woman and pregnant women.

The students acquire an exposure of conduction of a diet survey with preparation of a survey report.

CC--11. Special Senses

At the end of this course students would be able to describe the various steps in the biological transduction of different types of external stimuli like light, sound, chemicals into nerve impulse by sense organs ultimately leading to physiological perception of vision, audition, gustation and olfaction. They would also be able to explain the pathophysiology of diseases associated with vision, hearing, taste and smell.

The students would be able to perform some common tests to assess the functions of the special organs like the visual acuity test, tests for deafness etc.

CC--12. Endocrinology

The students would be able to describe the structure and location of the endocrine glands in the body and explain the functions and chemistry of the hormones secreted by them. They would be able to understand the regulation of secretion of hormones under different physiological conditions and situations and appreciate the role of these hormones in maintaining homeostasis. They would be able to associate the function of these hormones with the symptoms

arising from the deficiency or excess amount of these hormones in various endocrinological disorders.

The course would endow the ability to identify the endocrine glands under the microscope by their histological specificities.

CC--13. Reproductive Physiology & Developmental Biology

After completion of the course the students would acquire a general knowledge of histology, functions and hormonal control of male and female reproductive organ. They would possess a brief idea of different reproductive cycles with their hormonal control and the physiology of pregnancy, parturition, lactation and spermatogenesis. After the course they would gain a extensive knowledge of different stages of embryo development such as Fertilization,Blastulation,Implantation and Gastrulation as well development of different organs during pregnancy period such as Heart, urinary system and genital system.

The students acquire a practical knowledge of Pregnancy Test by kit method. They also could identify different histological sections of different organs.

CC--14. Excretory Physiology

The students would develop a detailed idea about structure and functional relationship of kidney and nephron, the mechanism of release the excretory products in urine, learn how to test the abnormal functions of kidney and their interpretation. They would also be able to explain the role of skin as an excretory organ and its role in regulation of body temperature. The students would also be able to detect the sources of pollutants like Lead, Arsenic etc. and describe their effects on human health.

DSE -- A

1. Biostatistics

The students would be able to understand the basic concepts of statistics like variable, parameter, population and sampling etc. They would be able to represent data in appropriate formats. They would be able to comprehend the importance of central tendencies in evaluating parameters of populations and samples. They would be able to understand the principles of determination of significance of difference between central tendencies of groups of samples like Null hypothesis, alternative hypothesis, errors of inference, levels of significance, t-test and z score for They would be able to correlate between variables of a sample by linear correlation and linear regression.

At the end of the course students would be able to calculate central tendencies of a set of data, evaluate the existence of differences in a variable between groups and impact of one variable on another.

2.Microbiology & Immunology

The students would be able to classify microorganisms and describe the growth patterns and disinfection techniques with special emphasis on bacteria. The would gain in depth knowledge of bacteriology namely bacterial structure, metabolism, genetics and artificial culture

techniques practiced in laboratories. They would be enlightened about the beneficial aspects of bacteriology in the food industry and also on the principles of controlling bacterial growth by different generations of antibiotics when they become the pathogens and cause infectitious diseases in humans. The students would also be able to describe the structure – virion, prion and bacteriophages ,classificy viruses based on nucleic acid composition and explain the replication of bacteriophages – lytic and lysogenic cycle.

The students would gain insight into the intriguing world of immunology and would be able to explain the importance of different branches of immunity namely innate and adaptive and the humoral and cellular branches of adaptive immunity, the functions of individual cells of each branch and the coordination among the different branches in conferring protection to individual against pathogens. They would also be able to explain the mechanism of development of diseases due to overt immune functions like autoimmune diseases, allergy, graft rejection on one hand and diseases due to deficiency of immune system like cancer, AIDS etc. They would be able to explain the underlying principles of vaccination and immunization protocols.

3. Ergonomics

The students would gain knowledge about the physical abilities and limitations as well as other human characters that are relevant to job design, learn about designing of equipments, devices, processes that fit the human body and its cognitive abilities, and improves the quality of work, productivity. They would learn how to reduce cost of production by minimizing the risk of work place, provide brief idea about musculo skeletal disorders and other occupational diseases associated with work. It can impart knowledge about body composition and body type analysis and its relationship with work or abilities.

4. Community and Public Health

At the end of this course students would be able to suggest dietary management of different abnormal physiological conditions in humans. They would be aware the problems of infertility and modern day techniques to solve the problem. They would gain knowledge of population control, immunization, nutrition related disorders and their social implications and epidemiology of diseases and their prevention

DSE - B

1.Chronobiology and Stress Physiology

The students would be able to comprehend the importance of time of the day in regulating various physiological processes like sleep, body temperature, hormone release etc. and the consequences of mismatch between time and bodily activities in jet lag and shift work. They would learn in detail about the biochemical link between time of the day with the biological clock in SCN.

