



Program Outcomes, Program Specific Outcomes and Course Outcomes for all programs offered by Women's College, Agartala

Women's College, Agartala offers four academic programs which includes

- 1) The Undergraduate program with BA Honours
- 2) The Undergraduate program with BA General
- 3) The Undergraduate program with BSc Honours
- 4) The Undergraduate program with BSc General

The Undergraduate program aims towards the success of students in Postgraduate studies, Research, Inventions, Academic and Administrative jobs and contributions in Nation building.

UG PROGRAM IN HUMANITIES: The college offers 11 honours and 14 general courses in Humanities. UG program in Humanities enhances the students' "ability in cultural aspects, sense of Literature, History, Politics, Religious devotion and ethical qualities. It also upgrades the students to acclimatize in the changing scenario of the above fields with critical evaluation in accordance with the syllabus and curriculum prescribed by the affiliating Tripura University. Our college with its running program has been trying its best to deliver the above responsibility with its well skilled and experienced faculty members.

UG PROGRAM IN SCIENCE: The college offers 6 honours and 7 general courses in Science. UG program in Science train the students in scientific skill both in theory and practice. It develops their aptitude for Chemical and Material science, Science of Nature, Environment and Biodiversity, Agricultural and Floral science, the Parasitological and Molecular aspects of life forms-its problems and solutions and the science of mathematical analysis. The programs have been instigating our students to secure skillfully their jobs as researchers in the institutes, teachers-both in schools and higher education institutes, administrators in government jobs as well as in private companies and in many other positions. From the program UG, the learners develop their aptitude of individual planning, habit of working in groups, field survey, literature reviews, diligence and other skills which fit them in various spheres of life.



Department of Bengali

BAH and BAG (BENGALI)

Programme Outcome

After completion of this programme students will gain information on the Bengali literature, Bengali language, culture and tradition. They will be equipped with the every aspects of the language.

Programme Specific Outcome

This programme provides skills in creative writing. Competence in the language will empower them with communicative skills. After passing out students can opt for Post Graduate in Literature, Comparative Literature, Linguistics, Culture Studies, Mass Communication, Manuscriptology and Tourism. They can engage themselves as teachers, translators and also as entrepreneurs in agriculture.

Course Outcome

Completion of the course in Bengali at undergraduate level develop students with the knowledge of linguistics and the history of Bengali literature including Western and Eastern Literature and Cultural History. The cultural history paper includes various aspects relating to the cultural diversity of the ethnic people. This paper requires the students to acquire knowledge on indigenous dress and ornaments. It also encompasses information on various religious and historical places of interest and archaeology. They can understand the value of Bengali literature.



Department of English

BAH and BAG (ENGLISH)

Programme Outcome

The Under Graduate programme in English deals mostly with the detailed study of the history of English literature and language, history of Indian English Literature, the different literary types such as tragedy, comedy, novel, lyric, concept of Phonetics, Linguistics, Stylistics, Literary theories etc. It makes the students familiar with different literary genres – fiction, non-fiction, poetry, plays, essays from Elizabethan to the modern period. The Program aims to develop intellectual, personal and professional abilities of the students by widening their knowledge of English language and literature as well as by increasing their effective communicative skills.

Programme Specific Outcome

As literature is the mirror of society, the programme contains various literary texts covering different time frame of history which helps students to experience the connection of literature with the society. It aims to increase the knowledge of the students not only in the literary arena but also in the social, cultural, intellectual sectors. Knowledge in phonetics, figures of speech, prosody and study of the structure of the English language help the students to develop their skills of pronunciation, communicative skills as well as linguistic ability. The course familiarizes students with the growth of English language and literature from chaos to cosmos. It helps students to develop their thinking capabilities, writing skill as well as makes them able to critically appreciate and comprehend literary texts written by great writers of English from the ancient to the modern times.

Course Outcome

The course will enable students to acquire sound comprehension of social, cultural, biographical, historical background of British literature, American literature, Australian literature, Caribbean literature as well as Indian Writings in English. Knowledge in English facilitates the students with a lot of career-options – teaching, civil services, journalism, communication media, tourism industry as well as in different creative explorations. For further studies also the students will be capable of choosing courses like PG in English, Linguistics, Culture Studies, Folklore, MBA, Mass Communication, Tourism, Law and many more.



Department of Economics

BAH (ECONOMICS)

Programme Outcome

The programme introduces the students to the economic variables, namely, inflation, unemployment, poverty, Gross Domestic Product, etc., to understand the behaviour of financial and money markets and to develop knowledge about prospects of economic growth. The course will provide knowledge on analyzing economic policies including fiscal and monetary policies.

Programme Specific Outcome

This programme prepares students for career as professionals or researchers in the field of Economics. Students equip themselves with knowledge to pursue higher education in the discipline, for Competitive Examinations in the Banking and Administrative sectors, to take up entrepreneurship, compete in Indian Economic Service, go for Master of Business Administration etc.

Course Outcome

The course gives the students the opportunity to understand the theories of exchange among rational economic agents in variant market structure. It helps students to get an idea of the behaviour of Indian and World economy. Three year Under Graduate course in Economics (Major) covers Basic concepts of Economics, Micro Economic theory, Macro Economic theory, Statistics, Mathematical Applications in Economics, Econometrics, International Economics, Indian Economy, Development Economics, Economic History of India, Public Finance and Monetary Economics.

BAG (ECONOMICS)

Programme Outcome

The programme introduces the students to the economic variables, namely, inflation, unemployment, poverty, National Income, etc., to understand the behaviour of financial and money markets and to develop knowledge about prospects of economic growth. The course will provide knowledge on analyzing economic policies including fiscal and monetary policies.

Programme Specific Outcome

This programme prepares students for career as professionals in the Banking and Administrative sectors, to take up entrepreneurship, compete in different UPSC, TPSC examinations.

Course Outcome

The course gives the students the opportunity to understand the theories of exchange among rational economic agents in variant market structure. It helps students to get an idea of the behaviour of Indian and World economy. Three year Under Graduate course in Economics (Major) covers Basic concepts of Economics, Micro Economic theory, Macro Economic theory, International Economics, Indian Economy, Development Economics, Public Finance and Monetary Economics.



Department of Education

BAH (Education)

Programme Outcome

1st Semester: Paper H 1—Philosophical and Sociological foundation of Education

Basically the programme helps the students to understand the different dimensions of Education. The course explains the Indian and Western schools of Philosophy and their impact on education, appreciate the importance of education for social change.

2nd Semester : Paper H 2—Educational Psychology

The course involves understanding the meaning and different perspectives of psychology and different theories of intelligence, learning, personality and nature of creativity. Students will acquire the knowledge of application educational psychology in teaching learning process.

3rd Semester: Paper H 3—Development of Education System in India

It develops an understanding of evolution of the education system in India. The recommendations of the different Education Commissions are included in the course.

4th Semester: Paper H4—Contemporary Trends and Issues in Education

The course helps the students to know about education for child Welfare, different educational organizations and their role, Value oriented Education, Inclusive Education, Current problems in Indian Education etc.

5th Semester: Paper H 5 –Measurement & Evaluation in Education, Paper H 6—Educational Technology & Management

The course involves understanding the concept of measurement and evaluation in education, tools & techniques of assessment, modern trends in evaluation etc. The course also involves understanding the concept and need of educational technology, system approach, programmed learning, need of educational management & need of educational as well as manpower planning

6th Semester: Paper H7—Basics of Educational Research & Statistics, Paper H8—Educational Theories & Ideas of Great Educators

On completion of this course the students shall be able to know-- the scope of research in education, identify types of research in education, basic statistics & their uses, inferential data analysis. Students shall be able to know the Educational theories and ideas of Great Educators and their contributions in modern education.

BAG (Education)

Programme outcome

1st Semester: Paper 1—Education and Society

Basically the programme helps the students to understand the concept of education, education as a social process, appreciate the importance of education for social change. The programme helps the students to understand the different dimensions of education --principles of curriculum construction, agencies of education and current issues relating to education.

2nd Semester: Paper 2—Educational Psychology

The course involves understanding the meaning and different perspectives of psychology and different theories of intelligence, learning, personality and nature of creativity. Students will acquire the knowledge of understanding human psychology from childhood to adulthood and they will also acquire the knowledge of application educational psychology in teaching learning process

3rd Semester: Paper 3---History of Education in India

It develops an understanding of evolution of the education system in India. The recommendations of the different Education Commissions are included in the course.

4th Semester: Paper 4---Measurement, Evaluation and Statistics in Education



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It develops an understanding of concept of measurement and evaluation, techniques of different measuring tools & techniques involved in measurement and evaluation. Students will also equipped with the fundamental of statistics and develop the competency in solving various statistical problems.

5th Semester: Paper 5—Thoughts and Ideas of Great Educators

On completion of this course Students shall be able to know the Educational theories and ideas of Great Educators and their contributions in modern education.

Programme Specific Outcome

The course prepares students for higher studies in Education and Psychology. It equips students for various avenues like research, teaching, competitive examinations, another career option can be that of an educational writer for journals, magazines, websites, one can take up various job types like tutor, camp organizer, part-time consultants in related fields etc.

Course Outcome

This programme will give students the opportunity to constantly challenge and push them in order to continuously improve themselves. Students will develop advanced critical thinking skills, inclusive of information literacy. Students will develop teaching attitude, students will build and maintain relationship to develop values. Students will also gain a reasonable knowledge in psychology.



Department of Hindi

BAH and BAG (HINDI)

Programme Outcome

The under Graduate Programme in Hindi deals mostly with Hindi literature and its history. Students gained knowledge about the various forms of prose. They gained knowledge relation between the socio cultural condition of a society . They gained basic knowledge of Hindi Grammar and literature. They learnt development of effective communication skills in Hindi.

Course Outcome

Paper Name : Hindi Sahitya ka Itihas, paper – I, 1st semester(Honours)

- 1.On completion of the course students are able to understand the Adikal and importance and basis of the names given to each period of Hindi.
- 2.Understand the features of Bhaktikal, in context of socio cultural and political condition of the period.
3. Understanding the features of Ritikal, in context of socio cultural and political condition of the period.
4. Understanding the feature of Adhunik kal, in context of socio cultural and political condition of that period.

Paper Name : Madhyakalin Hindi Kavya, Paper – III, 3rd semester (honours)

On completion of the course students are able to understand the development of madhyakalin Hindi Kavya, and describing the progressive nature of sant Kabir Das and his writings.

Understanding the role played by the poets of Bhaktikal in literature and society, and the Krishna leela poetry of Soordas and Mira Bai by relating it with his philosophy of his life.

Describing the Rama bhakti poetry of Tulsidas along with the philosophy of bhakti kal.

Describing the poems of Bihari and Ghananad in context with his experience of life.

Paper Name: Prayojanmulak Hindi, Paper –V, 6th semester (Honours)

- 1.Understanding the meaning, concept, various forms and importance of Functional Hindi.
2. Understanding the various forms Language – National language, Official language and Official Language Acts of 1963, 1968 and 1976.
3. Understanding various forms of writing in media.
4. Understanding the importance of translation.

Paper Name : Bhasha vigan aur Hindi Bhasha ka Itihas, paper – VI, 6th semester (Honours)

Understanding the concepts of linguistic.

Understanding the importance of linguistic

Understanding the origin of Hindi language and its literature and different forms of Hindi dialect.

Understanding the origin and development of Devanagari Lipi.

Paper Name : Hindi Sahitya ka Itihas , paper – I, 1st Semester (General)

Understand the Concept of History of Hindi literature of beginning period, importance and basic of names given to each period of Hindi.

Understanding the features of bhaktikal and meaning, concept, socio cultural, political condition of Nirguna Kavya Dhara.

Understanding the meaning, concept and socio cultural, political condition of Sagun Kavya Dhara.

Understanding the meaning, concept and cultural, political condition of Ritikal.

Paper Name : Hindi Gadya Sahitya, paper – III, 3rd Semester (General)

To understanding the concept and development of Hindi Novel and characters in Tyagpatra Novel.

Understanding the meaning, concept and development of Hindi one act play.

Understanding the meaning, concept and development of Hindi essay.

Understanding the concept and development of Hindi short stories of modern era.

Paper Name : Hindi Kavya, paper – V, 5th Semester (General)

Understanding the medieval period Nirgun poets Kabira Das and Jayesi poems and their philosophy.



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Understanding the medieval period Sagun poets Soordas and Tulsidas poems and their life of philosophy.

Understanding the Hindi poet Bhartendu Harishchandra and Maithilisaran Gupta's poems and their life of philosophy.

Understanding the Hindi poet Sumitranandan Pant and Nagarjuna's poems and their philosophy of life.

Program Specific Outcome

To understand the basic, concept and origin subject of Hindi language and literature.

To know about Hindi literature its roots cause perspectives and methods.

To understanding its philosophical methods of Hindi literature.

To enriched Hindi vocabulary.

To understand evaluate Hindi literature from past to present.

To spread the knowledge of our National language to others.

To make the students to the real world situation with the help of poems and stories.



Department of History

BAH and BAG (HISTORY)

Programme Outcome

The entire program deals with the disciplines which are very effective for the students. It enhances the power to think critically. From this program students learn the rich tradition of their country. The society, economy, cultural life reveal from this syllabus. This syllabus helps the students to find the meaning of patriotism, tradition, sacrifice etc.

Program specific outcome

To give a specific knowledge about the history of India. Archaeology and other ancillary disciplines are also included in this program as without the sources history study will be in effective. Along with the political history socio-economic cultural histories are also included in the program to provide a total knowledge to the students. A specific knowledge about the world history is also provided. The course prepared the students for higher studies in history, archaeology museology, cultural studies, mass communication and for any competitive examination including civil service exam.

Course Outcome

The under graduate courses in history comprises of Ancient, Mediaeval and Modern Indian history as well as history of different countries.

Semester 1 honours• It comprises Ancient Indian history and culture. The course started from pre-history up to Harshabardhan. This area is effective for students as this area increases the knowledge about socio economic life of early India.

Semester 2 honours• Early mediaeval India is the topic of this paper which consist religious, socio economic life as well as literature art architecture etc.

Semester 3 honours• Mediaeval Indian history is the matter of this paper which gives a sound knowledge about the transition of India along with political socio economic and cultural life of the country.

Semester 4 honours• Rule of British India and nationalist movement are the topics of this paper. From this paper the students acquire a sound knowledge about the sacrifice and tradition of the ancestors of our country.

Semester 5 honours• There are two papers in this semester. These papers of this semester deal with history of Europe. Students get a perfect knowledge about this continent.

Semester 6 honours• History of Tripura, Assam as well as other states of North East India is the content of the paper seven. To know own state as well as neighbor states is essential for the students. So this paper includes the history of North East India. Knowing the history of the struggle of Far East such as China and Japan is effective for the students. So in the 8th paper the history of this region is included.

Semester 1 General• This paper of history consist the history of Early India. Political, social, economic, cultural history are the topic of this paper.

Semester 2 General• Mediaeval Indian history is the main topic of this paper. The Sultanate period and the Mughal period are given here.

Semester 3 General• History of India under British rule along with the history of education, religion, culture is the topic of the paper.

Semester 4 General• History of Tripura and Assam is the subject matter of this paper. From this paper students came to know about their own region and the neighbor.

Semester 5 General• History of Europe and world is the topic of this paper. Without knowing the history of different culture no lesson can be fulfilled. So history of world is essential to enhance the knowledge of a student.



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Semester 6 General • In this semester the students learn how to write a paper. To know writing by their own is essential for a student.



Department of Kokborok

BAG (KOKBOROK)

Programme Outcome

The Under Graduate programme in Kokborok is all written in Kokborok the the second language of tripura state. Students gained knowledge about kokborok literature, kokborok language and its History. They gained knowledge about Social, Economics, Religion and political condition and values of the the society. They learnt development of effective communication skills in Kokborok. **Programme Specific Outcome**

Outcome

1st semester , Paper- History of kokborok language and literature

1. Undersanding the historical development of Kokborok and its Genetic classification, its relation with other sino-tibetan language family for e.g. Bodo,Garo ect.
2. Undersanding the development of Kokborok Phonology, Morphology & Vocabulary historical developments .
3. Undersanding history of Kokborok poetry development its also about folksongs, Rhymes, Lullabies ect.
4. Undersanding Kokborok history of Pros and Drama development.

2nd semester & 5th paper, Paper- Kokborok Poetry Poems of four poet in every unit,tells about four different period . Its help to understand different genre of kokborok poems, romantic, socio cultural, conflict of modren society ect.

3rd semester, paper- Kokborok Grammar, Translation and Transcription Undersanding Kokborok Phonology and Morphology, it's about how Kokborok language is different from other languages and relation between other sino-tibetan language group. In this semester, basic concept of Transcription and Translation also taught.

4th semster, Novel, Drama, short stories and Literary essay In this semester concept of kokborok novel, drama, short storiea and literature are tought, ability to understand the development of kokborok textual study, differentiation and departure points of hindi kokborok Novels, short stories.

Course Outcome

To prpare and motivate students for research studies in kokborok language and literature, To motivate students to pursue higher degrees. To encourage the students for original thinking , decision making in any field of life.



Department of Music

BAG (Music)

Course Outcome

1. Understand, apply, and integrate foundational concepts of musical study in theory, aural skills, history, composition, improvisation, and keyboard competency, and do so independently and cooperatively.
2. Demonstrate the ability to learn independently, make inquiries, think critically, discover solutions, and integrate knowledge across both similar and varied areas of musical study.
3. Develop and demonstrate effective communication skills, including artistic self-expression, with diverse audiences through multiple media.
4. Acquire a basic understanding of diverse musical systems and traditions across the world, and develop a sensitivity to and awareness of cultural and societal differences, and their contribution to an interdependent global consciousness.
5. Acquire an understanding of professional and ethical responsibility as musicians and citizens, and demonstrate the ability to work professionally and effectively as leaders and collaborators.
6. Acquire a basic understanding of technology and professional skills, along with knowledge of specific technological developments within area of specialization.
7. Appreciate how music interacts in communities to enhance and engage social and cultural identities to enrich lifelong learning.



Department of Philosophy

BAH and BAG (Philosophy)

Programme Outcome

The bachelor program in Philosophy deals with the study of Greek Philosophy, Indian and Western Philosophy and Ethics, Psychology, Philosophy of Religion- theory, origin and development, Epistemology and Metaphysics, Social and Political Philosophy and Logic.

Programme Specific Outcome

The programme develops introspective thinking and analytical abilities of the students. At the end of the course students opt for higher studies in Philosophy. Students are expected to be acquainted with Classical, Medieval and Modern Philosophers and their writings. The program consists of Classical, Medieval and Modern Philosophies both Indian and Western. So i) after completion of philosophy study, students will be able to demonstrate improvement in critical thinking skills. ii) After completion of philosophy study, students will be able to demonstrate improvement in their understanding of the major approaches to ethics and their application to contemporary moral problems in society. Moreover the programme would help them to develop in the following sectors-

Critical Thinking:- Students will demonstrate creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information.

Communication:- Students will effectively develop, interpret and express ideas through written, oral and visual communication.

Social Responsibility:- Students will demonstrate intercultural competence, knowledge of civic responsibility and the ability to engage effectively in regional, national, and global communities.

Personal Responsibility:- Students will relate choices, actions and consequences to ethical decision-making.