Students would be able to explain the stress response that causes physiologic and behavioural changes in various systems such as nervous, endocrine, and immune and the pathways such as activation of the sympathetic nervous system and the hypothalamic-pituitary-adrenal (HPA) axis which brings about these changes to promote homeostasis. They would be able to describe the impact of chronic stress in CV

disorders and immunosuppression. They would gain detailed insight in to oxidative stress and the cellular mechanisms to control it.

2.Advanced Molecular Biology and Nanotechnology

The students would accumulate an extensive knowledge of fundamental molecular biology processes such as control of gene expression, operon model, post-transcriptional modifications, cell-cell communication and apoptosis. They would gain idea of several advanced molecular biology techniques such as protein sequencing methods, genome analysis, methods for analysis of gene expression, methods for detection of molecules in living cells, genomic medicine and genetic counselling. They also acquire a brief idea of fundamental of nanotechnology and applications of nano materials in biology.

3.Toxicology and Pharmacology

After the course the students could gather a concept of the importance of pharmacology in the study of physiological processes by gaining an idea on toxins and toxicology and factors affecting toxicity along with pharmacokinetics and pharmacodynamics. The students also would be able to acquire an extensive idea related to usage of drugs in humans such as drugbiotransformation. bioavailability and drug accumulation. They would possess a concept of various aspects of different drugs which have therapeutic index.

4. Work, Exercise and Sports Physiology

The students would be to understand how the body functions in working condition and would gain knowledge to develop activities and programs that establish, maintain and promote physical fitness. gain knowledge in the scientific study of human movement and can help athletes to improve their performance and help them to recover from injuries.

SEC-A

1.Hematological Techniques

The students would gain in depth knowledge of the biochemical basis of ABO and Rh blood groups and its importance in blood transfusion and the hazards of blood transfusion and the concept of blood bank. They would be able to explain the cause and symptoms of haemoglobinopathies, anaemia, leucocytosis, leucopenia and purpura.The students would also be able to explain the significance of glycated haemoglobin, C-reactive protein, Ghrehlin and Leptin in health and disease. They would be able to define, determine and explain the significance of blood parameters like TC, DC, ESR, Arneth count, etc. of pathophysiological importance.Concepts of bone marrow ans suppression of transplantation

2.Clinical Biochemistry

At the end of this course students would be able to describe pathophysiological significance of blood constituents glucose, serumprotein, albumin, urea, creatinine, uric acid, bilirubin and ketone bodies, various serum enzyme, lipid profiles and tissue specific substances like Cardiac Troponins. They would be able to analyse the significance of hormones like thyroid hormones, adiponectin, leptin in health and diseases.

SEC-B

1.Detection of Food Additives /Adulterants and Xenobiotics

The students would learn about chemical contaminants in food in general and their impacts on human health. They would learn about the tests identifying specific food adulterants like Metanil yellow, Rhodamin B in food samples and their pathophysiological effects. They would learn about the concept of xenobiotics and mechanisms of detoxification of xenobioticsby the human body.

2. Bioinformatics

The students would gain knowledge about this interdisciplinary field that is essential for management of data in modern biology and medicine. They would learn about bioinformatic databases- PubMed, PDB, Gen Bank, NCBI and computer software programs such as FASTA,BLAST which are bioinformatic tools. The students would be aware of the Applications of bioinformatics like homology searches, sequence alignments and pattern searching etc. They would gain an insight into computational biology and its application in medical sciences.

Program specific outcome

At the end of the course in physiology students are expected to:

1. gain ability to apply basic principles of bio-chemistry and bio-physics to physiological systems

2. understand the functions of important physiological systems like the cellular, metabolic, cardio-vascular, respiratory, endocrinological, nervous, renal and reproductive systems

3. understand how these separate systems interact to generate integrated physiological responses to challenges such as exercise, fasting, certain environmental changes, stress etc. to maintain homeostasis

4. be able to perform, analyze laboratory report on experiments and observations in physiology;

5. understand the mechanisms of techniques and instrumentations used to assess health and disease

6. able to develop life and employability skills necessary for careers in teaching, and professions allied to medicine and industry

7. become literate digitally and acquire ability to use digital sources, and apply various platforms to convey and explain concepts of Physiology.

Course specific outcomes

CC 1

Cellular basis of Physiology

This course would enable the students to relate the structure of different cellular organelles to their functions like plasma membrane, nucleus, endoplasmic reticulum, mitochondria, lysosome and peroxisome.

Biophysical Principles, Enzymes and Chemistry of Bio-molecules

This course would enable the students to apply basic principles of physics to biological systems and understand their significance in human body.

This course also offers an insight into the activities of enzymes which are the regulators of any chemical reactions in the biological system.

Students would learn the chemistry and physiological importance of different biomolecules such as carbohydrate, protein, lipid nucleic acids in details.

Digestion and Metabolism

The students would be able to explain the structure function relation of different parts of the digestive tract, the breakdown of food into simpler absorbable forms. They would learn critically the metabolism of the major nutrients like carbohydrate, lipid, proteins, nucleic acids and the mechanism of energy generation from nutrients by studying different metabolic pathways.