Course Outcome

Semester-I (Paper-I)

Indian Philosophy

Unit-1 : Carvaka school: Epistemology, Metaphysics and Ethics. Jainism: Concepts of jiva, ajiva, Anekantavada, Syadvada and Nayavada, Bondage and Liberation and Ethical views. Buddhism:

Theory of Dependent Origination, Four Noble Truths, Doctrine of Momentariness, Theory of No-Soul, Four school of Buddhism: Vaibhasika, Soutrantika, Yogacara and Madhyamika.

Unit-II: Nyaya: Theory of pramanas, The individual self and its liberation, The idea of God and proofs for its existence. Vaisesika: Padarthas: Dravya, Karma, Samanya, Visesa, Samavaya and Paramanuvada.

Unit-III: Samkhya: Satkaryavada, Prakriti-its constituents, evolutes and arguments for its existence, Purusa- arguments for its existence, Plurality of Purusas. Yoga:Citta and Citta vritti, eightfold path, God. Purva Mimansa: The debates between Kumarila and Prabhakara about Anupalabdhi, Abhava, Arthapatti and Pramanyavada.

Unit-IV: Sankara: Nirguna Brahman, Maya, Three grades of Satta, Jiva, Jagat, Jivanmukti-Videhamukti. Ramanuja: Saguna Brahman, Refutation of Sankara's doctrine of Maya, Jiva, Jagat, Rejection of Jivanmukti.

After successful completion of this course the students can know

1. About the difference between the Heterodox and orthodox Schools in detail.
2. About the nature of soul, nature and source of valid knowledge in Indian Standpoint.
3. about the material and efficient cause of the world.
4. About the nature of world, relation between Brahman/God and the world.
5. About bondage and ways for obtaining liberation.

Semester II (Paper-II)

History of Western Philosophy



Unit-I: Plato: Theory of knowledge (episteme) and opinion (doxa), Theory of Forms. Aristotle: Critique of Plato's theory of Forms, Theory of Causation, Form and Matter, Potentiality and Actuality.

Unit-II: Descartes: Method and need for Method in philosophy, Method of doubt: Cogito Ergo Sum, types of Ideas, mind and matter, mind- body interactionism, God: nature and proofs for His existence. Spinoza: Substance, attributes and modes, the concept of 'God or Nature', Pantheism, mind-body problem, three orders of knowledge. Leibnitz: Monadology, doctrine of pre-established harmony, truths of reason and truths of facts, innateness of all ideas, principles of non-contradiction, Sufficient reason and identity of the indiscernible.

Unit-III: Locke: Ideas and their classification, refutation of innate ideas, knowledge and its grades, substance, qualities. Berkeley: Rejection of abstract ideas, rejection of the distinction between primary and secondary qualities, immaterialism, esse est percipi. Hume: Impressions and ideas, judgements concerning relations of ideas and matters of fact, causality, scepticism.

Unit-IV: Kant: Conception of critical philosophy, classification of judgements: analytic synthetic, apriori, aposteriori, possibility of synthetic apriori judgements, the forms of sensibility (space and time), categories of the understanding, the metaphysical deduction of categories, phenomena and noumena.

After the successful completion of this course the student can know

1. About the nature and source of idea and knowledge in the standpoint of ancient and modern Western Philosophy.
2. About the nature of God from the different Western thinkers.
3. About the relation between human Mind and Body.
4. About in detail quality and Substance.
5. About various kinds of judgement.

Semester III (Paper-III)

Psychology and Socio-Political Philosophy

Unit-I: Nature and scope of Psychology, Methods of psychology- Introspection, Extrospection and Experimental Methods, Levels of Mind, Behaviourism.

Unit-II: Memory: Factors of memory, Marks of good memory and forgetfulness. Learning: Theories of Learning, Trail and error theory of Thorndike, Thorndike's Laws of Learning, Gestalt theory of Learning, Pavlov's Conditioned Response theory. iii) Freud's theory of Dreams.

Unit-III: Basic concepts: Society, Social Group, Community, Association, Institution, Laws and customs. The major social codes: Customs and Law. Relation between individual and society (Individualism and Socialism).

Unit-IV: Political Ideas: Democracy and its different forms, Socialism-Utopian and Scientific Socialism of Marx, Gandhi's conception of Sarvodaya, Non-Violence and Trusteeship.

After successful completion of this course the student can know

1. about the nature and scope of mind, various levels of mind.
2. about the way for knowing own's and others mind.
3. about memory and causes of forgetfulness.
4. regarding the nature and scope of Social Philosophy and Political Philosophy.
5. about some basic socio-political concepts including society, community, association, custom, law, political ideas etc.
6. This course is designed to develop interest among the students about the contemporary social issues and concerns.

Semester IV (Paper-IV)

Western Logic: Introduction to Logic: I.M.Copi

Unit-I: Chapter-5: Categorical Propositions: Categorical Propositions and classes, Quality, Quantity and Distribution, The Traditional Square of Opposition, Further Immediate Inferences, Existential Import, Symbolism and Diagrams for Categorical Propositions



Unit-II: Chapter-6: Categorical Syllogism: Standard-Form of Categorical syllogism, The Formal nature of Syllogistic argument, Venn Diagram technique for testing Syllogism, Rules and Fallacies

Unit- III: Chapter- 8: Symbolic Logic: The value of special symbols, symbol for Conjunction, Negation, and Disjunction, Conditional statements and Material Implication, Argument Form and Argument, Statement Form, Material equivalence and logical equivalence.

Chapter- 9: Method of Deduction: Formal proof of validity, Rule of Replacement, Proof of validity and Inconsistency

Chapter- 10: Quantification theory Singular propositions, Quantification, Traditional subject-predicate propositions, Proving validity, Proving Invalidity, Asyllogistic Inference

Unit-IV: Chapter-11: Analogy and Probable Inference: Argument by Analogy, Appraising Analogical Arguments

Chapter-12: Causal connections: Mill's methods of Experimental Inquiry: Meaning of cause, Mill's Methods, Criticisms of Mill's Methods, Vindications of Mill's Methods.

Program Outcome

1. This paper gives the primary concepts of logic and arguments-both deductive and inductive. Syllogistic arguments, rules and fallacies, Venn diagram.
2. It helps the student to know about the methods of deduction and to prove the validity and invalidity of arguments.
3. It has both theoretical and practical content. It helps to develop reasoning ability and an analytic outlook towards various life situations.
4. This course helps the student to learn logical analysis, deduction and develop a rational bend of mind.

Semester V (Paper-V)

Indian Logic- Tarkasamgraha with Dipika: Annambhatta

Unit-I:- Buddha, Anuvyavasaya, smrti, Anubhava- Yathartha and Ayathartha

Unit-II:- Kāraṇa, Karana, Anyathasiddha, Different kinds of Kāraṇa, Pratyakṣa, Sannikarsa

Unit-III:- Anumiti, paramarsa, Paksata, Vyapti, Svarthanumiti and Pararthanumiti, Linga, Hetvabhāsa.

Unit-IV:- Sabda, sakti, Laksana, Pramanyavada, Upamiti etc

Course Outcome

1. This paper offers the students a textual reading of the Sanskrit text Tarkasamgraha of Annamdhatta.
2. With the help of dīpikā, students will penetrate into the arena of Indian logic and gather the concepts of pramana, prama, jnana, buddhi, smrti, karana, hetvabhāsa etc.
3. Also it helps to develop reasoning and thinking ability to the students.

Semester V (Paper-VI)

Contemporary Western Philosophy

Unit-I:-John Hospers- An Introduction to Philosophical Analysis- Ch- I

Unit-II:-John Hospers- An Introduction to Philosophical Analysis- Ch- II

Unit-III:- Positivism

Unit-IV:- Existentialism

On successful completion of the course the students can

1. Identify in detail the ideal language and ordinary language, word-meaning, sentence meaning.
2. Understand concept and image, truth and knowledge
3. Understand the verification theory of meaning of logical positivists.
4. Identify in detail the main feature of existentialism, Being and concept of freedom.

Semester VI (Paper-VII)

Ethics and Philosophy of Religion

Unit-I:- Western Ethics- Nature and scope of Moral Judgement, Moral standard- Hedonism, perfectionism, regorism



Unit-II:- Applied Ethics:- Environmental ethics, Professional ethics- educational, medical, management ethics

Unit-III:- Philosophy of Religion- Origin of religion, Theistic and atheistic theories of God, National and universal religion

Unit-IV:- S. Vivekananda (Jnanayoga)- Conception of God, Maya, God in everything, The Ideal of universal religion. This course introduces ethical principles and concept which develops moral thinking. It also provides the idea of religion.

On successful completion of the course the student can know

1. about the nature and subject matter of Ethics, real moral standard of human being.
2. about in detail Environmental and Professional ethics.
3. about the nature as well as scope and origin of philosophy of religion. Philosophy of religion is rational thought about religious issues and concern without a presumption of the existence of religion and religious beliefs.
4. about God and his relation to the world and man.-deism, pantheism and theism, pantheism.
5. About National and Universal religion and Ideal of universal religion.

Semester VI (Paper-VII)

Special Texts (Indian and Western)

Unit-I:- The Bhagavat Gita-Karmayoga, Jnanayoga, Karma-Sannyas yoga

Unit-II:- The Bhagavat Gita- Abhyas yoga, Jnana-Vijnana yoga, Bhakti yoga

Unit-III:- Russell- The Problems of Philosophy- Ch-5,8,11

Unit-IV:- Russell- The Problems of Philosophy- Ch-12, 13, 14

The Gita is the corner stone of Indian Philosophy. The course is an in-depth analysis of the basic concept of karmayoga, jnanayoga, bhaktiyoga etc. Metaphysics of Gita has deep ethical significance and it provides a way transcendental life. It knows the main duty of a human being is performing one's own duty. Learning of the message of Gita is the outcome of the course.

Russell's philosophy shows various problems of philosophy and how these problems can be solved, after completion of this course students can understand by depth thinking.

Semester VI

Project

The outcome of this course is to make students to write and contemplate on some basic themes and thinkers of philosophy. This will provide a preparatory ground for research in Philosophy.

Syllabus & Course Outcome of Philosophy (General)

Semester I (General)

Epistemology and Metaphysics (Indian and Western)

Unit-I: Carvaka (Perception, Refutation of Inference and other Pramanas). Nyaya (Perception: Nature Definition and Classification, Sannikarsa, Laukika and Alaukika Pratyksa).

Unit-II: Vaisesika Metaphysics (Padarthas: Samanya, Visesa, Samavaya, Abhava, Paramanuvada)

Unit-III: Western Epistemology: Theories of Knowledge: (Empiricism, Rationalism and Criticism), Theories of Truth: (Correspondence, Coherence and Pragmatic).

Unit-IV: Western Metaphysics: Idealism (Subjective and Objective): Realism (Naïve Realism and Representative Realism), Substance (Empiricist and Rationalist view), Causality (Entailment theory and Regularity theory).

Outcomes of this course are

1. The students improve knowledge about the Carvaka and Nyaya theory of the knowledge, Vaisesika concept of padhartha or category, about the material and efficient cause of the world.
4. Students understand about the ways of real knowledge and truth can difference idealism and realism etc.



Semester II (General)

Logic Indian (Nyaya Darsan) and Western

Unit-I: Nature of Inference, Paksa, Sadhya, Hetu, Paramarsa, Vyapti, Vyaptigraha, Svartha-anumiti, Kevalanvayi, Kevala vyateriki and Anvayi-vyateriki hetu. Paratha

Unit-II: Hetvabhasa- Definitions and kinds.

Unit-III: Introduction to Logic: I.M. Copi- Chapter-5 : Categorical propositions

(i) Categorical Propositions and Classes (ii) Quality, Quantity and Distribution

(iii) The Traditional Square of Opposition (iv) Further Immediate Inferences

(v) Existential Import (vi) Symbolism And Diagrams For Categorical Propositions.

Unit-IV: Introduction To Logic: I.M. Copi- Chapter-6: Categorical Syllogisms

(i) Standard-Form Categorical Syllogism

(ii) The Formal nature of Syllogistic Argument

(iii) Venn Diagram Technique for testing Syllogism

(iv) Rules and Fallacies.

Chapter-11: Analogy and Probable Inference

(i) Argument by Analogy,

(ii) Appraising Analogical Arguments.

Chapter-12: Mill's Methods- (i) Agreement, (ii) Difference, (iii) Concomitant Variation.

On successful completion of the course the students can know

1. Basic concept of inference and hetvabhasa, which helps the student to learn logical analysis.
2. This course includes the primary concepts of logic and arguments-both deductive and inductive Syllogistic arguments, rules and fallacies, Venn diagram, the methods of experimental enquiry of Mill etc. It helps to develop reasoning ability and an analytic outlook towards various life situations.

Semester III (General)

Ethics (Indian and Western)

Unit- I: Indian Ethics: Purusarthas and their inter-relations, Purusartha Sadhana, Law of Karma, Carvaka Ethics.

Unit-II: Indian Ethics: Buddhist Ethics, The Four Noble Truths, Jaina Ethics: Anuvrata, Mahabrata, Triratna.

Unit-III: Western Ethics: Nature and scope, Voluntary and Non-voluntary actions, Moral Judgements, Postulates of Moral Judgements, Objects of Moral Judgements.

Unit-IV: Western Ethics: Theories of Moral Standard (Hedonism, Rigorism of Kant, Perfection).

Practical Ethics: Rights and Human Rights: Their Characteristics (Racism, Castecism), Feminism (Radical and Spiritual), Environmental Ethics.

This course introduces ethical principles and concept which develops moral thinking of the students. Moreover, students can know

1. about the ultimate goal of human being.
2. about the causes of suffering and how one can obtain liberation or nirvana from these sufferings.
3. about the nature and subject matter of Ethics, real moral standard of human being..
4. about Rights and duties.

Semester IV (General)

Philosophy of Mind and Socio-Religious Philosophy

Unit- I: Psychology: Nature and scope of Psychology, Psychological Methods (Introspection, Extrospection, perception).

Unit- II: Psychology: Memory, Dream, levels of mind (Conscious, Unconscious, Sub-conscious), Learning (Theory of Insight & Trial and error theory).

Unit -III: i) Philosophy of Religion: Theories of the Origin of Religion (Anthropological & Psychological), Tribal, National and Universal Religion.



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Unit-IV: Social Philosophy: Basic concepts: Society, Social Group, Community, Association, Institution, Law and custom. Relation between individual and society (Individualism and Socialism).

After successful completion of this course the student can know

1. about the nature and scope of psychology, various levels of mind.
2. about the way for knowing own's and others mind.
3. about memory and causes of forgetfulness, about learning process.
4. about the nature as well as scope and origin of philosophy of religion.
5. About National and Universal religion and Ideal of universal religion.
6. About the nature and scope of Social Philosophy. About some basic socio-political concepts including society, community, association, custom, law, political ideas etc.

Semester V (General)

Contemporary Indian Philosophy

Unit-I:-Swami Vivekananda- Karmayoga

Unit-II:- Swami Vivekananda- Jnanayoga

Unit-III:- Dr. B.R. Ambedkar- social justice, Anihilation of caste

Unit-IV:- Dr. B.R. Ambedkar- Gandhian Ambedkar, Untouchables

After successful completion of this course the student can know

1. About Swami Vivekananda's concept of duty
2. About The real nature of man and the ideal of Universal Religion.
3. About social justice, untouchability views of Ambedkar and Gandhiji.

Semester VI (General)

Project

The outcome of this course is to make students to write and contemplate on some basic themes and thinkers of philosophy. This will provide a preparatory ground for research in Philosophy.



Department of Physical Education

BAG (PHYSICAL EDUCATION)

Programme Outcome

1. 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.
2. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
3. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
4. Effective Citizenship: Demonstrate empathetic social concern and equity-centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
5. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
6. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
7. Self-directed and Life-long Learning: Acquire the ability to engage in independent and lifelong learning in the broadest context of socio-technological changes.

Programme Specific Outcome

1. Students will acquire a comprehensive knowledge and sound understanding of fundamentals of Physical Education.
 2. Students will develop practical, theoretical skills in Physical Education.
 3. Students will be prepared to acquire a range of general skills, to specific skills to communicate with society effectively and learn independently.
 4. Students will acquire a job efficiently in diverse fields such as B.P. Ed, M.P. Ed, SSC, NET, SET etc.
- Course Outcomes After completion of this course, students will apply the knowledge of physical education, growth education, in the professional world and development of play, sports and games knowledge, history of physical education and use an understanding of history of yoga, and other ashtanga yoga to effectively know about yoga in job-oriented examinations for Physical education students. Completion of this course will enable the students to know the basics of anatomy, physiology, exercise physiology, musculo-skeletal system, circulatory system, respiratory system. Students will learn health education, personal hygiene, health problems prevention and control, physical fitness and wellness and first-aid-management.

Course Outcome

SEMESTER-I: The completion of this course will enable the learners to:

1. Know the meaning, aims, objectives, nature & scope of Physical Education and its origin and development in India.
2. Analyse the concepts and issues pertaining to Physical Education.
3. Formulate the principles, philosophy and concepts about Physical Education.
4. Understand the concept and issues concerning Health Education.
5. Identify as well as help them to prevent and control several communicable diseases like Malaria, Cholera, Hepatitis, Common Cold, Tuberculosis, Rabies, HIV/AIDS.
6. Be aware of the significance of First Aid and apply the knowledge to practical situation.



7. Understand the basic principles of Anatomy & Physiology and apply the knowledge of skeletal system, muscular system, circulatory system and digestive system in the field of physical education and movement activity.
8. Appraise the effects of health condition during the training and practical sessions.
9. Understand the principles and process of Administration and Management.
10. Know sports management and employ principles of strategic planning, and financial and human resource management.
11. Develop critical thinking in analysing sports management issues and in managerial planning and decision making.

SEMESTER-II: The completion of this course will enable the learners to:

1. Understand the necessity and importance of Physical Education.
2. Be informed about the basic schools of Philosophy like Idealism, Naturalism, Realism and Pragmatism.
3. Have better concept of Somatotype, chronological age and BMI.
4. Understand the Educational and cultural values of Olympic movement.
5. Comprehend the Modern Olympic Games and Rules of Eligibility for Competition.
6. Analyse the Achievement of India in Team Games and Individual Sports.
7. Enhance their knowledge of Respiratory system, nervous system, endocrine system and excretory system and apply the same for higher level of sports achievements and adopt training method.
8. Understand the rules of the games and sports and enable to mark Track and Field and Officiate as well as give seeding and Heats in Track and Field & Combined Events.
9. Understand the basic Concepts of Yoga and apply the principles of Yoga to live healthy and active life style.
10. Promote the awareness of health through yoga.
11. Analyse the techniques of body posture to bring out healthy change.

COURSE OUTCOMES OF SEMESTER-III: The completion of this course will enable the learners to:

1. Understand the necessity and importance of sports psychology in physical education.
2. Reflect upon motivational psychology as applied to sports activities.
3. Demonstrate the ability to discuss sociological theories, concepts, and ideas in large and small groups and to express empirically as well as theoretically-based opinions.
4. Understand the meaning and importance of physiology of exercise.
5. Analyse the effect of exercise and training over muscular system, cardiovascular system and respiratory system.
6. Appraise the effects during the training and practical sessions
7. Apply the knowledge in the field of physical education and movement activity.
8. Have conceptual and experiential learning about track and field events, gymnastics and ball games.