CC 2

Blood and Body Fluids

At the end of this course students should be able to discuss the functional organization and characteristics of blood and body fluids, explain the formation and functions of blood constituents describe the mechanism of blood coagulation and can learn the formation and function of lymph and tissue fluids.

The students would also be able to perform haematological tests and interpret the findings.

Cardiovascular System

The students would be able to describe the anatomy of the heart and histology of cardiac muscle, origin and propagation of cardiac impulse. They would also be able to analyze the pressure and volume changes during the cardiac cycle, the regulation, factors affecting and

measurement of cardiac output. They would also be able to understand blood pressure and factors controlling it, peculiarities of regional circulation like coronary and cerebral.

They would gain hands on training on measurement of blood pressure, study of the effect of hot and cold saline on amphibian heart.

Respiratory System

The student should be able to discuss the structure function relation of respiratory organs, understand the mechanics of breathing, explain the biophysical laws governing exchange of gases in the lungs and transport to the tissues.

The students would able to do and interpret lung function test by measuring peak expiratory flow rate and critically explain the pneumographic recording of impact of normal ventilation, hyperventilation and breath holding.

CC 3

Nerve-muscle Physiology

The students would be able to understand the ionic movement leading to the action potential or impulse in excitable tissues of nerve and muscle. They would be able to know different properties of nerve tissues; how excitation can propagate from one nerve to the next or muscle from its origin; why nerve undergo degeneration processes and their recovery, etc.

They would also be able to discriminate between the structural and functional properties of skeletal, cardiac and smooth muscles and mechanism of action of muscles.

Experiments according to ethical protocols on both animal tissues and human subjects would help them to know the basic properties of nerve/muscle function.

Nervous System

This part of the course enables students to outline the organization of the human nervous system and describe the structures and functions of the different parts of brain and the spinal cord. Students would be able to know the role played by peripheral and autonomic nervous system in the maintenance of homeostasis. They gain brief insight into the modern concepts of pain, sleep, learning, memory, and emotion and molecular chemistry of neurotransmitters of importance.

Special Senses

At the end of this part, students would be able to understand the various steps in the biological transduction of different types of external stimuli like light, sound, chemicals into nerve impulse by sense organs ultimately leading to physiological perception of vision, audition, gustation and olfaction. They would also be able to explain the pathophysiology of diseases associated with vision, hearing, taste and smell.

The students would be able to perform some common tests to assess the functions of the special organs like the visual acuity test, tests for deafness etc.

CC 4

Endocrinology

The students would be able to describe the structure and location of the endocrine glands in the body and explain the functions of the hormones secreted by them. They would also be able to understand the modified state of secretion of hormones under different physiological conditions and know the role of these hormones in maintaining homeostasis. They would be able to associate the function of these hormones with the symptoms arising from the deficiency or excess amount of these hormones in various endocrinological disorders.

The students can visualize the histological structures and can identify the endocrine glands under the microscope by their histological specificities.

Reproductive Physiology

The students would be able to describe the structure and location of the human reproductive structures, their functions, endocrine roles along with the process of gametogenesis. Brief outline of post-gestational changes would help them in future to build a healthy society.

Excretory Physiology

This part of the course helps students to know about the structure and functions of different parts of the excretory system of the body along with their roles in maintaining homeostasis. They would learn about the heat gaining and dissipating processes of our body and how it works to maintain homeostasis.

The course would also help them to visualize the histological structures of different organs. The students would also learn the bio-chemical process of identifying the normal and abnormal constituents of urine.

Discipline Specific Electives outcome

DSE: Group-A

Biological Statistics

This discipline specific course would help students to understand the basic concepts of variable, population, parameter, and sample. They would also be able to discriminate between qualitative and quantitative data, continuous and discontinuous data. They would learn how to present data by different graphical representation. They would gain brief insight about

mean, median, mode, standard deviation and standard error of ungrouped data; concept of probability.

The students would be able to perform different computational tests using physiological data of human subjects and also can represent them graphically.

Haematology

At the end of this course students should be able to describe the biochemical basis of blood groups and illustrate their relevance in blood transfusion and explain the pathophysiology of common haematological disorders, discuss the anatomy, functional organization and characteristics of the hematopoietic system explain the pathophysiology of common haematological disorders.

The students would also be able to perform haematological tests and interpret the findings.

DSE: Group-B

Work & Exercise Physiology and Ergonomics

This discipline specific course would help students to know about the different types of works and their effect on normal physiological processes. The students would also know about physical fitness and how it affects physical activities. They can gather knowledge about anthropometry and imply their knowledge on daily activities in future.

Human nutrition and dietetics

Proper nutrition is an essential element of healthy life. By this course, students can gather knowledge about different food commodities, their functions in body and their daily requirements. Students would also know about the status of their food-consumption and necessary rectification to sustain health.

Skill Enhancement Course (SEC)

SEC: Group- A

Microbiology and Immunology

At the end of this course students would be able to learn about the structures and morphological classification of different viruses and bacteria. They would also gain knowledge about disinfection methods and idea about different antibacterial agents. Students would also gain knowledge about innate and acquired immunity, toxin and immunization through vaccination.

Clinical Biochemistry

At the end of this course students would be able to describe pathophysiological significance of several blood constituents, lipid profile in health and disease and pathophysiological significance of various serum enzymes.

SEC: Group- B

Detection of Food Additives / Adulterants & Xenobiotics

Though food is very essential, the components are continuously contaminated by different adulterants or mixed with additives which may not be beneficial for our body. This course will guide students to identify those malpractices and aware them to the functions of certain drugs along with the brief idea of their processing in the body.

Community and Public Health

This course would guide students about some common public health issues along with their remedies. Their knowledge in this section would also guide them to build a healthy society by enlighten them about family planning, proper nutrition of expecting and nursing mother, growing child etc.

RAJA PEARY MOHAN COLLEGE
DEPARTMENT OF COMMERCE
UTTARPARA:HOOGHLY

PROGRAMME OUTCOMES (PO)

The new curriculum of B.Com (Honours +General) under CBCS of University of Calcutta vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. It will definitely empower students of B.Com to innovate and also inspire them to convert their innovations into real business models for the country's economic and social prosperity. The proposed programme offers better understanding of the business world and aims at building students entrepreneurial skills by giving them hands -on training.

PROGRAMME SPECIFIC OUTCOMES (PSO)

B.Com(Hons) Programme of University of Calcutta is designed to enable and empower students to acquire knowledge, skills and abilities to analyse and synthesize the contemporary realities pertaining to the domain of commerce and industry. This course not only provides for maintaining and sustaining existing businesses in the face of violent winds of change and competition but also a needed perspective of sustainable growth. This programme aims at instilling conceptual understanding to equip students to deal with business realities of today and prepares them to face the challenge of forthcoming days. Further, this course is designed to help students in cultivating entrepreneurial mindset and skills.

After completing this programme (under CBCS), the students will be able to prepare a progressive mindset by developing following attributes, qualities and skills:

1. Disciplinary Knowledge
2. Critical Thinking
3. Communication Skills
4. Foster an attitude of Cooperation and Team work
5. Research related skills
6. Moral and Ethical Awareness
7. Information / digital Literacy

B.Com (General) Programme of university of Calcutta under CBCS is designed to enable and empower students to acquire knowledge, skills and abilities to analyse and synthesize the contemporary realities pertaining to the domain of commerce and industry. As commerce is considered as an area where we

tend to study different aspects that impact the business world like social, political, legal, economic etc., the programme takes care the following aspects:

1. Demonstration of deeper understanding of business world both from theoretical and practical perspective.
2. Application of knowledge to understand the corporate world and its impact on the economy from various perspectives.
3. Application of one's disciplinary knowledge pertaining to theories and principles to find solution to problems of business world.
4. This programme enables the student to think of a given problem or situation from different perspectives like economic, financial, social, national etc. and broadens their thought processes.
5. This programme enables the students to be technically updated as it has courses like computerized accounting system, computer applications etc. This not only makes them digitally literate but also makes them aware of various cyber-crimes and how to take precautionary measures.

COURSE OUTCOMES (CO)

B.Com. Semester I (Hons. And Gen) (Under CBCS)

AECC 1.1Chg: Language (Communicative English and Indian Language)

Marks: 50 (Communicative English)+50(Indian Language) **Credits Hours: 2**

Course Objective

To enhance the knowledge of literature as well as the communicative skills of the students with an object to understand and express the language of the business profoundly.

Course Outcomes

The students shall learn the literature and as well as they shall increase their reading as well as writing skills in English and their mother tongue.

Paper GE 1.1 Chg: Microeconomics I & Statistics (50+50)

Part I Microeconomics

Marks: 50 **Credits Hours: 3**

Course objective :

The main objective of microeconomics is to generate basic idea regarding Demand curve, Supply curve, Consumers choice and Producers cost structure etc.

Course outcome :

The learning outcome of these course is students can visualized how prices are determined facing some constraint in consumer and producers side. Students have practical knowledge about cost structure in the economy.

Part- II (Statistics)

Marks: 50 **Credits Hours: 6**

Course Objective

This course introduces the fundamentals of statistics, central tendency, dispersion, moments skewness, kurtosis and interpolation to the students.

Course Outcomes

After completion of the course, the student shall be able to grow a knowledge of using appropriate graphical representation of the data set, mean, median and mode, applying the standard deviation of the numbers, different types of moments and their relationships, applying different measures of skewness and kurtosis, Newton's forward and backward interpolation method and Lagrange's interpolation method.