SEMESTER-IV: The completion of this course will enable the learners to:

1. Understand the basic principles of Sports training.
2. Apprise the issues of Physical fitness, types of load training, training method, concept of Warming up, cooling down and conditioning.
3. Understand training as performance-based science
4. Prepare training schedule for various sports and games
5. Appraise types of periodization for performance development
6. Understand the core concept, importance and scope of fitness and wellness.
7. Have awareness of physical activity and its benefits on healthy living.
8. Create consensus as well as prevent and tackle modern lifestyle and hypokinetic diseases.
9. Gain knowledge about issues regarding Obesity.
10. Gather practical knowledge of field events, Indian games, Cricket/Hockey and ball games.

SEMESTER-V: The completion of this course will enable the learners to:

1. Absorb knowledge about the therapeutic aspects of Physical Education.



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2. Assess the need and importance of studying sports injury, prevention and care of laceration, blisters, contusion, strain, sprain, fracture, dislocation, cramps, haemorrhage.
3. Acquire knowledge about the several aspects of therapeutic exercise.
4. Understand various therapies like cry therapy, thermo therapy, contrast bath, whirlpool bath, steam bath, sauna bath, hot water fomentation and massage.
5. Understand the basics of Test, Measurement and Evaluation in physical education, Health and Fitness.
6. Analyse the criteria of a good test.
7. Know about the different types of tests for different sports and games.
8. Analyze the performance and movements in the field of sports.
9. Evaluate the battery test and others tests prescribed by the government efficiently.
10. Possess basic skills and rules of play regarding games like badminton/table tennis/lawn tennis. 11. Demonstrate basic techniques and ways of performing Pranayam, Meditation and Kriya.
12. Provide first aid procedures for practical situations



Department of Political Science

BAH and BAG (Political Science)

Programme Outcome

Completion of the bachelor programme in Political Science leads a significant thrust on the knowledge of Indian Constitution, Indian Politics and Government, Public Administration and International Relations. It also requires students to study the constitutions of China, Switzerland, United Kingdom and America. The course includes Sociology, Women and Politics, Western and Indian Political Thinkers and Human Rights.

Programme Specific Outcome

The programme familiarizes the students with different approaches to the study of politics and orients them on contemporary political problems and behaviour thus enabling them to formulate a general idea on political phenomena. It also helps them to comprehend the basic structure and processes of government systems. The programme prepares students for pursuing higher education in Political Science. It orients students towards national and state level competitive examinations like APSC, UPSC, etc. Many students also pursue courses in Law.

Course Outcome

The Course outlines of the discipline of Political Science are divergent and contemporary. The course completion results the study of the different concept of political theory and comparative politics. It also study the concept of different political systems , Indian Government and politics, knowledge about Indian constitution, theories of International relations, concept of interrelations among the states and its impact, legislative practices and procedures , human rights, social movements in contemporary India , basic theories of public administration and local governance.



Department of Sanskrit

Programme outcome

Students will be awarded the B.A. Sanskrit Honours degree after successful completion of the three years/six semesters of studying Sanskrit language and literature as a major or general subject. Thus it will make the students eligible for higher study and jobs.

Programme specific Outcome

Academic Proficiency: this programme will make students skilled in reading, writing and speaking the Sanskrit language, and enhance their understanding of the Sanskrit language and literature. Also inspiring for the students to undertake higher study on Sanskrit language and literature.

Social Competency: It will inculcate ethical values, sense of social responsibility and enhance the capacity of the art of living in the society in harmony with all stakeholders.

Employability: It will make the students employable specifically for the jobs related to the subject Sanskrit.

COURSE OUTCOME: BAH (Sanskrit)

SEMESTER – I	
Paper – I (Unit-I – II) Grammar	This course is intended to strengthen the basics of Sanskrit language through the knowledge of elementary knowledge of grammar like Alphabets, Mahesvara sutra, Subanta, Tinanta, Sandhi, Pratyaya etc.
Paper – I (Unit III – IV) Ethics	It will enhance the knowledge of ethics and importance of ethical behaviour in human life through reading of ancient Indian ethical texts like Hitopadesa and Manusamhita.
SEMESTER – II	
Paper – II (Unit - I) Grammar	This will enhance the knowledge on Sanskrit grammar, make the student better in understanding the Sanskrit language and skilled in reading, writing, speaking the language.
Paper – II (Unit - II) Metrics	It will develop the understanding of Sanskrit prosody by the study of different Meters from the text Chandomanjari of Gangadasa, and make the students capable in composition of poetry in Sanskrit language.
Paper – II (Unit – III - IV) Drama	It will enhance the understanding of Sanskrit drama and through study of the famous Abhijnanasakuntalam of Kalidasa.
SEMESTER - III	
Paper – III (Unit –I) Prose	It will make the students acquainted with the prose literature in Sanskrit language and inculcate morals values through study of the text Kadambari (sukanasopadesa) of Vana.
Paper – III (Unit –II & III) Poetry	This gives better understanding of poetry (Kavya) in Sanskrit literature through Bharavi's Kiratarjuniyam and Bhatti's Ravanavadha.



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Paper – III(Unit –IV) Polity	Students get knowledge on various aspects of ancient Indian administration and their relevance in modern time by reading the Vinayadhikarana of the famous Arthashastra of Kautilya.
SEMESTER - IV	
Paper – IV (Unit – I) Drama	Though this student can identify, understand and analyse different distinct characteristics of Sanskrit Drama in general and Svapnavasavadattam of Bhasa in special.
Paper – IV (Unit – II) History of Classical Sanskrit Literature	Students get knowledge on various texts, viz. Ramayana, Mahabharata and Purana; origin and growth of different style of literary compositions, viz. drama, prose, poetry, fable etc.; and life and works of various famous authors and their works of classical Sanskrit literature.
Paper – IV (Unit – III) History of Ancient Indian Science and Medicine	It will make the students aware about famous scientific literatures pertaining to the field of medicine, astronomy, mathematics and their authors, viz. Caraka, Susruta, Jivaka, Varahamihira, Aryabhatta, Bhoja etc.
Paper – IV (Unit – IV) History of Modern Sanskrit Literature	Students will be conversant with the current and contemporary tradition of Sanskrit literature, i.e. modern Sanskrit literature, and will have brief idea about some selected authors and their contributions to modern Sanskrit literature. As a result they may also make an attempt to create their own literary creation in Sanskrit language.
SEMESTER - V	
Paper – V (Unit- I) Vedic Selection	Knowledge on various Gods and Goddess of Rig Vedic age is intended to obtain through selected hymns of Rig Veda.
Paper – V (Unit- II) Vedic Grammar & Padapatha	Students will be conversant with various rules of grammar of Sanskrit language pertaining to Vedic age and their distinctiveness from classical Sanskrit grammar.
Paper – V (Unit- III) History of Vedic Literature	Students will come to know about Vedas, Vedangas, Brahmana, Aranyaka, Upanisads etc. And acquire knowledge on Vedic society, Vedic culture and traditions.
Paper – V (Unit- IV) Upanisad	It would quench the thirst of students regarding Indian philosophical knowledge on Nature of Soul, transmigration of soul, way to emancipation through true knowledge etc. by reading the Brihadaranyakopanisad.



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Paper VI (Unit – I) Linguistics	It gives deeper understanding of Sanskrit language through its history and developments, and analysis in comparison with other languages, phonetic laws etc.
Paper VI (Unit – II, III & IV) Grammar	By the study of History of Paniniyan System students will have an insight about the famous grammarians of Sanskrit language of classical period starting from Panini, and have knowledge on some relevant rules for understanding the methodology of Panini in presenting different Sutras in his text Astadhyayi. Also students' knowledge on Sanskrit grammar, especially on Karaka and Samasa, will be strengthened through study of the different rules of relevant sections from the text Vaiyakaranasiddhantakaumudi of Bhattoji Dikshit. By this students' overall understanding of Sanskrit grammar will be strengthened and application of Sanskrit language by them will be refined.
SEMESTER VI	
Paper – VII (Unit – I & II) Poetics (Kavyasastra)	The outcome of this course is to introduce different aspects of poetics, viz. style of composition, types of poets, essentials for composition of poetry etc. through study of the text Kavyalankarasutravritti of Vamana. And students will be well versed with of selected Alankaras through study of the chapter X of Sahityadarpana of Vishwanathkaviraj.
Paper – VII (Unit – III & IV) Dharmasastra	It will make students aware about different social and administrative practices of ancient India and their relevance through study of the Vyavahara-adhyaya of Yajnavalkyasamhita.
Paper – VIII (Unit – I, II, III & IV) Introduction to Indian Philosophy	This course will enhance students' understanding on various schools of Indian philosophy, specially make students aware about different concepts of ancient Indian physics through study of the philosophical text Tarkasangraha of Annambhatta, and intends personality development and self management through study of Samkhyayoga of Bhagavadgeeta and Isopanisad.
Project Work (compulsory)	Students will develop their research aptitude and learn basics of preparing and presenting an research work.
SEMESTER - I	
Paper – I (Unit- I, II & IV) Grammar	Students will be well versed with the basics of Sanskrit grammar and that will enable them to read, write, speak and interpret Sanskrit language properly.



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Paper – I (Unit – III) Ethics	Inculcate human values through study of stories from the text Hitopadesa, and have knowledge on fable literature in Sanskrit language.
SEMESTER - II	
Paper – II (Unit – I) Grammar	Strengthen students' knowledge on Sanskrit grammar to improve the skill of reading, writing and speaking in Sanskrit language.
Paper – II (Unit – II) Metrics	Gives a basic understanding of selected meters from the text Chandomanjari of Gangadasa, and aims at developing the skill of students in the composition of poetry in Sanskrit language.
Paper – II (Unit – III & IV) Drama	It will make the students aware about the dramatic tradition of Sanskrit literature through study of the text Abhijnanasakuntalam of Kalidasa.
SEMESTER - III	
Paper – III (Unit – I) Prose	Give an insight into the tradition of prose writings through the study of Rajavahanacharitam of Dasakumaracharitam of Dandin, that will develop students' skill of prose writing.
Paper – III (Unit – II) Poetry	Through study of the Kiratarjuniyam of Bharavi students will come to know the beauty of Sanskrit poetry and enhance their skill of writing and interpreting Sanskrit poetry.
Paper – III (Unit – III & IV) Dharmasastra	Inculcate moral values and increase students' knowledge on their duties and responsibility in the society by studying the way and means of ancient Indian administration and polity as narrated in the Manusamhita.
SEMESTER - IV	
Paper – IV (Unit – I) History of Vedic literature	
Paper – IV (Unit – II & III) History of Classical Sanskrit literature	Students will gain knowledge about classical Sanskrit literature that includes - Ramayana, Mahabharata, Purana, origin and growth of different types of compositions, viz. Lyrics, Fable, Drama etc., and life and works of various famous authors pertaining to the above mentioned different types compositions in Sanskrit language.
Paper – IV (Unit – IV) History of Modern Sanskrit Literature	Through study of famous authors and their texts pertaining to the ancient Indian science and medicine, and modern Sanskrit literature Students will be inspired to create their own creations in Sanskrit language.
SEMESTER – V	
Paper – V (Unit – I) Veda	
Paper – V (Unit- II) Upanisad & Bhagavadgeeta	Students will get moral and philosophical lessons through study of Srimad Bhagavad Geeta and Isopanisad that will enhance the life management skill.



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Paper - V (Unit - III) Poetics	Knowledge on Alankara through study of the text Sahityadarpana of Viswanathkaviraj will enhance students' skill of poetry composition in Sanskrit language.
Paper - V (Unit - IV) Philology	Study of the history and development of languages, different groups of languages, and various basic rules of linguistics will make students skilled in understanding and interpreting languages, especially the Sanskrit language.
SEMESTER - VI	
Project Work (optional)	



Department of Sociology

BAH and BAG (Sociology)

Programme Outcome

The Sociological knowledge and skills that will enable them to think decisively and creatively about society and social issues. Understanding basic concepts and theoretical viewpoints in Sociology. Developing broad knowledge of the theory and methods of the discipline and in-depth knowledge of a specific topic. Researching and analyzing data through collection of both qualitative and quantitative data collection.

Course Outcome

1st Semester Honours: Basic Concepts in Sociology.

By the end of this course, the students will be able to:

Understand the basic concepts in Sociology.

Understand Culture, Socialization, and Social Control.

Understand the various theoretical perspectives of social stratification.

Understand the concepts of its theories and factors of social change.

2nd Semester Honours: Sociological Thought.

By the end of this course, the students will be able to:

Understand the growth of Sociology and Social Anthropology in India.

Understand the basic ideas and perspectives of Comte, Spencer and Durkheim.

Understand the contributions of Marx, Simmel and Weber.

Understand the major contributions of B. Sarkar, D.P.Mukherjee, G.S.Ghurye and M.N.Srinivas.

3rd Semester Honours: Society in India.

By the end of this course, the students will be able to:

Understand the social institutions like marriage, family, kinship and the declining of joint family system.

Understand the various aspects of Caste and Tribal Societies in India.

Understand the stratification system in India including Caste, Class and Power.

Understand the social change in Modern India especially through the process of Modernization, Westernization and Globalization.

4th Semester Honours: Social Problems in India.

By the end of this course, the students will be able to:

Understand the causes and consequences of Social Problems.

Understand the various social problems like Alcoholism, AIDS, Child Labour, Ethnic Violence, etc.

Understand the causes and strategies of Poverty, Unemployment, Population Explosion, Communalism and Casteism.

Understand the effects and measures of Crime, Juvenile Delinquency, Cyber Crime and Terrorism.

5th Semester Honours, Paper –V: Methodology of Social Research.

By the end of this course, the students will be able to:

Understand the concepts and steps in research.

Understand the quantitative and qualitative research and various techniques of data collection.

Understand the various techniques of Observation, Questionnaire, Interview and Case Study.

Understand the utilities of different types of Sampling and writing research reports.

5th Semester Honours, Paper –VI: Sociological Theory.

By the end of this course, the students will be able to:

Understand the nature, scope and various perspectives in Sociological theories.

Understand Functionalism: the basic ideas and perspectives of R.Brown, Malinowski, Parsons and R.Merton.



Understand Structuralism and Symbolic Interactionism : The basic ideas and perspectives of Levi-Strauss, Cooley and Herbert Mead.

Understand the arguments of Conflict Theory, Exchange Theory, Phenomenology and Ethnomethodology.

6th Semester Honours, Paper-VII: Rural and Urban Sociology.

By the end of this course, the students will be able to:

Understand the scope, importance and subject matter of Rural Sociology.

Understand Rural Social Structure and Stratification and some Rural Development Schemes like CDP, MGNREGA, IRDP and SGSY.

Understand origin, scope and subject matter of Urban Sociology.

Understand the processes and patterns of Urbanization in India.

6th Semester Honours, Paper-VIII: Industrial Sociology.

By the end of this course, the students will be able to:

Understand the origin, nature and scope of Industrial Sociology.

Understand the concepts and features of Post Industrial Society and Industrial organizations.

Understand Labour Management Relations, Participatory and Human Resource Management.

Understand the origin and growth of Trade Union.

Course Outcome: 1st Semester General: Introduction to Sociology.

By the end of this course, the students will be able to:

Understand the concepts in Sociology, its origin, nature and scope.

Understand the relevance of the concepts like Social Control, Socialization and Social Processes.

Understand the institutions and their interactions.

Understand role of Social Stratification and the concepts of theories and factors of Social Change.

2nd Semester General: Foundations of Sociological Thought.

By the end of this course, the students will be able to:

Understand the emergence of Sociology.

Understand the Positivism, Suicide, Ideal types, Class Struggle, Authority, etc.

Understand the major arguments and critiques of Functionalism, Conflict School and Social Action Perspectives.

Understand the growth of Sociology and Social Anthropology in India.

3rd Semester General: Society in India.

By the end of this course, the students will be able to:

Understand the nature and feature of Indian Society.

Understand the problems and upliftment measures of ST, SC and OBC's.

Understand the social mobility in caste system and the changing nature of Family, Kinship and Marriage.

Understand the convergence and ideas related to Indian Society.

4th Semester General: Social Research Methods.

By the end of this course, the students will be able to:

Understand the meaning, scope and significance of Social Research.

Understand the methods and types of Social Research.

Understand the various techniques of Observation, Questionnaire, Interview and Case Study.

Understand the utilities of different types of Sampling and writing research reports.

5th Semester General: Social Problems in India.

By the end of this course, the students will be able to:

Understand the nature, causes and consequences of Social Problems.

Understand the various social problems that prevail in Indian Society like Alcoholism, AIDS, Child Labour, and Corruption.

Understand the causes and consequences of Poverty, Unemployment, Illiteracy, Population Explosion and Problems of Elderly Persons.



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Understand the causes, preventions and effects of Crime, Juvenile Delinquency, Communalism, Casteism and Terrorism.

Programme Specific Outcome

Sociology seeks to understand all aspects of human social behavior, including the behavior of individuals as well as the social dynamics of small groups, large organizations, communities, institutions and entire societies. Sociologists are typically motivated both by the desire to better understand the principles of social life and by the conviction that understanding these principles may aid in the formulation of enlightened and effective social policy. Sociology provides an intellectual background for students considering careers in the profession or business.



Department of Botany

BScH and BScG (Botany)

Program outcome

Botany is the scientific study of plants - how plants functions, what they look like, how they are related to each other, where they grow, how people make use of plants and how plants evolved. Knowledge and understanding of the range of plant diversity, evolution of plant diversity, plant classification role of plants in the functioning of the global ecosystem, statistics as applied to biological data, chromosomal studies. Assimilate knowledge and ideas based on wide reading and through the internet, understanding the evolving state of knowledge in a rapidly developing field. Students learn to carryout practical work, in the field and in the laboratory. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. Interpreting plant morphology and anatomy, taxonomy, physiological experiments, biochemical tests, analyze data using statistical methods, plant pathological studies, identifications, chromosomal studies, pharmacological identification & tests and also workout different types of plants depending on classification. Student learn Industrial Botany also where cultivation process of Mushroom, *Spirulina*, infrastructure of nursery, floriculture included.

Course outcome

A student completing the course is able to understand different branches of Botany, such as Students will be able to access the primary literature, identify relevant works for a particular topic and evaluate the scientific content of these works. Evaluation of ideas and arguments by collection relevant information about the plants, so as recognize the position of plant in the broad classification and phylogenic level. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences and a depth and breadth of knowledge in the field of plant identification. Accurately interpretation of collected information and the use of taxonomical information to evaluate and formulate a position of plant in taxonomy. Students will be able to identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenic framework. Students will be able to compare and contrast the characteristics of plants such as algae, fungi, bryophytes, pteridophytes, gymnosperms & angiosperms. They also able to perform to do bio chemical tests, genetic studies, statistical problems, anatomical structure of plants, Pharmacognostical experiments, Plant pathological tests, Tissue culture method etc.



Department of Chemistry

BSch (Chemistry)

Programme Outcome: The expected outcome of the course is to provide students with the concepts, principles, theories and practical applications of chemistry which facilitate them in pursuing their higher studies in chemistry, to boost their career and to apply Chemistry in their everyday life. The programme encourages the students towards logical thinking, finding solutions to different issues scientifically, finding the way to minimize pollutions, thinking about sustainable development and also to make correct decisions when encountered with different challenges in life.

Course Code	Course Name	Course Outcomes
CEMH: H1	General	This course will provide interest to understand about the basic concepts of atomic model, nucleus, quantum numbers, various principles, electronic configuration, wave function, periodic table, periodic properties. The students will be aware of the importance of the elements of the periodic table and how to analyse and separate various elements through qualitative estimation.
	Inorganic	To develop interest and understanding about the basic concepts of chemical bonding, hybridization, structure, H-bonding, metallic bond, lattice energy, Born-Haber cycle, factors affecting covalency, MOT, weak interactive forces, concept of oxidation, reduction, reduction potential, redox potential on the prospective of qualitative and quantitative analysis, redox indicator and titration.
	Organic	From this course the students will be able to learn about the hybridisation of orbitals, the concepts of acids and bases dipole moment, types of reagents and intermediates, activation energy and Transition state, energy profile diagrams for reactions with single or multiple steps, reactions of alkyl/aryl halides-nucleophilic substitution and elimination reactions, structure and bonding including chemical reactivities of alcohols, phenols, aldehydes and ketones, reactions with mechanism.
	Physical	From this course the students will have knowledge about theories and laws of real gases, liquid state, the various crystalline structures and their defects, fundamental ideas about computer development, hardware, binary system, basic program. They will also be able to apply the knowledge acquired to solve problem relating to those topics.
CEMH: Paper- H2(A)	Inorganic	The students can apply their knowledge and understanding about modern concepts of acid-base, SHAB principle, pH, effect of solvent on relative strengths of acids and bases – leveling effect, relative strengths of acids and bases (pKa and pKb concept). They are able to learn about the physical, chemical properties, solvation and complex formation tendencies of alkali and alkaline earth metals. Chemistry of lithium and beryllium their anomalous behavior and diagonal relationship. Students can acquire knowledge about noble gases especially xenon oxides, fluorides, oxyfluorides. Students will also learn about the periodic properties of p-block elements, inert pair effect and catenation, structure and bonding in



		<p>diborane, some other important compounds of p-block elements. This course also gives idea about the preparation, structure and uses of compounds of elements belonging to s and p block elements.</p>
	Organic	<p>From this course the students will be able to learn about configurational, conformational isomerism-Fischer, Newman and sawhorse projections, enantiomers, diastereomers, geometrical, pi-diastereomers and their nomenclatures, difference in chemical and physical properties of pi-diastereomers, optical isomers, chirality, asymmetry, dissymmetry, R/S and D/L notations of optical isomers, racemic mixture and resolution. Students will also gather knowledge about conformational nomenclature, eclipsed, staggered, gauche and anti; dihedral angle, energy barrier of rotation, relative stability of conformers on the basis of steric effects, conformational analysis of ethane, n-butane, cyclohexane and monosubstituted cyclohexanes; stability of cycloalkanes-strains in rings, angle strain and torsional strain, Baeyer strain theory and its limitations, asymmetric synthesis: stereospecific and stereoselective synthesis, regioselective synthesis, application of Cram's rule, Prelog's rule and Ahn-Felken rule. This chapter also includes aromaticity, non aromatic, antiaromatic, homoaromatic (benzenoid and nonbenzenoid) and preparation & properties of benzene, naphthalene, anthracene and some reaction mechanism in aromatic compounds.</p>
	CEMH: Paper-H2(B) Inorganic (Practical)	<p>This paper will impart skills and knowledge in identification basic and acid radicals through preliminary test such as nature, colour and solubility of compound: Dry Test and Wet test for Acid, Basic and interfering radicals, removal of interfering radical, group separation and group analysis. The students will develop skills and learning about salt analysis and can apply their knowledge in identification of radicals/compounds present in water, food etc.</p>
CEMH: Paper-H3(A)	Inorganic	<p>From this course the students will learn about the IUPAC nomenclature of coordination compounds, isomerism, chelates, innermetallic compounds, VBT, CFT, CFSE, LFT, bonding and structures in coordinate compounds, origin of colour and magnetism in coordination compounds, selection rules for electronic transition and Curie law, Curie-Weiss law. Students can apply their basic knowledge gathered about properties, structures, colour and magnetic properties of coordination compounds in higher studies.</p>
	Physical	<p>From this course the students will learn about the various thermodynamic terms and thermodynamic functions and parameters, Carnot's cycle and Carnot's theorem, laws of thermodynamics, concept of heat and work, enthalpies of various reactions, osmosis and reverse osmosis with applications, law governing dilute solutions and colligative properties with derivations of important equations involved. They will gain knowledge about homogeneous and heterogeneous equilibrium and principle involved. They will be able to determine rates of various chemical reactions both theoretically and experimentally and also observe the effect of</p>



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		catalyst and determine energies of activation of such reactions. From knowledge and understanding of the above topics, they can perform calculations and apply to experiments.
	CEMH: Paper-H3(B) Organic (Practical)	Systematic qualitative analysis of organic compounds for the detection of elements with two functional groups, determination of melting point of the compound, identification of the compound and preparation of derivative and determination of its melting point and purity of the compound by calculation of R_f factor. The students will develop skills and learning about organic compound analysis and can apply their knowledge in identification of compounds present in food, sample etc.
CEMH: Paper- H4(A)	Organic	From this course the student will learn about carbocations, carbanions, carbenes (electrophilic and nucleophilic), arynes and nitrenes – synthesis, stability, structure and reactivity, synthesis and synthetic applications of diethyl malonate and ethyl acetoacetate, synthetic application of Grignard reagent, organo lithium and organo copper compounds. Reaction mechanism of rearrangement reactions like Pinacol-pinacolone, Dienone-phenol, Wagner-Meerwein, Beckmann, Wolff, Hoffmann, Curtius, Lossen, Schmidt, benzil-benzilic acid, Favorskii, Fries and Claisen, Demjenov. This will grow the thinking ability to design a route for molecule synthesis.
	Physical	From this course the student will learn about the laws in electrochemistry and electrical properties like solubility product and common ion effect and conductance etc. and apply them in experiments. They learn about strong acids and bases and weak acid and bases and derivation of hydrolysis constant for their salts, electrochemical cells, types of electrodes and to determine their EMF. Students are able to examine different types of phase diagrams of one component and two component systems and types of liquid liquid-liquid mixtures, fractional crystallization, Thermal analysis, cooling curves, eutectic points, and different alloys.
CEMH: Paper- H4(B)	Practical (Physical)	Students will learn how to determine the surface tension of a given liquid / solution with a stalagmometer by drop weight method, the viscosity coefficient of a given liquid / solution by Ostwald's viscometer, the distribution coefficient of iodine between water and an organic solvent, the distribution coefficient of an organic acid between water and an organic solvent, the pH of a buffer solution by colour matching of indicator. Students will learn how to perform acid base titrations using a conductometer and potentiometer. This work develops the skill of the students to handle equipments as well as determination of different physical parameters.



CEMH: Paper-H5	Inorganic	This paper is an advance studies on theories and applications such as error analysis, nuclear chemistry, stability of nucleus, nuclear fission, fusion reactions, radio carbon dating, chemistry of d-block elements, lanthanides and actinides, organometallic compounds, reactions, properties, nomenclature, EAN, Bioinorganic chemistry, active and passive transportation, Na-ion pump, hemoglobin, myoglobin, chlorophyll, anti cancer drug, chelation therapy, beneficial elements, poisoning effect of metals, antidotes. The students gain information about the various biological effects and properties of organometallic compounds. Therefore, they can apply their knowledge in predicting and elucidating of chemical effects on humam. They can also apply their knowledge on accuracy, precession and error of readings. The students will gather knowledge and understanding about the importance of elements in the biological system as well as their toxic effects.
	Organic	From this course the student will learn about the classification, nomenclature, synthesis and reactions of monosaccharides, amino acids, urea, drugs, heterocyclic compounds. The students will learn about reactions and structure of disaccharides, classifications, isolation, structural elucidation, synthesis of terpenoids and alkaloids, proteins vitamins and their biological importance. The enzymes coenzymes, photochemical reactions, pericyclic reactions and use of mass, UV-visible, IR and NMR spectra for structural elucidation.
CEMH: Paper-H6	Practical (Inorganic)	This paper will impart skills and knowledge in separation technique of radicals from a mixture and quantitatively estimate the amount of each radical present in it. The students can apply their knowledge in estimation of radicals in mixture by gravimetric as well as volumetric titration. Students gain knowledge about importance of equivalent weight, method of preparation of normal and molar solutions, redox titration, iodometric titration and pH dependant complexometric titrations. They learn how to prepare coordination compounds maintaining a particular molar ratio and reaction conditions.
	Practical (Organic)	This paper will impart skills and knowledge in quantitative estimation of organic compounds. The students can apply their knowledge in estimation of different organic compounds in their real life by volumetric titration. They learn how to synthesize organic compounds maintaining standard method.
CEMH: Paper-H7	Green	The students will be enlightened about the consequences and impact on environment, chemical applications and industrial development through green chemistry learning. Students will learn about the principles of green chemistry, atom economy, and environmental factor. This chapter also gives idea about green synthesis of some organic and inorganic compounds. Green chemistry also deal with sonochemical reaction, use of green reagents, green oxidizing agents, green catalysts, and green solvents. Students will get idea about sustainability development.



	Industrial	This unit will impart skills and knowledge in purification of water, composition and manufacture of fertilizer, glass, cement, paints, soap, detergents, rubber, plastic, resins, silicones, cellulose in a large scale. The manufacture process of steel, stainless steel. Students will get idea about galvanization, rusting and corrosion. They will learn how to isolate different chemicals from coal, about Cracking of petroleum, knocking and octane number, biodiesel, synthetic petrol, LPG and CNG. This course also gives idea about the fermentation reaction of starch and sugar to produce alcohol.
CEMH: Paper-H7	Physical	From this course the student will learn about limitation of classical thermodynamics, concept of distribution of energy; thermodynamic probability and entropy; Boltzmann distribution law, partition function and its significance, translational partition function of ideal monoatomic gas, Maxwell-Boltzmann statistics, Bose-Einstein Statistics and Fermi Dirac statistics, Thermodynamic functions in terms of partition functions, SackurTetrode equation, heat capacity of solids, Quantum Mechanics. Introduction to molecular spectroscopy and spectrometers. Born-Oppenheimer approximation and degrees of freedom. Rotational and vibrational spectra of diatomic molecules with derivations and applications. Isotope effect. Beer-Lambert's Law, Einstein Law, Concept of potential Energy curves, Frank condon Principle, Jablonski diagram, Florescence and phosphorescence photochemical and photosensitized reactions and quantum yield. Boltzmann distribution for degenerate and non degenerate cases, idea of partition function. Activity, ionic activity, mean ionic activity electrophoretic and relaxation effects. preparation and purification of colloids, properties of colloids – physical, mechanical (Brownian motion), optical (Tyndal effect), electrical (Zeta potential) properties, stability and protective action of colloids – Gold number; Hurdy – Schulze rule, coagulation, peptisation, salting out, mechanism of functioning of soap and detergents, micelle formation; critical micelles concentration (CMC), emulsions, application of colloids – determination of Avagadro's number from Perrin distribution equation and Einstein diffusion equation, introduction of nano particles & applications. This chapter also includes concentration cells with and without transport liquid junction potentials, EMF and its measurement, calculation of thermodynamic parameters from EMF. Applications of electrodes and potentiometric titrations with examples. Students will also learn about Freundlich, Langmuir and Gibb's adsorption isotherms – their derivations, BET equation, determination of surface area of adsorbates, application adsorption phenomenon in nature and industry
CEMH: Paper-H8	Physical (Practical)	This course will impart skills and knowledge in determination of the concentration of a supplied solution by surface tension method, by viscosity method. Students also learn how to determine partition coefficient of ammonia, to determine of $E_{\text{Fe}^{3+}/\text{Fe}^{+2}}$ by potentiometric titration of Fe^{2+} with dichromate and concentration of unknown iron solution. Students are also demonstrating the verification of Freundlich's adsorption isotherm by study of the adsorption of acetic acid solution on activated charcoal and determination of concentration of acetic acid of unknown strength. They are also skilled how to determine the



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		concentration of salts and mixed acids by conductometric method. Students have scope to verify Beer's law and determine the concentration of supplied unknown solution. Students get the idea how to determine the rate constant of acid catalyzed hydrolysis of ethyl acetate ester at room temperature and the rate constant of iodination of acetone.
CEMH: Paper-H8	Green (Practical)	This course will impart skills and knowledge in preparation of inorganic coordination compounds by green method and acetylation of primary amine by using aniline, glacial acetic acid and zinc dust catalyst. They will get idea about green method, green reagents, green solvents, atom economy and sustainable development through practical application. Students have the scope to demonstrate the [4+2] cycloaddition reaction
	Industrial (Practical)	(Diels-Alder reaction between furan and maleic acid using water as solvent), base catalyzed aldol condensation (synthesis of dibenzalpropanone) in practical. Students are also trained on Column chromatography, a separation techniques through which reactions products can be separated. Students will learn about the synthesis procedure and purification of different compounds from mixed products.

BScG (Chemistry)

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Course Code	Course Name	Course Outcomes
CEMG: Paper- C1P1(A)	General	This course will provide interest to understand about the basic concepts of atomic model, nucleus, quantum numbers, various principles, electronic configuration, wave function, periodic table, periodic properties, learn to naming of different inorganic and coordination complexes. The students will be aware of the importance and properties of the elements of the periodic table and how to analyst and separate various elements through qualitative estimation.
	Inorganic	To develop interest and understanding about the basic concepts of oxidation and reduction, power of their oxidizing and reducing strength, standard electrode potential, electrochemical series; redox potentials and its applications, radio activity and its cause, utility and hazardless of nuclear energy, disintegration series, half-life period, radioactive equilibrium, types of nuclear reactions, artificial transmutation reactions, nuclear fission and nuclear fusion, Carbon-14 dating, nuclear forces: n-n, n-p, p-p.



	Organic	From this course the students will be able to learn about the hybridisation of orbitals, the process like resonance, tautomerism, steric inhibition of resonance, hyperconjugation, inductive and field effects, H-bonding, dipole moment- bond moment and group moment, physical properties (m.p., b.p.,solubility) related to molecular structures. Organic reaction mechanism in aliphatic compounds, Electrophilic and free radical addition, Nucleophilic addition, Nucleophilic substitution reactions - SN1, SN2, SNi; Elimination reactions - α and β -eliminations, syn - and anti-elimination; E1 and E2- mechanism. Important reactions with mechanism of aliphatic compounds
	Physical	From this course the students will have knowledge about theories and laws of gases, different types of velocities possessed by gases, concept of real gases , liquid state and properties of liquids , parameters of thermodynamics, law of thermodynamics, heat engine, Carnot cycle, Carnot engine and its efficiency, concept of entropy, entropy change in simple transformations, physical significance of entropy. Gibb's free energy, Helmholtz free energy, Gibbs Helmholtz equation, criteria for thermodynamic equilibrium and spontaneity of a process. They will also be able to apply the knowledge acquired to solve problem relating to those topics.
CEMG: Paper- C1P2(A)	General	The students can apply their knowledge and understanding about the concepts of different types of bond in chemical compounds. They can also learn lattice energy, Born-Haber cycle, and ionic solids: radius ratio rule and its limitations, ionic potential, polarizing power and polarisability, Fajan's rule. Basic concepts of valence bond theory and its limitations, resonance and resonance energy, hybridization involving s, p, d orbitals; sigma and pi-bonds, bond length, bond order, bond energy, formal charge, dipole moment, percentage of ionic character of covalent bond, VSEPR theory and its applications, concept of equilibrium and equilibrium constant and factors on which equilibrium depends, La-Chatelier principle, simple application, inter relations hip between K_p , K_c and K_x , characteristic of the equilibrium state. Exothermic and endothermic reactions; enthalpy, laws of thermochemistry, bond dissociation energy, Born - Haber cycle.
	Inorganic	From this course the students will be able to learn about Coordination complexes, Werner's theory, IUPAC nomenclature, different types of ligands, multi dentate ligands, coordination number and stereochemistry ; chelates, inner metallic complexes, types of isomerism in coordination compounds, bonding in coordination compounds: Valence Bond Theory. Double Salts and their applications, Concept of diamagnetism, paramagnetism, ferromagnetism and antiferromagnetism, origin of paramagnetic moment: electron spin moment and orbital angularmoment, magnetic susceptibility and magnetic moment; magnetic susceptibility measurement by Gouymethods.



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CEMG: Paper- C1P2(B)	Inorganic (Practical)	This paper will impart skills and knowledge in identification basic and acid radicals through preliminary test such as nature, colour and solubility of compound: Dry Test and Wet test for Acid, Basic and interfering radicals, removal of interfering radical, group separation and group analysis. The students will develop skills and learning about salt analysis and can apply their knowledge in identification of radicals/compounds present in water, food etc.
	Organic (Practical)	The students can prepare some organic compounds like 7-hydroxy-4-methyl coumarin by Pechmann method, dibenzylidene acetone by condensation reaction, and some aniline derivatives via green method.
CEMG: Paper- C1P3(A)	Organic	From this course the students will learn about the Stereochemistry of organic compounds: Types of stereoisomers, Conformation, Conformational nomenclature; relative stability of conformers on the basis of steric effects, conformational analysis of ethane, n-butane. Aromaticity, non-aromaticity, antiaromaticity, homoaromaticity (benzenoid and nonbenzenoid), Preparation and properties of benzene and naphthalene Organic reaction mechanism in aromatic compound, Electrophilic substitution in benzene Synthesis and reactivities of aromatic alcohols, aromatic halides, phenols, carbonyls, amines and carboxylic acids
	Physical	The students will learn here about the Chemical kinetics: Order and molecularity of a reaction, rate of reaction, rate laws and equations, experimental methods for the determination of order of reactions. Criteria of catalyst, classification, catalyst promoters, catalyst poison, theories of catalysis, applications of catalysts,. Idea about Phase, component, degree of freedom, phase rule equation phase diagram one component systems, Henry's law for solubility of a gas in liquid, Nernst Distribution law, partition coefficient. Type of solution, mode of expressing composition of solution, concept of extensive, intensive, additive, constitutive and colligative properties. Van't-Hoff factor, determination of molecular weight, analogy between ideal gas and dilute solution, abnormal solution properties. From knowledge and understanding of the above topics, they can solve numerical problems, perform calculations and apply to experiments.
CEMG: Paper- C1P3(B)	Inorganic (Practical)	This paper will impart skills and knowledge in the preparation of some inorganic complexes and double salts like Chrome alum, Potash alum, Potassium -tri(oxalate) Chromate (III), Hexamine Cobalt (III)Chloride, Tris(thiourea) Cu(I) Sulphate, Bis (dimethylglyoximinato)Ni(II), Tetra ammine Cu(II) Sulphate, Tris(oxalate)ferrate(III).
	Organic (Practical)	The students can acquire the skill and concept of analyzing and identifying some organic functional groups like phenolic-OH, -COOH, -CHO, >CO, -NH ₂ , -NO ₂ , -CONH ₂ , >C=C< present in some organic sample. They can also learn to determine m.p, solubility test of such compounds also.