Paper CC 1.1 Chg: BUSINESS LAWS

Marks: 100 **Credits Hours: 6**

Course Objective

The main aim of this course to provide a fundamental knowledge regarding The Indian Contract Act, 1872,The Sale of Goods Act, 1930,Partnership Laws, The Limited Liability Partnership Act, 2008,The Negotiable Instruments Act 1881 andConsumers Protection Act, 1986.

Course Outcomes

After completing the course the learners shall be able to gather a basic knowledge about the laws and regulations prevailing in India relating to businesses such as process of formation of a valid contract as well as several essentials to make a contract legal, various important legal aspects regarding sale of goods, details about partnership and limited liability partnership laws, rules and regulations relating to different negotiable instruments and different rules to protect the interest of the consumers from any kind of fraud.

Paper CC 1.2 Chg: PRINCIPLES OF MANAGEMENT

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of the course is to acquaint the students with various emerging management theories and practices as well as to provide an idea about different management principles and practices.

Course Outcomes

After completion of the course, the student shall be able to build a knowledge regarding importance, functions of management, universality of management, levels of management, managerial tasks and skills, different Schools of Thoughts relating to management, concept, importance, steps, types and other details regarding planning and techniques of forecasting. The students can also learn the concept, importance and principles of organisation along with different organizational models, various theories relating to motivation and leadership, different details regarding the process of coordination and control.

Paper GE 1.1 Chg: Microeconomics I & Statistics (50+50)

Part I : MICROECONOMICS

Marks: 50 **Credits Hours: 3**

Course objective :

The main objective of microeconomics is to generate basic idea regarding Demand curve, Supply curve, Consumers choice and Producers cost structure etc.

Course outcome :

The learning outcome of these course is students can visualized how prices are determined facing some constraint in consumer and producers side. Students have practical knowledge about cost structure in the economy.

Part- II (Statistics)

Marks: 50 **Credits Hours: 6**

Course Objective

This course introduces the fundamentals of statistics, central tendency, dispersion, moments skewness, kurtosis and interpolation to the students.

Course Outcomes

After completion of the course, the student shall be able to grow a knowledge of using appropriate graphical representation of the data set, mean, median and mode, applying the standard deviation of the numbers, different types of moments and their relationships, applying different measures of skewness and kurtosis, Newton's forward and backward interpolation method and Lagrange's interpolation method.

Paper CC 1.1 Ch: FINANCIAL ACCOUNTING I

Marks: 100 **Credits Hours: 6**

Course Objective

This course throws a light on theoretical background of Financial Accounting and also enhances knowledge about the techniques of maintaining books of Accounts of various types of organisations.

Course Outcomes

After completion of the course, the student shall be able to grow knowledge of theoretical framework of accounting such as nature of accounting, basic concepts and conventions, revenue recognition, concept, benefits, procedure for issuing accounting standards in India, IFRS etc. The students can also build a detailed understanding relating to determination depreciation and inventory value, consignment, sectional and self-balancing ledger and insurance claim. Above all they shall be capable of preparing financial statements of from incomplete records and for trading and non-profit making organisations.

B.Com. Semester II (Hons. And Gen) (Under CBCS)

Paper GE2.1Chg: E-COMMERCE & BUSINESS COMMUNICATION

Marks: 100 **Credits Hours: 6**

Course Objective

This paper highlights on the theoretical background of both E-Commerce & Business communication and also provides knowledge about different aspects of E-Commerce as well as the different techniques of business communication.

Course Outcomes

Module-1

After completion of module – 1, the student shall be able to gather knowledge about different business models of e-commerce, the concept of electronic customer relationship management and supply chain management, the different methods digital payments like debit card, credit card, e-money etc. the different payment gateways like CBS, Mobile payment, UPI etc. and the risk involved in e-payment. The course is designed to provide concept about the meaning and importance of online banking. The course also provides in depth knowledge about enterprise resource planning and the new upcoming trends in e-commerce.

Module-2

After completion of module – 2, the student shall be able to gather knowledge about the concept, objectives, elements and models of business communication. The course also covers the different types of communication along with the characteristics of corporate communication concept of communication network. The course enhances the student's knowledge about the different tools of communication (both old and modern). Finally a separate chapter is dedicated to learn about drafting the subject matter of communication like notice, circular, report etc.

Paper CC2.1Chg: COMPANY LAW

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of the course is to acquaint basic knowledge of the provisions of the Companies Act 2013 to understand the conduct of business as per legal framework provided in the country. Case studies involving issues in company law are included to enhance the knowledge of the students.

Course Outcomes

After completing the course, the students shall be able to understand the basic concepts & different types of company, the steps involved in company formation, the role of promoter in company formation, the idea about articles of association, memorandum of association, doctrine of constructive notice & indoor management & certificate of incorporation. The course includes a separate chapter on company administration which includes the qualification, disqualification, appointment, position, rights, duties & power of Directors of a company. A separate chapter of the course highlights the basic concepts about shares & debentures & the matters relating to the issue & buyback/redemption. Finally the course concludes with the concept of corporate meetings, its types, minutes of proceedings, notice, agenda, chairman of meeting, quorum, proxy, resolutions etc.