CEMG: Paper- C1P4(A)	Organic	From this course the student will learn about Synthetic applications of active methylene compounds and Grignards reagent concept of five and six membered heterocycles, nomenclature, aromatic character, structure, synthesis and chemical reactivity and chemistry of some heterocyclic compounds, Idea of carbohydrate monosaccharides, constitution, reactions and mechanism of reaction of glucose and fructose cyclic structures, pyranose and furanose forms. Synthesis, physical and chemical properties of amino acids determination of C and N terminal amino acid residues of peptides.
	Physical	The student will learn and acquire knowledge about the Arrhenius theory, mode of transport of electricity through solution, transport number of ions and its determination, conductance's, ionic mobility, electrolytes, Kohlrausch's law and its applications, measurement of conductance of solutions and applications. Solubility of sparingly soluble salts. Ostwald dilution law, ionization of water, pH, buffer solution, buffer capacity, mechanism of buffer, Henderson equation, hydrolysis of salts, common ion effect, solubility product and its application, ionic strength. Study of some electrochemical cells, concept of some physical properties like boiling point, parachor, refractive index, molar refraction, optical activity, specific and molar rotation, dielectric constant, induced and orientation polarization, polar and non-polar molecules, dipole moment and its methods of determination, Clausius-Mossotti equation, ionic character of bonds. Adsorption; Freundlich and Langmuir isotherms, Surface Catalysis. Application of adsorption. Concept and properties of Colloids, stability of colloids; Hurdy - Schulze rule, Electro-kinetic Phenomena, micelles .
CEMG: Paper- C1P4(A)	Organic (Practical)	The students can acquire the skill and concept of analyzing and qualitative estimations of some organic compounds like aniline using brominating mixture and glucose by Benedict's reagent.
	Physical (Practical)	Students will learn how to determine the surface tension of a supplied liquid solvent/ solution by drop volume method, determination of the coefficient of viscosity of a given liquid/solvent using Oswald viscometer and determination of the partition coefficient of iodine between water and an organic solvent. These works develops the skill of the students to handle equipments as well as determination of different physical parameters.
CEMG: Paper- C1P5(A)	General	This paper is a studies and concept on different Acid-Base Concept , Solvent dependence of acidity and basicity, Ionic product of water, The pH scale, Buffer solutions, Hard and Soft acids and based and their classifications, Acid-base strength and hardness and softness, symbiosis, Nature of solid state, laws of crystallography, Weiss and Miller indices, unit cell, crystal systems, Bravis lattice, symmetry elements, types of crystals, crystal forces. X-ray diffraction of crystals, Bragg's law. Detailed concept of acid base indicators; types criteria and selection of indicators.



	Inorganic	<p>From this, the student will learn about the s-and p-Block Elements: The oxides and hydroxides of alkali and alkaline earth elements, Boron hydrides, Silicates, Silicones, oxyacids of sulphur, d-Block Elements: First row Transition Series: (3d) electronic configuration, Oxidation states, Reactivities, colour and Magnetic properties.</p> <p>Preparation, properties and structure of Potassium ferro and ferricyanide, Lithium aluminium hydride, Sodium cobaltinitrite, Nessler's reagent, Sodium borohydride, Ferrocene, Sodium nitropuricide.</p>
CEMG: Paper- C1P5(B)	Inorganic (Practical)	<p>Students have acquired the skill and knowledge about the acid-base titration, redox titration in practical ground. They are able to carry out the quantitative estimation of Na_2CO_3 & NaHCO_3 present in a mixture by acid-base titration method, estimation of Fe (II) and Fe (III) by redox titration using $\text{K}_2\text{Cr}_2\text{O}_7$, KMnO_4 solutions individually, estimation of Cu (II) by iodometric method.</p>
	Physical (Practical)	<p>Students will learn how to determine the pH of a buffer solution by colour matching method, determination of concentration of HCl/NaOH by Conductometric Titration, determination of concentration of supplied BaCl_2 by standard $\text{Na}_2\text{SO}_4/\text{K}_2\text{SO}_4$ conductometrically, determination of Order of a Reaction - Hydrolysis of Ester.</p> <p>These works develop the skill of the students to handle equipments as well as determination of different physical parameters.</p>
CEMH: Paper-VI	Project	<p>This paper will impart skills and knowledge of writing project paper after doing some hands' on experiments or trainings.</p>



Department of Environmental Science

BScG (Environmental Science)

Programme Outcome

Critical Thinking- Students will demonstrate an understands major concept of environment in association with multidisciplinary subjects like physics, chemistry, zoology, botany, statistics etc. understood the basic concepts, fundamental principles, and the scientific theories related to various environmental phenomena and their relevance in our day to day life. Effective Communication- Development of various communication skills which will help them in expressing ideas and views clearly and effectively. Social Interaction - Development of scientific outlook not only with respect to science subjects but also in all aspects related to life. Effective Citizenship- Imbibes moral and social values in personal and social life leading to highly cultured and civilized personality. Ethics - Follow the ethical principles and responsibilities to serve the society. Environment and sustainability- understand the issues of environmental context and sustainable development.

Programme Specific Outcome

Environmental Science students are able to gather knowledge competent professional with a strong foundation of environmental science and application to be suitable for vital positions in academia, industry, and government and non-government institutions as skilled manpower. The Environmental Science prepares students for careers as leaders in understanding and addressing complex environmental issues from a problem-oriented, interdisciplinary perspective. The learner will be able to become effective scientific communicators in multidisciplinary team providing technical leadership to engage with the challenging environmental problems. They opt for higher studies in plant and animal sciences as environmental science is a multidisciplinary in nature.

Course Outcome: After successful completion of the course, the students will develop following attribute.

Title of Unit: Introduction to Earth and Environment.

Title of Unit: Ecology and Ecosystem Dynamics.

Title of Unit: Natural resource and their management.

Title of unit: Environmental Education and major environmental issues and movements.

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE: ENSG2A

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES	
CO1	Students will be acquainted with various analytical techniques.	
CO2	They will know application of biometry in experiments related to environmental research.	
CO3	They will learn the importance of biodiversity.	
CO4	They will also learn the sustainable use and protection of biodiversity.	
Unit wise detail content		
Unit 1	Number of Lecture- 20	Title of Unit: Analytical Techniques and Environmental Statistics.
Principle and applications: Trirrimetry, spectrophotometry, flame photometry, Electrophoresis, Atomic Absorption Spectrophotometry, Gas Chromatography. Microscopy: SEM, TEM and Image Analysis. Sampling, Measures of Central Tendency(mean, median, mood), SD, SE, Probability, types of error, test of significance (Students t-test, F-test, Least Significant Difference); Correlation, regression.		
Unit 2	Number of Lecture-	Title of Unit: Biodiversity Conservation



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	20	
<p>Concept of Biodiversity, hierarchical levels (genetic diversity, species diversity, ecosystem diversity); Gradients of biodiversity (Latitudinal changes); Biodiversity as a resource; Causes of biodiversity loss, Rare, Threatened and Endangered flora and fauna, Concept of Endemism and Invasive species, Global Biodiversity Hotspots, Strategies for Biodiversity conservation, Ex-situ, In-situ (wild life sanctuaries, National parks and Biosphere reserves, Gene and Seed bank), Biodiversity Documentation, Convention on Biological Diversity.</p>		

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE: ENSG2B (Practical)

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
C01	Students will be able to identify various rocks & minerals and method of their formation.
C02	Students will be able to analyze various meteorological parameter and interpretation of the result.
C03	They will be able to estimate the population size of flora and fauna of a vegetation.
C04	They will also learn the presentation of data in Word processing software and power point presentation.

Detail content of Practical

Identification of Rocs.
 Climatic Maps-drawing of Hythergraph and Climpgraph
 Identification of Important minerals
 Study of Meteorological parameter: light intensity, Ambient Temperature, Wind velocity and relative humidity.
 Estimation of moisture, temperature and conductivity of soil.
 Determination of Transparency, temperature and conductivity of water.
 Determination of requisite size and number of quadrates to be laid down for studying vegetation.
 Determination of density, abundance and frequency of components of species in a grassland community.
 Measurement of primary production of a pond ecosystem
 Estimation of population size from population chart by quadrat method.
 Computation of Mean, Median, Mode and Variance of the given environmental data Set.
 Working on Word processing Software
 Preparation of Power Point Presentation for seminar.

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE: ENSG3A

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
C01	Students will be able to explain why chemistry is an integral activity for addressing the environmental problems.
C02	They will be able to analyze the causes of pollution in our environment and how the various chemicals effect the organism and environment.
C03	Students will be able to explain the effects of water, land and air pollution on environment and ways to reduce them.
C04	They will evaluate the relation between the environment and human



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health. Define the concept of acid rain, GHGs and Global warming.		
Unit wise detail content		
Unit 1	Number of Lecture- 20	Title of Unit: Environmental Chemistry
Law of Thermodynamics, Chemical Composition of Earth, Chemical composition of Air and Soil; Metals, Hydrocarbons. Biogeochemical Cycles; Nitrogen, Phosphorus, Carbon, Sulphur, Some important chemical processes (Pyrolysis, Fermentation, degradation pathways of organochemicals) Chemical nature of pesticides, surfactants, heavy metals, photo chemical smog, Ozone chemistry, Acid Rain, BOD and COD.		
Unit 2	Number of Lecture- 20	Title of Unit: Environmental Pollution and Degradation.
Definition, Type, source and consequence and remedial measure of Pollution (Air, Water, Soil, Noise, Radiation, Thermal): sources and remedial measures for Marine and Coastal Pollution; Causes and consequences of Environmental Degradation: deforestation, desertification and soil erosion.		

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE: ENSG3B(Practical)

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
C01	Students will be able to determine SPM in atmosphere and their effect on human health.
C02	They will be able to analyze various aquatic parameters like TSS, TDS, Alkalinity, Chloride, Calcium and magnesium and their impact on aquatic organisms.
C03	They will study soil profile, organic carbon, soil pH, mycorrhizal association and their importance in plant growth.
C04	They will learn about non-timber forest products and their economic importance.

Detail content
Determination of SPM in atmosphere (road side and classroom).
Determination of Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) in water samples.
Determination of alkalinity, chloride, calcium and magnesium content of water samples.
Study of Soil profile.
Study of soil organic carbon content in grassland and forest.
Determination of pH of grassland and forest soil.
Comparative study of different types of lichen population (crustose, fructose and foliose) in disturbed and undisturbed forest ecosystem.
Monitoring of noise level in public area (campus and roadside)
Inventorization of important local NTFPs.
Study of Mycorrhizal association.



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COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE : ENSG4A

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME		ATTRIBUTES
CO1		Students will gain knowledge about environmental toxin, source, transformation their affects on human health.
CO2		They will learn about various contagious diseases and their control measures.
CO3		They will be able to describe the application of Remote sensing and GIS Technology.
Unit wise detail content		
Unit 1	Number of Lecture- 20	Title of Unit: Ecotoxicology and Environmental health
Pesticides- types and mode of action; Bio-entry, Bioaccumulation, Biotransformation and biomagnifications, Persistent organic pollutants (Organochlorine), Concept of LD50, Concept of Xenobiotics, indices of toxicology, mutagens, carcinogens and teratogens and mutagens-their effects on human system, concept of environmental health, water borne, Air borne and Vector born diseases. Causes and remedial measure of Malaria, Arsenikosis, and amoebiosis. Toxins of biological origin; occupational health. Epidemiological issues-Goiter, Fluorosis.		
Unit 2	Number of Lecture- 20	Title of Unit: Remote Sensing and GIS
Definition, principle and kind of remote sensing, types of images and date, aerial photographs, resolution, pixel, electromagnetic spectrum, Global positioning system, data interpretation, mapping. False colour composing. Normalized differential vegetation Index, Reflectance pattern of different surfaces, application of remote sensing and GIS in environmental management.		

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE : ENSG4B

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME		ATTRIBUTES
CO1		Student will able to estimate the coliform count.
CO2		They will be able to estimate the nitrate and phosphate content of water and can analyze the condition of water.
CO3		The will learn the use of GPS.
CO4		Student will be able to estimate the biomass of any plants by using clinometers.
Detail content		
Determination of coliform count in natural water.		
Study of root nodules of a nitrogen fixing plant.		
Estimation of nitrate and phosphate content in natural waters.		
Demonstration on the use of GPS.		
Preparation of area map by using GPS.		
Demonstration on the use of ARC-GIS software.		
Determination of height and distance of an object from ground with Clinometer.		



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Visit to a place/area/locality promoting biodiversity conservation and preparation of filed report using GIS.
Demonstration and editing of scientific photography and videography.
Visit to a health institution and preparation of health report.

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE : ENSG5A

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
CO1	Gain knowledge about how to dispose the solid waste.
CO2	Knowledge for protection of environment through effective waste management system.
CO3	Develop basic knowledge on concept of hazard, risk and vulnerability. Also will gain knowledge about the role of government bodies in disaster management.
CO4	Student will understand about how guiding principles of sustainable development help in facing global challenges of sustainable development.

Unit wise detail content

Unit	Number of Lecture-	Title of Unit:
Unit 1	20	Disaster Management and Traditional Knowledge system.
Nature and type of disaster, Earthquake Tsunami; Disaster management plans. Roles and regulatory functions of NIDM and NDMA in disaster management. Intellectual Property, Rights, Traditional Agro forestry system. Traditional water harvesting system and Traditional health care system: Ethno-biology wild Edibles.		
Unit 2	20	Environmental Biotechnology and Management.
Management of Municipal Solid Waste, Biomedical Waste, Hazardous waste and Electronic Waste, Integrated pest management; Bio-pesticides, Bio-fertilizer, Vermicomposting and its importance. Environmental monitoring, environmental audit and reporting; major environmental acts: Air, Water wildlife and Biodiversity. Concept of Sustainable Development; Joint Forest Management, Environmental Impact Assessment (EIA); Environmental management Plan.		

COURSE: ENVIRONMENTAL SCIENCE

COURSE CODE : ENSG5B

COURSE OUTCOME: After successful completion of the course, the students will develop following attribute.

COURSE OUT COME	ATTRIBUTES
CO1	Students will be able to prepare disaster management plan.
CO2	They will also learn about frequency, evenness, abundance and biomass of a plant community.
CO3	To develop hypothesis on solution of global environmental issues by making models.
CO4	Gain knowledge on ethno medicinal plants and their preservation techniques.
Detail content	



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Preparation of Pre disaster, disaster and post disaster plans for earth quake disaster.
Measurement of girth, height and volume of tree bole.
Determination of similarity and dissimilarity by Morisita Index and Bray Curtis methods.
Determination of Simpson diversity Index in a forest community.
Study of important ethno-medicinal plants with the help of herbarium.
Determination of texture of given soil sample.
Identification of plants of grassland and forest community.
Preparation of vermicompost.
Preparation of environmental model on Global warming, Climate change, water harvesting technique etc.
Study of edible insects and molasses of different tribes of Tripura.

COURSE: ENVIRONMENTAL STUDIES

COURSE CODE : FNDC 3

COURSE OUTCOME: The course will empower the undergraduate students by:

Gaining in-depth knowledge on natural processes that sustain life and govern economy.

Predicting the consequences of human actions on the web of life, global economy and quality of human life.

Developing critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development.

Acquiring values and attitudes towards understanding complex environmental-economic-social challenges, and participating actively in solving current environmental problems and preventing the future ones.

Adopting sustainability as a practice in life, society and industry.



Department of Human Physiology

BScH and BScG (Human Physiology)

Programme outcome

Human Physiology describes basic structural and functional features of the major organ systems within the human body. Human physiology is the science of how the human body functions in health and disease. Students examine human physiological systems from the molecular and cellular levels to the human body as a whole. It is the study of functions and mechanisms of living organisms. It investigates how organisms, organs, cells and bio-molecules carry out their chemical and physical functions. Human physiology, a specific branch of physiology, studies how our cells, muscles and organs work together and interact. Physiologists use this knowledge to study the methods for treating diseases and coping with the stresses our bodies are exposed to in different environments.

Semester	Name of the Unit	Course Outcome
I	Unit-I: Structural units of Human System Unit-II: Biophysical and Biochemical Principles Unit-III: Blood, other Body fluids and clinical Hematology Unit-IV: Biochemistry and Enzymology	In the ISEM course students are expected to learn and know about the basic of Human physiological system starting from sub cellular organelles to tissues. In this SEM students learn about basics of thermodynamics and biochemical principles. Students learn about blood and other body fluids such as lymph and tissue fluids. They also learn about the biochemical structure, properties and functions of different organic substances with physiological importance such as carbohydrate, protein, fat and other biomolecules. They also learn about the functions and mode of action of different enzymes in details.
II	Unit-I: Physiology of excitable cell Unit-II: Cardiovascular system	In this semester students learn about one of the control and coordination system of the body i.e., nervous system. They learn about the general organization and mechanism of functioning of nervous system. Under cardiovascular system they learn about the heart and its functioning in normal and abnormal conditions. In practical part the learn about some clinical hematology such blood group and some pathological tests such as estimation of haemoglobin and TC, DC, ESR, CT, BT etc.
III	Unit-I: Metabolic Biochemistry and Molecular Respiration Unit-II: Nutritional Biochemistry	In this unit students are expected to learn about different biochemical pathways and biomolecules. Students also learn about different metabolic diseases. They also learn about human nutrition, diet and malnutrition diseases. Students practise some biochemical experiments from health and disease related point of view such as estimation of blood glucose level, lipid profile serum SGPT/SGOT. They also go through some qualitative analysis of different food item.
IV	Unit-I: Respiratory system and Aviation Physiology Unit-II: Ergonomics and Sports Physiology	The syllabi contain mechanism of respiration and gaseous exchange in normal and pathological conditions human body. Students learn about high altitude and space physiology, G-force etc. Ergonomics Demonstrate knowledge of general overall physiological principles



		<p>associated with metabolic processes; musculoskeletal system; cardiovascular system; aerobic and anaerobic program design. Demonstrate knowledge of pathophysiology and risk factors associated with exercise and disease.</p> <p>Demonstrate the ability to administer and interpret health appraisals, fitness, and clinical exercise testing.</p> <p>Demonstrate the ability to administer and interpret electrocardiography and other diagnostic techniques associated with physiological processes.</p> <p>Design and monitor exercise prescriptions and fitness programming.</p> <p>Assess and evaluate nutritional intake and demonstrate the ability to design weight management programs.</p> <p>Demonstrate knowledge of safety, injury prevention, and emergency procedures associated with laboratory activities and general exercise.</p> <p>Demonstrate knowledge of orthopedic/musculoskeletal issues including pathophysiology and risk factors for injury.</p>
V	<p>Unit-I: Nervous system</p> <p>Unit-II: Excretory system, skin and thermoregulation</p> <p>Unit-III: Endocrinology and Chronobiology</p> <p>Unit-IV: Reproductive system and development biology</p>	<p>The student will be able to</p> <p>Describe the function of the brain, spinal cord, and nerves.</p> <p>The major structures of the nervous system and some of their functions</p> <p>How the nervous system develops and how it changes with experience</p> <p>Strategies for repairing damaged brains and spinal cords, and the obstacles</p> <p>After studying the excretory system, students will be able to explain the purpose of the kidneys, bladder, and urethra. Describe the excretory system.</p> <p>In endocrinology unit, students learn about the total endocrine system of human body, different endocrine glands, their functions, mode of action and about disease related to hormonal imbalance.</p>
VI	<p>Unit-I: Sensory Physiology</p> <p>Unit-II: Microbiology, Biotechnology and Immunology</p> <p>Unit-III: Molecular Biology and Genetics</p> <p>Unit-IV: Research Methodology and Epidemiology</p>	<p>After studying sensory physiology, students will have the knowledge and skills to-</p> <p>Describe and understand the way in which light, sound, mechanical forces and chemicals are being sensed and coded in sensory systems, explain and analyze the information content of different sensory modalities</p> <p>Microbiology apply the knowledge to understand the microbial physiology and to identify the microorganism, the regulation of biochemical pathway and possible process modifications for improved control over microorganisms for microbial product synthesis. After completion of the course the students will know-</p> <p>The basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes.</p> <p>Know various Culture media and their applications and also understand various physical and chemical means of sterilization</p> <p>Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, fungi and algae</p>



	<p>Master aseptic techniques and be able to perform routine culture handling tasks safely and effectively</p> <p>Comprehend the various methods for identification of unknown microorganisms</p> <p>Upon successful completion of the Molecular Biology and genetics, students will be able to:</p> <p>understand and appreciate the diversity of life as it evolved over time by processes of mutation, selection and genetic change.</p> <p>explain that the growth, development, and behavior of organisms are activated through the expression of genetic information in context.</p> <p>design a scientific process and employ the scientific method, demonstrating that biology is evidence based and grounded in the formal practices of observation, experimentation, and hypothesis testing.</p> <p>execute quantitative analysis to interpret biological data.</p> <p>communicate biological concepts and understanding to members of a diverse scientific community as well as to the general public.</p> <p>identify social and historical dimensions of biological investigation.</p> <p>Research Methods syllabus has been framed with the following objectives-</p> <p>Students should understand a general definition of research design.</p> <p>Students should know why educational research is undertaken.</p> <p>Students should be able to identify the overall process of designing a research study from its inception to its report.</p> <p>Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research. Students should know the primary characteristics of quantitative research and qualitative research.</p> <p>Students should be able to identify a research problem stated in a study.</p> <p>Students should be familiar with how to write a good introduction to an educational research study and the components.</p> <p>Students should be familiar with conducting a literature review for a scholarly educational study:</p> <p>Students should be able to distinguish a purpose statement, a research question or hypothesis, and a research objective.</p> <p>Students should be able to define the meaning of a variable, and to be able to identify independent, dependent, and mediating variables.</p> <p>Students should be able to distinguish between categorical and continuous measures.</p> <p>Students should be able to define theory use in quantitative research.</p> <p>Students should be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses.</p> <p>Students should know the steps in the process of quantitative data</p>
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		<p>collection.</p> <p>Students should be able to distinguish between a population and a sample.</p> <p>Students should know the various types of quantitative sampling and which ones present the most rigorous approach to use.</p> <p>Students should understand the link between quantitative research questions and data collection and how research questions are operationalized in educational practice.</p> <p>Students should be familiar with the steps involved in identifying and selecting a good instrument to use in a study</p>
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Specific Program Outcome

Define basic biological processes essential for maintenance of homeostasis.

Correlate specific structural features of human cells, tissues, organs and systems of the human body with their normal functions, and identify the changes that occur during human development, ageing and disease.

Work in teams to apply their knowledge to investigate clinical scenarios and debate current topics in scientific research.

Work in teams to apply their knowledge to investigate clinical scenarios and debate current topics in scientific research.

Develop research skills including critical analysis, interpretation, synthesis and communication of scientific data.

Develop and display the motivation necessary for ongoing independent learning

Programme outcome:

Career Opportunities in Physiology

Clinical Exercise Physiologists

Biomedical Scientists

Sports Physiologists

Physiotherapists

Research

Teaching



Department of Mathematics
BScH and BSc (Mathematics)

Programme Specific Outcomes (PSO):

PO1. Bachelor's degree in mathematics is the culmination of in-depth knowledge of algebra, calculus, geometry, differential equations and several other branches of mathematics. This also leads to study of related areas like computer science and statistics. Thus, this program helps learners in building a solid foundation for higher studies in mathematics.

PO2. The skills and knowledge gained has intrinsic beauty, which also leads to proficiency in analytical reasoning. This can be utilized in modeling and solving real life problems.

PO3. Students undergoing this program learn to logically question assertions, to recognize patterns and to distinguish between essential and irrelevant aspects of problems. They also share ideas and insights while seeking and benefitting from knowledge and insight of others. This helps them to learn to behave responsibly in a rapidly changing interdependent society.

PO4. Students completing this program will be able to present mathematics clearly and precisely, make vague ideas precise by formulating them in the language of mathematics, describe mathematical ideas from multiple perspectives and explain fundamental concepts of mathematics to non-mathematicians.

PO5. Completion of this program will also enable the learners to join teaching profession in primary and secondary schools.

PO6. This program will also help students to enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

COURSE OUTCOMES:

SEMESTER-I		
MTMH Paper-I	UNIT-I (Classical Algebra & Number Theory)	Outcome1: Students will understand inequalities and their generalization in the form of theorems mainly weighted mean and m power theorem, Cauchy- Schwartz inequality, Weierstrass inequality. Outcome2: Students will be able to apply trigonometry concepts on DeMoivre's theorem and trigonometry functions. Outcome3: Students will understand numbers, way of representing numbers, relationships among numbers, and number systems.
	UNIT-II (Abstract Algebra-I)	Outcome1: Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic, prove elementary results involving sets. Apply the different properties of injections, surjections, bijections, compositions, and inverse functions. Outcome2: Students will be able to understand group theory, subgroup, abelian group, their properties and applications in the real phenomena. Outcome3: Students will be able to demonstrate a working knowledge of Cyclic group and its properties, order of the group, permutations, symmetric and alternating group.



	UNIT-III (Abstract Algebra-II)	<p>Outcome1:After successful completion of this topic, students will understand group homomorphism, endomorphism and isomorphism and be acquainted with applications.</p> <p>Outcome2: Students will be able to understand rings and fields, their properties and applications.</p> <p>Outcome3:Students will be able to demonstrate a working knowledge of sub-ring, sub-field, characteristic of ring and integral domain along with ring and field homomorphism, isomorphism.</p>
	UNIT-IV (Vector Algebra)	<p>Outcome1:After successful completion of this topic, students will be able to understand vector algebra, its properties and product of two or more vectors like scalar product, vector product, scalar triple product, vector triple product.</p> <p>Outcome2:Students will understand direct application of vector algebra in geometrical and trigonometrical problems and also work done, moment of force.</p> <p>Outcome3:Students will be able to demonstrate a working knowledge of vector equation of lines and planes, volume of a tetrahedron.</p>
SEMESTER-II		
MTMH Paper-II	UNIT-I (Linear Algebra-I)	<p>Outcome1:After successful completion of this topic, students will be able to understand matrices of real and complex numbers, algebra of matrices, solution of linear equations, rank of the matrix.</p> <p>Outcome2:Students will be able to demonstrate a working knowledge of characteristics polynomial, characteristics equations, eigen values, eigen vectors and Cayley Hamilton theorem.</p> <p>Outcome3: Students will understand linear space, subspace, their properties and linear sum of two subspaces.</p>
	UNIT-II (Linear Algebra-II)	<p>Outcome1:Students will be able to demonstrate a working knowledge of linear combination, independence and dependence, basis of vector space, finite dimensional vector space and replacement theorem.</p> <p>Outcome2: Students will understand row space and column space of matrix, row rank and column rank of matrix, consistency of a linear non- homogeneous system of equations.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand linear transformations and their representation as matrices and algebra of linear transformations, rank and nullity.</p>
	UNIT-III (Geometry-2 dimension)	<p>Outcome1: After successful completion of this topic, students will be able to understand transformation of rectangular axes, translation, rotation and their combinations, reduction of general equation of second degree in two variables into canonical form.</p> <p>Outcome2:Students will be able to demonstrate a working knowledge of pair of straight lines, condition that the general equation of second degree in two variables represents a pair of straight lines.</p> <p>Outcome3:Students will understand polar coordinates, polar equation of straight lines, circles and conic.</p>



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	UNIT-IV (Geometry-3 Dimension)	<p>Outcome1: Students will understand rectangular Cartesian coordinates in space, equation of a plane, their properties and parallel and perpendicularity of two planes.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand straight lines in space, canonical equation of line of intersection of two intersecting lines, shortest distance between two skew lines.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge general equation of sphere, cone, right circular cone, cylinder and right circular cylinder.</p>
SEMESTER-III		
MTMH Paper-III	UNIT-I (Calculus-I)	<p>Outcome1: Demonstrate a working knowledge of limit and continuity of a real valued function, neighbourhood properties of continuous function, intermediate value theorem.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand discontinuity of function, types of discontinuity, uniform continuity, Lipschitz condition.</p> <p>Outcome3: Students will understand infinite series of real numbers, tests of convergence, absolute and conditional convergent series and rearrangement of series.</p>
	UNIT-II (Calculus)	<p>Outcome1: Students will be able to demonstrate a working knowledge of chain rule, successive differentiation, Darboux theorem, mean value theorems of Lagrange's and Cauchy and Rolle's theorem.</p> <p>Outcome2: Students will be able to apply Taylor's theorem on closed and bounded interval with Lagrange's and Cauchy's form of remainder, Maclaurin's infinite series.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand functions of several variables, partial derivatives, Euler's theorem of homogenous functions of two variables</p>
	UNIT-III (Calculus)	<p>Outcome1: After successful completion of this topic, students will be able to understand extremum of a function, application of the principle of maximum/ minimum in geometrical problems.</p> <p>Outcome2: Students will be able to understand tangent, normal, pedal equation of a curve, curvature, asymptotes.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of reduction formulae and their applications.</p>
	UNIT-IV (Vector Calculus)	<p>Outcome1: After successful completion of this topic, students will be able to understand limit, continuity, derivative of vector function and conditions for constant length and parallelism of vector function.</p> <p>Outcome2: Students will be able to understand vector integration, gradient, divergence and curl.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of line, surface and volume integral which are applied in physics.</p>
SEMESTER-IV		



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MTMH Paper-IV	UNIT-I (Differential Equations-I)	<p>Outcome1: Students will be able to demonstrate a working knowledge of geometrical and physical application of ordinary differential equation, existence theorem, equations reducible to first order linear equations.</p> <p>Outcome2: Students will be able to understand equations of first order but not first degree, Clairaut's equation, orthogonal trajectories, particular integral.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand method of variation of parameters, Euler's homogeneous equation.</p>
	UNIT-II (Differential Equations-II)	<p>Outcome1: After successful completion of this topic, students will be able to understand exact differential equations of higher order, non-linear exact equations and linear equations of some special forms.</p> <p>Outcome2: Students will be able to understand second order linear equations with variable co-efficient, complete solution.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of reduction to normal form, simple eigenvalue problems and simultaneous linear differential equations.</p>
	UNIT-III (Linear Programming Problem-I)	<p>Outcome1: Students will be able to demonstrate a working knowledge of mathematical form of LPP, graphical representation and solution of LPP, basic solution.</p> <p>Outcome2: Students will be able to understand Euclidean space, hyperplane, convex set, extreme points of convex set.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand slack, surplus, artificial variables, application of simplex method of solution of LPP, Charne's M-technique.</p>
	UNIT-IV (Linear Programming Problem-II)	<p>Outcome1: Students will be able to understand degeneracy, two phase method.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand duality theorem, dual simplex method.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of transportation problem, assignment problem, travelling salesman problem and their practical applications.</p>
SEMESTER-V		
	UNIT-I (Analysis-I)	<p>Outcome1: Students will be able to demonstrate a working knowledge of bounded subset of \mathbb{R}, supremum, infimum of a set, Bolzano-Weierstrass theorem, complement of open set and closed set.</p> <p>Outcome2: Students will be able to understand Heine Borel theorem, sequence of real numbers, convergence and divergence.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand sandwich rule, nested interval theorem, Cauchy's first and second limit theorems, Cauchy's general principle of convergence.</p>



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MTMH Paper-V	UNIT-II (Analysis-II)	<p>Outcome1: Students will be able to understand Riemann integral, darbox's theorem, condition of Riemann integrability, equality of Riemann and Darbox's approach.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand Riemann integrability of sum, product, quotient, piecewise continuous functions.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of primitives or indefinite integrals, first mean value theorem of integral calculus.</p>
	UNIT-III (Analysis-III)	<p>Outcome1: Students will be able to demonstrate a working knowledge of improper integrals and their convergence, tests of convergence.</p> <p>Outcome2: Students will be able to understand beta and gamma functions and their convergence, their properties and interrelation.</p> <p>Outcome3: After successful completion of this topic, students will be able to understand geometric interpretation of definite integral, fundamental theorem of integral.</p>
	UNIT-IV (Analysis-IV)	<p>Outcome1: Students will be able to understand sequence of functions, uniform convergence, power series, Weierstrass M-test.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand Fourier series, calculation of Fourier coefficients, Parseval's identity.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of evaluation of double and triple integrals, Dirichlet's integrals, change of order of integration in double integrals.</p>
	UNIT-I (Probability)	<p>Outcome1: Students will be able to demonstrate a working knowledge of definition and properties of probability, Binomial, Poisson, Beta, Gamma, Uniform and normal distribution.</p> <p>Outcome2: Students will be able to understand two dimensional probability distributions, conditional distribution and transformation of random variables in two dimensions.</p>
MTMH Paper-VI	UNIT-II (Statistics)	<p>Outcome3: After successful completion of this topic, students will be able to understand mathematical expectation and their properties, measures of central tendency, measures of dispersion, skewness and curtosis.</p> <p>Outcome1: After successful completion of this topic, students will be able to understand concept of sampling and various types of sampling, sample characteristic and their computation, sampling distribution of statistic.</p> <p>Outcome2: Students will be able to understand estimates of population, characteristic or parameter, maximum likelihood estimate, estimation of population proportion, normal population parameters.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of testing of hypothesis, type one and type two errors, Chi-square test of goodness of fit.</p>



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	UNIT-III (Tensor Analysis)	<p>Outcome1: Students will be able to understand summation convention, Kronekar symbol, n-dimensional space, Chritoffel symbols and their properties, law of transformation law of Chritoffel symbols.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand covariant differentiation of tensors, gradient, divergence, curl and Laplacian, spherical and cylindrical coordinate system.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of curves in E3, Riemannian space, Serret-Frenet formulas.</p>
	UNIT-IV (Dynamics of Particle)	<p>Outcome1: After successful completion of this topic, students will be able to understand Simple Harmonic Motion, Tangent and normal acceleration, velocity and acceleration along radial and transverse directions.</p> <p>Outcome2: Students will be able to understand central orbit, central forces and differential equation in polar and pedal coordinates.</p> <p>Outcome3: Students will be able to demonstrate a working knowledge of Kepler's laws of planetary motion, artificial satellites, geo-stationary satellite, and disturbed orbits.</p>
SEMESTER-VI		
	UNIT-I (Numerical Analysis-I)	<p>Outcome1: Students will be able to understand error in numerical analysis, different operators- their properties and interrelations, equispaced arguments and entries.</p> <p>Outcome2: After successful completion of this topic, students will be able to understand interpolations, different interpolation formulae and their applications in different branches of science.</p>



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MTMH Paper-VII		Outcome3: Students will be able to demonstrate a working knowledge of Numerical differentiation, numerical integration, their formulae and applications, Euler Maclaurin' sum formula.
	UNIT-II (Numerical Analysis-II)	Outcome 1:After successful completion of this topic, students will be able to understand numerical solution of non-linear equations, different methods, their geometrical significance and convergency. Outcome 2:Students will be able to understand numerical solution of a system of linear equations, different methods and their convergency. Outcome3: Students will be able to demonstrate a working knowledge of numerical solution of ordinary differential equation of first order, different methods like Euler's method, Picard's method, Runge-Kutta method, Milne's method and their applications.
	UNIT-III (C-Programming-I)	Outcome1:Students will be able to understand algorithm and flow charts, bracing and looping. Outcome2:After successful completion of this topic, students will be able to understand ANSI-C, different kinds of integer constant. Outcome3: Students will be able to demonstrate a working knowledge of different operators, relation operators, logical operators.
	UNIT-IV (C-Programming-II)	Outcome1:After successful completion of this topic, students will be able to understand control flow, conditional and unconditional bracing, looping. Outcome2:Students will be able to understand switch, break, continue, goto statements. Outcome3: Students will be able to demonstrate a working knowledge of infinite loops, functions, arrays and pointers.
MTMH Paper- VIII	UNIT-I Practical (Numerical Analysis)	Outcome:After successful completion of this topic, students will be able to understand practically Problems of interpolation. Numerical differentiation and integration. Roots of an equation by different methods. Inverse of a third order matrix without finding its determinant.
	UNIT-II	Outcome:After successful completion of this topic, students will be able to understand practically Ascending/ descending order, finding largest/ smallest. Sum of finite series. Solution of quadratic equation. Interpolation. Solution of linear equation. Numerical integration.



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MTMH Paper-IX	Project Work	Outcome: Each student will select an advanced topic in Mathematics and undergo critical study and will develop his or her research aptitude.
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Course Outcomes: General

SEMESTER-I		
MTMG Paper-I	UNIT-I (Classical Algebra & Vector Algebra)	Outcome: Students will understand inequalities and their generalization in the form of theorems mainly weighted mean and power theorem, Cauchy-Schwartz inequality, Weierstrass inequality, able to apply trigonometry concepts on DeMoivre's theorem and trigonometry functions, vector algebra, its properties and product of two or more vectors like scalar product, vector product, scalar triple product, vector triple product. Students will understand direct application of vector algebra in geometrical and trigonometrical problems and also work done, moment of force.
	UNIT-II (Abstract Algebra & Linear Algebra)	Outcome: Demonstrate a working knowledge of set notation and elementary set theory, recognize the connection between set operations and logic, prove elementary results involving sets. Apply the different properties of injections, surjections, bijections, compositions, and inverse functions. Students will be able to understand group theory, subgroup, abelian group, their properties and applications in the real phenomena. Students will be able to understand rings and fields, their properties and applications, students will be able to understand matrices of real and complex numbers, algebra of matrices, solution of linear equations, rank of the matrix, characteristics polynomial, characteristics equations, eigen values, eigen vectors and Cayley Hamilton theorem. Students will understand linear space, subspace, their properties and linear sum of two subspaces, linear transformations and their representation as matrices
SEMESTER-II		
MTMG Paper-II	UNIT-I (Differential Calculus)	Outcome: Demonstrate a working knowledge of limit and continuity of a real valued function, successive differentiation, Darboux theorem, mean value theorems of Lagrange's and Cauchy and Rolle's theorem, functions of several variables, partial derivatives, Euler's theorem of homogenous functions of two variables.



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	UNIT-II (Integral Calculus)	Outcome: Students will be able to demonstrate a working knowledge of improper integrals, reduction formulae, beta and gamma functions, evaluation of double and triple integrals, rectification of planes, volume and surface area of solid.
SEMESTER-III		
MTMG Paper-III	UNIT-I (Geometry-2 dimension & 3-dimension)	Outcome: After successful completion of this topic, students will be able to understand transformation of rectangular axes, translation, rotation and their combinations, reduction of general equation of second degree in two variables into canonical form, pair of straight lines, polar coordinates. Students will understand rectangular Cartesian coordinates in space, equation of a plane, their properties and parallel and perpendicularity of two planes, straight lines in space, canonical equation of line of intersection of two intersecting lines, shortest distance between two skew lines, general equation of sphere.
	UNIT-II (Differential Equations)	Outcome: Students will be able to demonstrate a working knowledge of geometrical and physical application of ordinary differential equation, existence theorem, equations reducible to first order linear equations. Students will be able to understand equations of first order but not first degree, Clairaut's equation, orthogonal trajectories, particular integral. After successful completion of this topic, students will be able to understand method of variation of parameters, Euler's homogeneous equation.
SEMESTER-IV		
MTMG Paper-IV	UNIT-I (Linear Programming Problem)	Outcome: Students will be able to demonstrate a working knowledge of mathematical form of LPP, graphical representation and solution of LPP, basic solution, Euclidean space, hyperplane, convex set, extreme points of convex set, slack, surplus, artificial variables, application of simplex method of solution of LPP, Charne's M-technique. Students will be able to understand two phase method, duality theorem, transportation problem, assignment problem.
	UNIT-II (Probability & Vector Calculus)	Outcome: Students will be able to demonstrate a working knowledge of definition and properties of probability, Binomial, Poisson, Beta, Gamma, Uniform and normal distribution. After successful completion of this topic, students will be able to understand limit, continuity, derivative of vector function and conditions for constant length and parallelism of vector function. Students will be able to understand vector integration, gradient, divergence and curl, line, surface and volume integral which are applied in physics.
SEMESTER-V		
	UNIT-I (Numerical Analysis)	Outcome: Students will be able to understand error in numerical analysis, different operators- their properties and interrelations, equispaced arguments and entries, interpolations, different interpolation formulae. Students will be able to demonstrate a working knowledge of Numerical differentiation, numerical integration, their formulae and



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MTMG Paper-V		applications. Students will be able to understand numerical solution of a system of linear equations, different methods and their convergency.
	UNIT-II (Computer Science)	Outcome: Students will be able to understand algorithm and flow charts, bracing and looping. After successful completion of this topic, students will be able to understand ANSI-C, different kinds of integer constant. Students will be able to demonstrate a working knowledge of different operators, relation operators, logical operators.
	UNIT-III Practical (C-programming & Numerical Analysis)	Outcome: After successful completion of this topic, students will be able to understand practically Ascending/ descending order, finding largest/ smallest. Sum of finite series. Solution of quadratic equation. Interpolation. Solution of linear equation. Numerical integration.
SEMESTER-VI		
MTMG Paper-VI	Project Work	Outcome: Each student will select an advanced topic in Mathematics and undergo critical study and will develop his or her research aptitude.