Paper CC2.2Chg: MARKETING MANAGEMENT AND HUMAN RESOURCE MANAGEMENT

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of the course is to enable the students to acquire knowledge about the different theories and practices on marketing management and human resource management and at the same time provide an idea about the principles and practices of these two areas of management.

Course Outcomes

Module-1

After completion of module – 1, the student can gain an in depth knowledge about the concept and importance of marketing, how marketing is different from selling, marketing mix and marketing environment, consumer behaviour, market segmentation, an in depth knowledge about product including the idea of product mix, branding, packaging, labelling and product life cycle. In addition, the course also highlights the concept of pricing of the product, distribution channels, as well as the promotion of a product. There is a separate chapter dedicated to the modern developments in the field of marketing.

Module-2

Module 2 of the course enables students to understand about the nature and scope of human resource, the concept and importance of human resource planning, the concept and importance of recruitment policy, the different sources of recruitment, the recruitment process, concept of selection and the steps involves in the selection process. The module is so developed to provide an idea about the concept and the purpose of training, methods of training and benefits of training. There is a separate chapter in this module that deals with job evaluation, its methods, and concept of performance appraisal.

Paper CC2.1Ch: COST & MANAGEMENT ACCOUNTING – I

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of this course is to provide an in depth theoretical and practical knowledge of some parts of Cost Accounting and analysis of cost components and cost ascertainment using different cost methods.

Course Outcomes

After completing the course, the students shall be able to acquire basic knowledge about the concepts, terminologies & classification of cost. The course provides an in depth knowledge about material cost, the process of purchase & storage of materials, methods of pricing material issues, systems of recording labour cost, concept of idle time, labour turnover, system of wage payment & incentives for direct & indirect workers, concept & classification of overhead, preparation of cost sheet, cost book keeping through non- integrated system & reconciliation between cost & financial profits. The course also highlights the different methods of costing such as job costing, its application, batch costing, contract costing, service costing & process costing.

B.Com. Semester III (Hons. And Gen) (Under CBCS)

Paper SEC 3.1 Chg: Information Technology & Its Application in Business

Marks: 100 **Credits Hours: 4**

Course Objective

This course throws a light on both the theoretical aspects as well as practical application ofInformation technology and its impact on business.

Course Outcomes

After completion of the course, the student shall be able to grow a knowledgeof various theoretical aspects of information technology such as computer based information system, impact of information technology on business, types of information System, data organization, data base management system, internet and its applications, security and encryption, IT Act. 2000 and cybercrimes. The students can also build a detailed understanding of practical application relating toword processing, preparing

presentations, spreadsheet and its business applications, database management system and website designing.

Paper GE 3.1 Chg: Business Mathematics and Statistics

Marks: 100 **Credits Hours: 6**

Course Objective

This course throws light on permutations, combinations, set theory, binomial theorem, logarithm, compound interest and annuities, correlation, regression, index numbers, time series analysis, probability theory.

Course Outcomes

At the end of this course the students will be able to gain the knowledge of permutations, restricted permutations, combinations, restricted combinations, presentation of sets, law of algebra of sets, stating the binomial theorem for positive integral index, simple properties of binomial coefficients, general properties of logarithm, different types of interest rates, different types of annuities, valuation of simple loans and debentures, Pearson's correlation coefficient, Spearman's rank correlation coefficient, least squares of regression, constructing price and quantity indices, components of time series, probability theory.

Paper CC3.1 Ch: Financial Accounting II

Marks: 100 **Credits Hours: 6**

Course Objective

This course throws a light on practical application of Financial Accounting and also enhances knowledge about the various technical aspects and principles and procedures of accounting.

Course Outcomes

After completion of the course, the student shall be able to grow a depth understanding about the principle and procedures of accounting for Partnership accounts, branch accounting, hire purchase and installment payment system, departmental accounts and investment accounts. The students can also build a detailed understanding relating to business acquisition and conversion of partnership into limited company. Moreover students can understand the various aspects of partnership accounting such as change in P/S ratio, admission, retirement and retirement cum admission, treatment of Goodwill, treatment of Joint Life Policy, Death of a partner and Accounting for dissolution of firm.

Paper CC3.2 Ch: Indian Financial System

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of the course is to understand the Indian financial system, its components and its impact on economic development of our country.

Course Outcomes

After completion of the course, the student shall be able to build a depth knowledge regarding Indian financial system and its structure, significance and role of the financial system, financial market, financial institutions, financial services and various financial intermediaries. Students can also aware about the investor protection, grievance redressal mechanism and role of SEBI.

B.Com. Semester IV (Hons & Gen) (Under CBCS)

Paper GE 4.1 Chg: MICROECONOMICS II AND INDIAN ECONOMY

Marks: 100 **Credits Hours: 6**

Course objective :

The objective of microeconomics II is to generate knowledge about various form of market in the economy. On the other hand the objective of Indian Economy is to introduce student among the structure of the economy.