Department of Physics

BScH and BScG (Physics)

Programme Specific Outcomes (PSOs) for B.Sc. Physics

Sl. No.	On completing B.Sc. Physics, the student will be able to:
PSO-1	Comprehend physics principles and their applications in the problems of everyday life.
PSO-2	Possess industry-specific skills for the existing industrial jobs, and for developing new technologies.
PSO-3	Understand the advanced methods of scientific inquiry and develop skills for extensive research.
PSO-4	Know mathematical methods so as to assess the advanced theories and provide deductions.
PSO-5	Develop skills for understanding scientific literature and creating scientific communication in the written & through hands on experiment.
PSO-6	Not only stitch a fragmented problem into a complete one, but also create alternate solutions in diverse fields of physical, biological and social sciences.



Course Outcomes (COs): B.Sc. Physics Semester I

Course Code-PHSG Paper: C1

Course Title: Vectors, Mechanics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand and apply the concepts of vector calculus including various differential operators like Gradient, Divergence, Curl their physical meanings. The idea of vector integration and related theorems like Gauss's divergence theorem, Stoke's theorem and Green's theorem	PSO-1, PSO-4
CO-2	Understand the concepts of moment of inertia & radius of gyration, parallel and perpendicular axes theorem and apply them to industrial and day-to-day life situations	PSO-1, PSO-4

Course Title: Gravitation, Elasticity and Fluid (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get some idea about gravitational field and potential, Applications of Gauss's theorem Understand the concepts of elasticity and various kinds of elastic moduli, concept of twisting, bending, and depressions produced in cantilever and double beam. The knowledge so acquired can be utilized to understand the some physical phenomena in daily life.	PSO-1, PSO-3, PSO-4,
CO-2	Get the idea of surface tension, surface energy, their relation, meaning of excess pressure, explanation of various common phenomena using this concept, experimental techniques employed for the determination of surface tension	PSO-1, PSO-2, PSO-3
CO-3	An important property of fluid viz. viscosity, Poiseulli's equations, Stoke's law, terminal velocity	PSO-1, PSO-2, PSO-3

Course Title: Thermodynamics and Radiation (Unit-III)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Apply the laws of thermodynamics in various processes / systems (in day- to-day phenomena) to calculate. Role of p-V diagram to calculate the efficiency of Carnot's engine, Limitations of first law of thermodynamics the work done/ internal energy	PSO-1, PSO-3, PSO-4
CO-2	Understand the basic concepts of thermodynamics such as state variables, state of a system, work done and internal energy Analyse the performance of heat engines, refrigerators, and their components using the first law of thermodynamics	
CO-3	Understand Carnot's theorem and Absolute scale of temperature, concept of entropy and change of entropy, calculation of the change of entropy in a number of cases	PSO-1, PSO-6

Course Title: Optics (Unit-IV)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the basics of Geometrical optics including refraction from spherical surfaces, thin lenses and their combination	PSO-1, PSO-3, PSO-4
CO-2	Get a preliminary idea about the wave theory of light including the interference of light & Young's experiment	PSO-1, PSO-3, PSO-4
CO-3	Understand the various kinds of interference demonstrative experiments, related numerical problems	PSO-1, PSO-6

Course Outcomes (COs): B.Sc. Physics Semester II

Course Code-PHSG Paper- 201 (A)

Course Title: Acoustic (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get elementary idea about SHM its differential equation and solution, composition of SHM, Lissajou's figures, damped and forced vibration and their related discussion.	PSO-1, PSO-3, PSO-4
CO-2	Application of resonance, Idea about quality factor, sharpness of resonance	PSO-1, PSO-3, PSO-4
CO-3	Application of acoustics of building, Growth and decay of sound intensity, Idea of reverberation, reverberation time and Sabine's law, Characteristics of a good auditorium	PSO-1, PSO-6
CO-4	Analyse the acoustics of a room, large or small; presence of noise and its elimination.	PSO-2, PSO-3

Course Title: Electrostatics, Magneto statics, Magnetic effect of Current (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Know about Coulomb's theorem, mechanical force on a charged surface, energy per unit volume.	PSO-2, PSO-3, PSO-4
CO-2	Get basic idea of working of a capacitor, calculation of capacitance in some cases, idea about the electrometers.	PSO-2, PSO-3, PSO-5
CO-3	Get some elementary idea about various terminology on magnetism like permeability, Hysteresis.	PSO-2, PSO-3
CO-4	Know how to determine experimentally the thermal conductivity of a bad conductor using Lees and Choltron's method	PSO-5
CO-5	Determine the coefficient of viscosity of a given liquid (Poiseulli's method) using experimental techniques	PSO-5



Course Outcomes (COs): B.Sc. Physics Semester II

Course Code-PHSG Paper- 201 (B)

Non-Electrical Practical

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Demonstrate how to work with basic measuring instruments like slide callipers, screw-gauge, spherometer, travelling microscope, physical balance	PSO-5
CO-2	Determine experimentally values of various material characteristics like refractive index, focal length, moment of inertia, rigidity modulus, Young's modulus, viscosity etc.	PSO-5

Course Outcomes (COs): B.Sc. Physics Semester III

Course Code-PHSG Paper- 301 (A)

Course Title: Current Electricity I (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the various theories behind some thermoelectric phenomena, Inter-relation, thermoelectric power, applications of thermo-couple.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand the phenomenon electromagnetic induction, Calculation of self and mutual inductances in a number of cases	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand the basics behind the charging and discharging of a capacitor in a series LCR circuit considering various conditions	PSO-1, PSO-2, PSO-3

Course Title: Current Electricity II and Atomic theory (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Analyse AC circuits with circuit elements and their combinations, theory of transformer and its applications	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Explain the phenomenon like normal and anomalous Zeeman effect using the quantum theory, they will be able to conclude about the number of lines to be obtained in normal and anomalous Zeeman effect for a given transition	PSO-1, PSO-2, PSO-3



Course Outcomes (COs): B.Sc. Physics Semester III

Course Code-PHSG Paper- 301 (B)

Electrical Practical

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Demonstrate how to work with basic electrical instruments like ammeter, voltmeter, galvanometer, tangent galvanometer, magnetometer, potentiometer, meter bridge, etc.	PSO-5
CO-2	Determine experimentally values of unknown resistance, end correction of meter bridge, Carey-Foster's bridge, small current using potentiometer, reduction factor using tangent galvanometer etc.	PSO-5

Course Outcomes (COs): B.Sc. Physics Semester IV

Course Code-PHSG Paper- 401 (A)

Course Title: Electronics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Analyse the working of PNP and NPN transistor, current components in a junction transistor CB, CE and CC configurations of transistor and their comparison.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand the construction, working and industrial applications of FETs	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand Operational amplifier, concept of virtual ground, applications of OP-AMPs.	PSO-1, PSO-2, PSO-3

Course Title: Relativity and Nuclear Physics (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get a detailed idea of Michaelson -Morley's experiment and its necessity, postulates of special theory of relativity, Idea of Lorentz's transformation, relativity of simultaneity length contraction and time dilation, addition of velocities, variation of mass with velocities, equivalence of mass and energy	PSO-1, PSO-2, PSO-3
CO-2	Analyse the concept of Q-equation in different nuclear reactions, and understand the radioactive decay of alpha, beta and gamma rays, and their fine structure spectrum	PSO-1, PSO-2, PSO-3, PSO-4

Course Outcomes (COs): B.Sc. Physics Semester IV

Course Code-PHSG Paper- 401 (B)

Electronics Practical

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Demonstrate working of p-n junction diode, triode valve, transistor, Field effect transistor, realization of basic logic gates using discrete components like diode, resistor, LEDs etc.	PSO-5



Course Outcomes (COs): B.Sc. Physics Semester V

Course Code-PHSG Paper- 501 (A)

Course Title: Electromagnetic theory Laser, Computer Science, Programming and Digital Electronics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Analyse the importance of existence of displacement current, Idea of Maxwell's electromagnetic induction, propagation of plain electromagnetic waves in free space	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Analyse the concept laser action, conditions required, Einstein's A, B co-efficients	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Get some elementary idea about the optical fibre, its type, various terminology	PSO-1, PSO-2, PSO-3
CO-4	Understand foundation concepts of information and information processing in computer systems: a matter of information, data representation, coding systems Understand of programming language syntax and its definition by example of BASIC language.	PSO-1, PSO-2, PSO-3

Course Title: Quantum Mechanics I and Quantum Mechanics II (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand physical situations where classical physics fails, and how quantum concepts explain it.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand the mathematical basis of quantum theory and concept of probabilistic approach	PSO-1, PSO-2, PSO-3, PSO-4

Course Outcomes (COs): B.Sc. Physics Semester V

Course Code-PHSG Paper- 501 (B)

Computer Practical

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand foundation concepts of information and information processing in computer systems: a matter of information, data representation, coding systems	PSO-5
CO-2	Understand of an algorithm and its definition.	PSO-5
CO-3	Understand of programming language syntax and its definition by example of BASIC language.	PSO-5
CO-4	Know of basic principles of imperative and structural programming,	PSO-5
CO-5	Write simple programs in BASIC language by using basic control structures (conditional statements, loops, branching, etc.).	PSO-5
CO-6	Create a programmable model for a problem given. Basic knowledge of working with arrays in BASIC language. Handle possible errors during program execution.	PSO-5



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Programme: B.Sc. Physics Programme Code: TDPH BSH
Programme Specific Outcomes (PSOs) for B.Sc. Physics

Sl. No.	On completing B.Sc. Physics, the student will be able to:
PSO-1	Comprehend physics principles and their applications in the problems of everyday life.
PSO-2	Possess industry-specific skills for the existing industrial jobs, and for developing new technologies.
PSO-3	Understand the advanced methods of scientific inquiry and develop skills for extensive research.
PSO-4	Know mathematical methods so as to assess the advanced theories and provide deductions.
PSO-5	Develop skills for understanding scientific literature and creating scientific communication in the written & through hands on experiment.
PSO-6	Not only stitch a fragmented problem into a complete one, but also create alternate solutions in diverse fields of physical, biological and social sciences.



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Course Outcomes (COs): B.Sc. Physics Semester I
Course Code-PHSH Paper: H1

Course Title: Mathematical Methods in Physics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand and apply the concepts of vector calculus including various differential operators like Gradient, Divergence, Curl their physical meanings. The idea of vector integration and related theorems like Gauss's divergence theorem, Stoke's theorem and Green's theorem	PSO-1, PSO-4
CO-2	To get brief idea about Orthogonal curvilinear co-ordinate system, unit vectors in such system and various operators like gradient, divergence, curl and Laplacian in different curvilinear co-ordinate systems like Cartesian, spherical polar & cylindrical polar co-ordinates.	PSO-1, PSO-4
CO-3	To deal with eigen value and eigen vectors calculation of a given Matrix, Properties of matrices, Calculation of Inverse of a matrix, Diagonalization of matrix	PSO-4
CO-4	To acquire some idea of Beta and Gamma functions, their properties, inter- relationship, their applications to some problems	PSO-4
CO-5	To apply Fourier series to study the complex nature of a given function	PSO-4

Course Title: Mechanics (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Apply Newton's laws to any physical situation, and deduce its kinematical behaviour, Also use of equation of motion of a particle under time dependent force, resistive force	PSO-1, PSO-3, PSO-4, PSO-6
CO-2	Understand the concepts of moment of inertia & radius of gyration, parallel and perpendicular axes theorem and apply them to industrial and day-to-day life situations	PSO-1, PSO-3, PSO-4
CO-3	To get some idea about the Frame of reference & rotating frame of reference, Coriolis and centrifugal force and to understand various physical phenomena from the point of view of Coriolis force	PSO-1, PSO-6
CO-4	Know about velocity and acceleration in plane polar co-ordinate (radial and transverse components)	PSO-4
CO-5	Get some basic idea of Central force, differential equation of a particle moving under central force, nature of orbit, Deductions of Kepler's laws on planetary motion and their applications	PSO-1, PSO-4



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Course Title: General Properties of Matter (Unit-III)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get some idea about gravitational field and potential, Applications of Gauss's theorem in the calculation of gravitational field in some symmetric cases (spherical & cylindrical), Poisson's and Laplace equations in gravitation and their application.	PSO-1, PSO-3, PSO-4
CO-2	Understand the concepts of elasticity and various kinds of elastic moduli, concept of twisting, bending, and depressions produced in cantilever and double beam. The knowledge so acquired can be utilized to understand the some physical phenomena in daily life.	PSO-1, PSO-3, PSO-4
CO-3	Get the idea of surface tension, surface energy, their relation, meaning of excess pressure, explanation of various common phenomena using this concept, experimental techniques employed for the determination of surface tension	PSO-1, PSO-6
CO-4	An important property of fluid viz. viscosity, Poiseulli's equations, Stoke's law, terminal velocity	PSO-4
CO-5	Get an idea of fluid dynamics, Equation of continuity, Bernoulli's theorem and its applications in a number of cases.	PSO-1, PSO-4

Course Title: Vibrations & Waves (Unit-IV)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get elementary idea about SHM its differential equation and solution, composition of SHM, Lissajou's figures, damped and forced vibration and their related discussion	PSO-1, PSO-3, PSO-4
CO-2	Application of resonance, Idea about quality factor, sharpness of resonance	PSO-1, PSO-3, PSO-4
CO-3	Various kinds of wave dynamics, longitudinal and standing waves, phase and group velocity	PSO-1, PSO-6
CO-4	To understand how to form the differential equation of transverse vibration in a stretched string	PSO-4
CO-5	To get idea about the theories of plucked, struck and bowed strings	PSO-1, PSO-4
CO-6	Application of acoustics of building, Growth and decay of sound intensity, Idea of reverberation, reverberation time and Sabine's law, Charcateristics of a good auditorium,	PSO-1, PSO-5
CO-7	Analyse the acoustics of a room, large or small; presence of noise and its elimination.	PSO-2, PSO-3



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Course Outcomes (COs): B.Sc. Physics Semester II
Course Code-PHSH Paper- H2 A

Course Title: Electrostatics & Magnetostatics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get an idea about Gauss's theorem in electrostatics and how to apply the same for symmetric charge distribution problem to find the electric field intensity	PSO-1, PSO-3, PSO-4
CO-2	Know about Coulomb's theorem, mechanical force on a charged surface, energy per unit volume	PSO-1, PSO-3, PSO-4
CO-3	Know how to get potential and electric field using Poisson's and Laplace's equation in spherical and cylindrical charge distribution	PSO-1, PSO-6
CO-4	Get elementary idea about the method of electrical images to the field problem in few cases	PSO-2, PSO-3
CO-5	Get basic idea of working of a capacitor, calculation of capacitance in some cases, idea about the electrometers	PSO-1, PSO-2, PSO-3
CO-6	Understand the dipole-dipole interaction, dielectric medium, polarization and susceptibility	PSO-1, PSO-2, PSO-3
CO-7	Get some elementary idea about various terminology on magnetism like permeability, Hysteresis, Boundary conditions, magnetic circuit etc.	PSO-2, PSO-3

Course Title: Optics (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the basics of Geometrical optics including refraction from spherical surfaces, thin lenses and their combination	PSO-2, PSO-3, PSO-4
CO-2	Get an idea about the various kinds of Cardinal points	PSO-2, PSO-3, PSO-5
CO-3	Know about various types of aberration like spherical and chromatic aberrations and their remedies	PSO-2, PSO-3
CO-4	Get a preliminary idea about the wave theory of light including the interference of light & Young's experiment	PSO-2, PSO-3
CO-5	Understand the various kinds of interference demonstrative experiments, related numerical problems	PSO-1, PSO-2, PSO-3
CO-6	Generate some idea about both the Fresnel and Fraunhofer class of diffraction, Zone plate	PSO-1, PSO-2, PSO-3
CO-7	Get idea of limit of resolution and resolving power, How to calculate the resolving power of grating, prism, microscope and telescope	PSO-2, PSO-3
CO-8	Know about the phenomenon of polarization and how to form different polarised light, idea of compensator, optical activity	PSO-2, PSO-3



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Course Code-H2 B (PRACTICAL): NON-ELECTRICAL

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Know how to determine experimentally the thermal conductivity of a bad conductor using Lees and Choltson's method	PSO-5
CO-2	Determine the coefficient of viscosity of a given liquid (Poiseulli's method) using experimental techniques	PSO-5
CO-3	Generate extensive idea about the various terminology of spectrometer, labelling and adjustment of a spectrometer, Use of spectrometer, experimental determination of dispersive power of material of prism, study of angle of deviation versus wavelength curve etc.	PSO-5
CO-4	Get acquainted to illustrate the phenomenon like polarization and optical activity. Using these concepts, ability will be attained to determine the unknown concentration of an optically active substance by a polarimeter	PSO-5
CO-5	Understand the phenomenon of diffraction of light (Fraunhofer diffraction) and use that theoretical concept to determine the slit width and the separation between the slits of a double slit.	PSO-5



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Course Outcomes (COs): B.Sc. Physics Semester III

Course Code-PHSH Paper- H3 A

Course Title: Current Electricity (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Apply Kirchoff's laws and analyse the electrical circuits.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Apply Thevenine's, Norton's, Superposition and Maximum Power Transfer theorem	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand the inadequacy of Wheatstone's bridge, Working principle of Platinum resistance thermometer, Callendar & Griffith Bridge and how to measure the boiling point of a given liquid	PSO-1, PSO-2, PSO-3
CO-4	Understand the Working principle of potentiometer and its applications in a number of cases	PSO-1, PSO-2, PSO-3
CO-5	Understand the various theories behind some thermoelectric phenomena, Inter-relation, thermoelectric power, applications of thermocouple	PSO-1, PSO-2, PSO-3
CO-6	Analyse the detailed theory behind the working of moving coil dead beat and ballistic types of galvanometers and correction due to damping	PSO-1, PSO-2, PSO-3
CO-7	Understand the phenomenon <i>electromagnetic induction</i> , Calculation of self and mutual inductances in a number of cases, Eddy currents and their applications in daily life	PSO-1, PSO-2, PSO-3, PSO-4, PSO-5
CO-8	Understand the basics behind the charging and discharging of a capacitor in a series LCR circuit considering various conditions	PSO-1, PSO-2, PSO-3
CO-9	Analyse AC circuits with circuit elements and their combinations, theory of transformer and its applications	PSO-1, PSO-2, PSO-3, PSO-4