Course outcome :

The main outcome of these course is that learner can differentiate how demand curve, supply curve, equilibrium price differ from market to another market. After completing these syllabus students are able to know how factor prices like wage rate, rental rate are determined in the economy.

The main outcome of Indian Economy is learner get the perfect knowledge about basic feature of Indian economy. Students have clear idea about sectoral contribution of Indian national income during planning period.

Paper CC 4.1 Chg: Entrepreneurship Development and Business Ethics

Marks: 100 **Credits Hours: 6**

Course Objective

This course introduces the process of developing an enterprise and the principles of business ethics and corporate governance.

Course Outcomes

After completion of the course, the student shall be able to grow a knowledge of micro, small and medium enterprises, sources of business ideas, significance of writing the business plan, mobilizing resources for start-up. Moreover students will acquire the knowledge of business ethics, principles of business ethics, the impact of corporate culture, corporate code of ethics and finally the concept of corporate governance.

Paper CC 4.1 Ch: TAXATION-I

Marks: 100 **Credits Hours: 6**

Course Objective

The main aim of this course is to show the students the practical application of Income Tax Act 1961 and the process of levying tax on different persons.

Course Outcomes

At the end of this course the students will be able to understand the different types of persons, the residential status of different persons and incidence of tax, the five heads of income i.e. income from salary, income from house property, income from capital gain, income from business or profession and income from other sources. The students are also going to gather the knowledge of calculating the deductions, set off and carry forward of losses.

Paper CC 4.2 Ch: COST &MANAGEMENT ACCOUNTING-II

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of the course is to make students aware of the advanced topics on costing regarding joint product, activity based costing, budget, standard costing, marginal costing and short term decision making.

Course Outcomes

After completion of the course, the students will gather the knowledge of treatment and apportionment of cost among the joint products, application of activity based costing system, preparation and monitoring of budgets, preparation of fixed, flexible budget and functional budget, analysis and computation of materials, labour and overhead costs variances, marginal costing techniques, cost volume and profit analysis, choosing between making or buying products.

B.Com. Semester V (Hons. And Gen) (Under CBCS)

CC 5.1Ch: Auditing & Assurance

Marks: 100 **Credits Hours: 6**

Course Objective

To provide e detailed understanding regarding concepts of auditing, main aims of auditing as well as several auditing principles, procedures and techniques.

Course Outcomes

The students shall gather an in depth knowledge regarding concept, need and purpose of audit**,** various audit procedures and techniques, different audit risks and detailed understanding regarding the essentials of an ideal internal control system of an organisation. Besides that, students shall get an overview of the process of vouching, verification, preparation of audit report and certificates well as the details of company audit. Lastly, they shall learn about several dynamics of auditing apart from financial audit.

CC 5.2Ch: Taxation II

Marks: 100 **Credits Hours: 6**

Course Objective

To gather knowledge of principles and provisions of Goods and Service Tax (GST) and Customs Law, as well as the important legislations dealing with direct tax payable and tax management.

Course Outcomes

The students shall build a knowledge regarding computation of total income and tax payable as well several aspects of direct tax management. Apart from this, they will have a fundamental understanding of GST such as and Customs Laws which will help the students to apply the same in practical world.

Paper DSE 5.1 A : Macroeconomics and Advanced Business Mathematics (50+50)

Part I Macroeconomics

Marks: 50 **Credits Hours: 3**

Course objective :

The main objective of study macroeconomics is to introduce student among the overall economy like National Income, Gross National Product, Gross Domestic Product, Aggregate demand, Aggregate supply etc.

Course outcome :

The main outcome of these course is that learner get perfect knowledge about National Income, Gross National Product ,Gross Domestic Product ,Personal Income etc. After completing these course student are able to know how interest rate determine in the economy, so that commodity market and money

market both are in equilibrium. Study of Macroeconomics help the students to identify how inflation and unemployment can be control by various govt. policies.

Part- II (Advanced Business Mathematics)

Marks: 50 **Credits Hours: 6**

Course Objective

The main aim of this course is to make students aware of the basic calculus portion of mathematics and the application of it in real life and also the matrix and determinant.

Course Outcomes

This course will lead the students towards the knowledge of classification of functions, elementary ideas of limit and continuity through the use of simple algebraic functions, rules of derivative, significance of derivative as rate measure, second order derivative, integration, integration by substitution, application of derivative to find the maximum or minimum of any function, elementary properties of determinants, solving a system of linear equations by Cramer's Rule, operations on matrices.

Paper DSE 5.2 A: Corporate Accounting

Marks: 100 **Credits Hours: 6**

Course Objective

This course enlightens theoretical and conceptual background of Company Accounts and also enhances knowledge about the techniques of maintaining books of Accounts relating to company merger and reconstruction as well as valuation of goodwill and shares of a company.

Course Outcomes

After completion of the course, the student shall be able to grow a theoretical knowledge of company as well as an in depth understanding of accounting for issue of Shares & debentures of a company, preparation of company final accounts, valuation of goodwill and shares, redemption of preference shares and debentures, buy back of equity shares, issue of bonus and right shares, company merger and reconstruction.

B.Com. Semester VI (Hons. And Gen) (Under CBCS)

Paper AECC6.1Chg: ENVIRONMENTAL STUDIES

Marks: 100 **Credits Hours: 2**

Course Objective

The basic objective of Environment studies is enabling the students about the way one should live and develop sustainable strategies to protect the environment. The course is designed to enable students to develop an understanding of living and physical environment and how to resolve challenging environmental issues affecting nature.

Course Outcomes

Studying the course on environmental studies the students learn about the eco-system, pollution and problems concerned with the environment, help students understand the importance of the resources like air, water, oils, minerals, that are being depleted rapidly and how situations can be improved by taking appropriate actions in our regular lives to preserve these resources. The course is designed to empower the students to take a lead in creating a healthier, greener and sustainable learning environment where students understand the importance of saving the environment and take necessary steps to conserve the natural resources. Environment studies also help to develop the knowledge and skills required to address challenging environmental issues.

Paper SEC6.1Chg: COMPUTERISED ACCOUNTING AND E-FILLING OF TAX RETURNS

Marks: 100 **Credits Hours: 4**

Course Objective

The objectives of this course is to provide a detailed understanding regarding the theoretical concepts of computerised accounting and e-filling, supported by adequate amount of practical knowledge of both aspects.

Course Outcomes

After completion of the course the student will gain the theoretical as well as the practical knowledge of company creation, ledger creation, processing purchase and sales order, process of maintaining multiple godowns and bank reconciliation. The course also highlights the practical knowledge about cost centre, cost category, bill of material, budgets & control, payroll accounting, TDS, GST & finally the knowledge on how to back up and restore data and export and import data. The course also includes the use of DBMS package in creating different vouchers, ledger, trial balance, profit & loss A/c and balance sheet using form, wizard and report. The course also includes designing payroll system using form, query & report. In the final section the course deals with the e filing portion where students will learn about

preparation and submission of ITR for individual tax payers, how to view form 26AS, upload return, e file returns and e verification and uses of e tax calculator, including E- Pay tax and preparation and submission of online form 10E.

Paper CC6.1Ch: PROJECT WORK

Marks: 100 **Credits Hours: 6**

Course Objective

The basic objective of this course is to provide the basic idea among the students about the fundamentals of research work using either primary data or secondary data.

Course Outcomes

After completion of the course the student will gain the theoretical as well as the practical knowledge about the various aspects related to research work & encourage them to undertake research work in future. Project work enables the students to understand the nuances about research work. This course aims to develop the research skills of the students by enabling them to understand & differentiate among the primary & secondary data, the concepts about research methodology, literature review, helps them to understand how to develop research questions, build up hypotheses, use different statistical tools for analysis of the data collected, prepare a proper questionnaire for collection of primary data, draw conclusion from their analysis & address proper authority their suggestions for improvement in the concerned field of study. The course also enables students to understand the methods of developing a bibliography &webliography related to their area of study.

Paper DSE6.1A: FINANCIAL REPORTING & FINANCIAL STATEMENT ANALYSIS

Marks: 100 **Credits Hours: 6**

Course Objective

This course provides a detailed knowledge regarding the concepts on analysis of financial statements and accounting standards.

Course Outcomes

The students on completion of this course shall gather in depth knowledge about the concept of holding company, consolidation of balance sheets of parent and subsidiary company, concept of minority interest etc. The accounting standards Ind AS 1, Ind AS 16, Ind AS 33, are incorporated in the course. The course highlights the concept, sources and applications of fund, advantages and limitations of fund flow statement, concept, objectives and preparation and presentation of cash flow statement as per relevant accounting standard. The course is designed to provide and in depth knowledge about concept of financial statement analysis, traditional and modern approach to financial statement analysis, parties interested in it, concept and preparation of comparative statement, common size statement, trend analysis. Finally the course also includes a detailed discussion on accounting ratios, its uses and limitations, its preparation and computation.

Paper DSE6.2A: FINANCIAL MANAGEMENT

Marks: 100 **Credits Hours: 6**

Course Objective

The objective of this course is to provide an in depth knowledge to the students regarding planning, organizing, and controlling the financial activities of any business unit like the procurement and utilization of funds.

Course Outcomes

After completion of the course the student will acquire sufficient knowledge on the basic concepts, the importance of time value of money and the different sources of finance available to the company. The course is designed to enable the students to develop idea about the cost involved in different sources of finance as well as to analyse the risk profile of the firm using the concept of Leverage. The course ensures that the students gather knowledge about the capital structure of the company, compute working capital requirement of the company and learn to take proper decision on long term investments and dividend declaration.