Course Title: Thermal Physics (Thermodynamics, Radiation, Kinetic Theory of Gases, Transport Phenomenon and Refrigeration) (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the basic concepts of thermodynamics such as state variables, state of a system, work done and internal energy.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Apply the laws of thermodynamics in various processes / systems (in day-to-day phenomena) to calculate the work done/internal energy	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Analyse the performance of heat engines, refrigerators, and their components using the first law of thermodynamics. Role of p-V diagram to calculate the efficiency of Carnot's engine, Limitations of first law of thermodynamics	PSO-1, PSO-2, PSO-3
CO-4	Understand Carnot's theorem and Absolute scale of temperature, concept of entropy and change of entropy, calculation of the change of entropy in a number of cases`	PSO-1, PSO-2, PSO-3
CO-5	Analyse Maxwell's thermodynamical relations in deriving a number of thermodynamical relations	PSO-1, PSO-2, PSO-3



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CO-6	Elaborate the idea of emissive and absorptive power, Kirchhoff's law, Black Body radiation, Different laws to interpret the black body radiation curve	PSO-1, PSO-2, PSO-3
CO-7	Understand kinetic theory of gases, Maxwell's distribution law, different types of velocities, collision probability, mean free path, degrees of freedom, inter-relation	PSO-1, PSO-2, PSO-3, PSO-4, PSO-5
CO-8	Analyse the various transport phenomena like viscosity and thermal conductivity and their relation, Brownian motion	PSO-1, PSO-2, PSO-3

Course Code-H3 B (PRACTICAL): ELECTRICAL

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Build the circuit connections to prepare 1 Ohm Coil, to study thermoelectric curve and hence to determine thermoelectric power, boiling point of a given liquid, high resistance by leakage method, mutual inductance between two coils, construction of rectifier circuits	PSO-5



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**Course Outcomes (COs): B.Sc. Physics Semester IV
Course Code-PHSH PAPER-H4-A**

Course Title: Mechanics-II & Relativity (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the basic concepts of Rigid body dynamics, angular momentum of a rigid body, Understand the fundamental concept of moment of inertia and inertia tensor of a rigid body.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Apply the above-mentioned concepts to understand the ellipsoid of inertia Apply critical thinking skills to describe the motion of the rigid body about its principal axis.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Get an idea about inertia tensor, principle axis in simple symmetric cases, Apply the theories learnt and the skills acquired to solve real time problems, both analytically and computationally.	PSO-1, PSO-2, PSO-3
CO-4	Understand the idea of generalized coordinates, definition of constraints, forces of constraints and degrees of freedom.	PSO-1, PSO-2, PSO-3
CO-5	Apply the idea generalized co-ordinates and the concept of constraints in different cases, idea of generalized velocity, potential and forces	PSO-1, PSO-2, PSO-3
CO-6	Analyse the Lagrangian formulation and its superiority over Newtonian mechanics, the idea of virtual work, D'Alembert's principle	PSO-1, PSO-2, PSO-3
CO-7	Apply Lagrange's formulation to understand complex mechanical systems and solve quantitative problems in applied physics.	PSO-1, PSO-2, PSO-3, PSO-4, PSO-5
CO-8	Analyse the Hamiltonian formulation and its advantages, computation techniques of Hamiltonian in some simple cases.	PSO-1, PSO-2, PSO-3
CO-9	Apply the concepts of special theory of relativity to the various physical phenomena, and understand its significance.	PSO-1, PSO-2, PSO-3, PSO-4, PSO-5
CO-10	Get a detailed idea of Michaelson -Morley's experiment and its necessity, postulates of special theory of relativity, Idea of Lorentz's transformation, relativity of simultaneity length contraction and time dilation, addition of velocities, variation of mass with velocities, equivalence of mass and energy	PSO-1, PSO-2, PSO-3

Course Title: Electromagnetism and Electromagnetic Theory (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Apply Biot-Savart's law and Ampere's circuital law to find the magnetic field intensity in various symmetric cases	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Idea of Lorentz's force and concept of magnetic induction, non- existence of magnetic monopole	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Idea of magnetic vector potential and magnetic induction in simple cases	PSO-1, PSO-2, PSO-3



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CO-4	Analyse the importance of existence of displacement current, Idea of Maxwell's electromagnetic induction, propagation of plain electromagnetic waves in free space	PSO-1, PSO-2, PSO-3
CO-5	Generate some idea electromagnetic waves in free spaces, transverse character	PSO-1, PSO-2, PSO-3
CO-6	To analyse the transverse character and polarized electromagnetic wave, calculation of Poynting vector and Poynting's theorem, Importance of Hertz's experiment	PSO-1, PSO-2, PSO-3
CO-7	To calculate reflection and refraction co-efficient of plane wave at the boundary of two dielectrics , waves in conducting media, idea of skin effect and skin depth	PSO-1, PSO-2, PSO-3, PSO-4, PSO-5
CO-8	Get an elaborate idea normal and anomalous dispersion, Cauchy and Sellemier equation	PSO-1, PSO-2, PSO-3

Course Code-PHSH

PAPER-H4-B

PRACTICAL (COMPUTER PROGRAMMING ON BASIC/FORTRAN)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand foundation concepts of information and information processing in computer systems: a matter of information, data representation, coding systems	PSO-5
CO-2	Understand of an algorithm and its definition.	PSO-5
CO-3	Understand of programming language syntax and its definition by example of BASIC language.	PSO-5
CO-4	Know of basic principles of imperative and structural programming,	PSO-5
CO-5	Write simple programs in BASIC language by using basic control structures (conditional statements, loops, branching, etc.).	PSO-5
CO-6	Create a programmable model for a problem given. Basic knowledge of working with arrays in BASIC language. Handle possible errors during program execution. Elementary knowledge of programming code style.	PSO-5



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Course Outcomes (COs): B.Sc. Physics Semester V

Course Code-PHSH Paper- H5

Course Title: Mathematical Methods in Physics –II (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the 1st and 2nd order ordinary linear differential equations, and solve these equations using different methods especially by the method of separation of variables.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Get a comprehensive idea about the various method employed for series solution of a differential equations like Legendre, Hermite and Laguerre's equation, idea about their orthogonality conditions and recurrence relation will be also developed.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Analyse the complex variables and functions of a complex variable, continuity and differentiability, singular points, removable, essential and isolated singularities	PSO-1, PSO-2, PSO-3
CO-4	Get some idea about the branch cut and branch points, Riemann sheet and Riemann surface, single and multi-valued function, idea of complex plane	PSO-1, PSO-2, PSO-3
CO-5	Develop the necessary and sufficient condition for a function to be analytic in nature (Cauchy Riemann Conditions), Harmonic function.	PSO-1, PSO-2, PSO-3
CO-6	Develop the understand the special type of integral transform like Laplace transform, its properties and Laplace's transform for different cases	PSO-1, PSO-2, PSO-3

Course Title: Atomic and Molecular Physics, Laser & Fiber Optics (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Analyse the spectrum of hydrogen atom with reduced mass correction, its advantages, computation of magnetic moment of orbital electron and related discussion	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Know about the importance of introducing the idea of Vector atom model, consequences of Stern Gerlach experiment to establish the idea of electron spin	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Analyse the meaning and requirements of L-S and j-j coupling schemes, Lande-g-factor and its expression	PSO-1, PSO-2, PSO-3
CO-4	Explain the doublet structure in the spectra of alkali atom,	PSO-1, PSO-2, PSO-3
CO-5	Explain the phenomenon like normal and anomalous Zeeman effect using the quantum theory, they will be able to conclude about the number of lines to be obtained in normal and anomalous Zeeman effect for a given transition	PSO-1, PSO-2, PSO-3
CO-6	Get some elementary about the various kinds of energies those need to	PSO-1, PSO-2,



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	be addressed while studying the molecular spectra, Analyse vibrational, rotational and electronic spectra of diatomic molecules	PSO-3
CO-7	Compute the Compton shift considering the energy and momentum conservation laws	PSO-1, PSO-2
CO-8	Analyse the concept laser action, conditions required, Einstein's A, B co-efficients, detailed idea of 3-and 4-level laser system and their working, basic principle of holography	PSO-1, PSO-2, PSO-3
CO-9	Get some elementary idea about the optical fibre, its type, various terminology	PSO-1, PSO-2, PSO-3

Course Title: Electronics (Unit-III)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand the working, characteristics and applications of semiconductor diodes, idea of clipper and clamper	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Analyse the working of PNP and NPN transistor, current components in a junction transistor CB, CE and CC configurations of transistor and their comparison.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Know about the working of a CE transistor amplifier, hybrid parameters,	PSO-1, PSO-2, PSO-3
CO-4	Recollect different types of biasing methods for transistor.	PSO-1, PSO-2, PSO-3
CO-5	Understand the construction, working and industrial applications of FETs,	PSO-1, PSO-2, PSO-3
CO-6	Understand Operational amplifier, concept of virtual ground, applications of OP-AMPS.	PSO-1, PSO-2, PSO-3
CO-7	Generate some idea of feedback amplifier and its working, various types of oscillators	PSO-1, PSO-2
CO-8	Idea of principle of radio transmission and reception using block diagrams	PSO-1, PSO-2, PSO-3
CO-9	Get detailed idea about the role of ionosphere in radio wave propagation	PSO-1, PSO-2, PSO-3

Course Title: Statistical Mechanics (Unit-IV)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Remember and describe micro and macro states	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Analyse the differences in micro-canonical, macro-canonical and grand canonical ensembles.	PSO-1, PSO-2, PSO-3
CO-4	Analyse the phase transition of different systems.	PSO-1, PSO-2,



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		PSO-3
CO-5	Distinguish different types particles, and understand between of particle statistics.	PSO-1, PSO-2, PSO-3
CO-6	Distribute particles, and fermions among classical bosons energy levels.	PSO-1, PSO-2, PSO-3

Paper- H6 (PRACTICAL: NON-ELECTRONICS)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Investigate the working of LCR circuit, Anderson's bridge,	PSO-5
CO-2	Use the concept of diffraction in a grating to determine lines per cm and wavelength of unknown radiation, Using the idea of interference in Fresnel Biprism how one can determine the wavelength of unknown radiation	PSO-5
CO-3	Determine experimentally the mechanical equivalent of heat and study the B-H loop for a ferromagnetic specimen	PSO-5

Course Outcomes (COs): B.Sc. Physics Semester VI

Course Code-PHSH Paper- H7

Course Title: Nuclear Physics (Unit-I)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand different properties of the nucleus, binding energy, and the measurements of the size of the nucleus.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Analyse the concept of Q-equation in different nuclear reactions, and understand the radioactive decay of alpha, beta and gamma rays, and their fine structure spectra.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Analyse different nuclear models, viz., liquid drop model and shell model, and their applications.	PSO-1, PSO-2, PSO-3
CO-4	Understand generation of nuclear energy by nuclear fission and nuclear fusion processes; designing different types of fission and fusion reactors	PSO-1, PSO-2, PSO-3
CO-5	Design and analyse various nuclear detectors and their applications.	PSO-1, PSO-2, PSO-3
CO-6	Understand the concept of nuclear force, design different types of accelerators for production of elementary particles, and analyse different properties of elementary particles based on the Quark Model	PSO-1, PSO-2, PSO-3



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Course Title: Quantum Mechanics (Unit-II)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand physical situations where classical physics fails, and how quantum concepts explain it.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand the mathematical basis of quantum theory and concept of probabilistic approach.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand the concept of quantization and discrete energy states.	PSO-1, PSO-2, PSO-3
CO-4	Apply the quantum theory to many idealistic situations and solve problems.	PSO-1, PSO-2, PSO-3
CO-5	Apply quantum theory and perform mathematical analysis of more complicated systems	PSO-1, PSO-2, PSO-3
CO-6	Apply quantum theory to a real world example of hydrogen atom and look at limitations of the quantum theory.	PSO-1, PSO-2, PSO-3

Course Title: Condensed Matter Physics (Unit-III)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Understand crystal structures, crystal planes and directions, and Miller indices.	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand Bragg's law and methods of crystal structure determination.	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand free electron gas model and band model (Kronig Penney model).	PSO-1, PSO-2, PSO-3
CO-4	Apply the band theory to understand the motion of charge carriers in solids.	PSO-1, PSO-2, PSO-3
CO-5	Understand the concepts of magnetization and origin of magnetism in an atom, and differentiate between dia, para and ferromagnetic materials.	PSO-1, PSO-2, PSO-3
CO-6	Understand the quantum theory of dia, para and ferromagnetic materials.	PSO-1, PSO-2, PSO-3



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Course Title: Digital Electronics, Computer (Unit-IV)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Get basic idea about digital electronics like binary and decimal number system, their inter-conversion, binary addition and subtraction, Boolean algebra	PSO-1, PSO-2, PSO-3, PSO-4
CO-2	Understand the working of various logic gates like AND, OR and NOT gates using discrete components	PSO-1, PSO-2, PSO-3, PSO-4
CO-3	Understand the working of various combinational circuits adder and subtractor, multiplexer, flip-flops	PSO-1, PSO-2, PSO-3
CO-4	Generate the idea of different operating systems, idea of simple MS- DOS commands	PSO-1, PSO-2, PSO-3
CO-5	Get some elementary idea about flow-chart, algorithm, programming using BASIC.	PSO-1, PSO-2, PSO-3
CO-6	Idea about different BASIC commands.	PSO-1, PSO-2, PSO-3

Paper- H8 (PRACTICAL: ELECTRONICS)

Sl. No.	On completing the course, the student will be able to:	PSOs addressed
CO-1	Investigate the working of triode and to determine the voltage gain, working of a transistor (its input and output characteristics), characteristics of Zener diode and study of line and load regulation	PSO-5
CO-2	Investigate the working of static, dynamic and transfer characteristics of FET	PSO-5
CO-3	Construct half and full wave rectifier with and without R-C filter	PSO-5
CO-4	Study of operational amplifier (IC-741)	PSO-5
CO-6	Design the logic circuits like OR, AND & NOT circuit using discrete components, Boolean expression and realization of relevant truth tables	PSO-5



Department of Zoology

BScH and BScG (Zoology)

SEMESTER I

Paper -I

Unit I: Non-Chordates-I(Without Coelom)

All non-chordates are not schizocoelomates. Phylum porifera are known as acoelomate while phylum Aschelminthes and Nematoda are pseudocoelomates. Non-chordates are animals without a notochord – the rod-like elastic structure that supports the body. Members of phylum Protozoa, Porifera, Cnidaria, Platyhelminthes, Aschelminthes, fall under Non-chordates without coelom. The objectivity of studying nonchordates without coelom are in-depth knowledge of the amoeboid, ciliary and flagellar locomotion, conjugation process in *Paramecium* canal system in *Sycon*, polymorphism of Siphonophora and excretory and nervous system in helminthes

Unit II: Non-Chordates-I(With Coelom)

The objectivity of studying nonchordates with coelom are in-depth knowledge of the origin, types, significance of coelom and metamerism, the different organ system of Cockroach, Pila, Asterias, Echinoderm larve and their evolutionary significance.

Unit III: Chordates (Protochordates to mammals)

The urochordates and cephalochordates are protochordates. . Protochordates are an informal category of animals named mainly for convenience to describe invertebrate animals that are closely related to vertebrates. This unit comprises of ciliary mode of feeding of *Branchiostoma*, life history of *Ascidia* with reference to retrogressive metamorphosis and evolutionary status of *Balanoglossus* . In this unit, in-depth discussion of different organ system of chordates are made which is extremely important for gathering knowledge of vital organ system of chordates.

Unit IV: Taxonomy and Classification

No scientific ecological survey can be carried out without identification of the species of ecological significance. There must be a large number of plant and animal species yet to be described in the biosphere . Without the knowledge of taxonomy, the discovery of new species of plants and animals is not possible and we cannot know much about the organisms of our surroundings. Therefore , there is a great necessity or utility of taxonomy.

SEMESTER II

Paper -I

Unit I : Cell Biology, Histology and Developmental Biology

Cell biology is devoted to the study of structures, molecular organizations and functions of specialized cells. The results of these studies are used to formulate the generalization applied to almost all cells as well as to provide the basic understanding of how a particular cell carries out its specific functions. The cell biology has helped to understand various complicated life activities such as metabolism, growth, differentiation, heredity and evolution at the cellular level. Histology is the study of tissues, including their role in the body, their anatomy, their interaction with body systems. It also helps in figuring out what causes certain diseases, how to treat those diseases, and whether the treatment has worked. Histology helps students gain insight into the development of complex organs and organ systems. When students evaluate the tissue of humans and animals with complex



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organs, they gain more insight into how organs and organ systems develop and change across the life course. The Life science discipline Developmental Biology aims to understand the processes that lead from the fertilisation of an egg cell (or equivalent) to the formation of a well-structured and functional multicellular organism. Developmental biology is that part of biology concerned with how changes in embryonic development during single generations relate to the evolutionary changes that occur between generations. It helps to explain how a variety of interacting processes generate an organism's heterogeneous shapes, size, and structural features that arise on the trajectory from embryo to adult, or more generally throughout a life cycle.

Unit -II: Applied Zoology

Applied zoology is a specialized branch of zoology which deals with animals that is associated with the economy, health and welfare of humans. It includes culturing animals for mass production for human use and to control or eradicate animals that are injurious to man directly or indirectly. The applied zoology is well equipped to tackle problems related to sustainable livestock development and to the management of companion animals, wild animals and zoo animals. This unit offers students an understanding of experiential learning on the methodology of fish culture, prawn culture, poultry, sericulture, apiculture, vermiculture and pest management.

SEMESTER III

Unit -I: Genetics

Genetics has always been concerned with the problem of how the hereditary information in DNA controls what an organism looks like and how it works. Classically this involved the use of genetic variants (mutants) to upset the biological function of the cells or organisms and, from the effect of these mutations, to make deductions about the way cells and organisms worked. Understanding genetic factors and genetic disorders is important in learning more about promoting health and preventing disease. Some genetic changes have been associated with an increased risk of having a child with a birth defect or developmental disability or developing diseases such as cancer or heart disease. At the molecular level, the availability of sequence information and genomic analysis, together with sophisticated techniques for gene replacement, and analysis of gene expression patterns gives us much more powerful tools for looking at the way genes work to make us what we are. Knowledge of genetics is fundamental to an understanding of how organisms, populations and species evolve.

Unit -II: Ecology

Ecology is the relationship between living organism, including humans and their physical environment. Existence in the world is made up of living and non-living things. Both have to co-exist in order to share the resources that are available within the environmental ecosystem. The understanding of this mutual co-relationship is ecology. It provides information for students about the benefits of environment and judicious use of natural resources in ways that make the environment healthy for future generations. It also provides new knowledge of the interdependence between people and nature that is vital for food production, maintaining clean air, pure water and sustaining biodiversity in a changing climate. The study of ecology is important for environmental conservation, resource allocation, reduce pollution etc.

SEMESTER IV

Unit -I: Microbiology, Parasitology and Immunology

Microbiology is a branch of biological science that studies microorganisms (also known as microbes), which are microscopic unicellular or cell-cluster organisms and infectious agents.



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Microbes play both negative and positive roles. Studying microbiology is crucial as students will know more about infectious pathogens such as bacteria, fungi, parasites, and viruses. Identify the prevention, diagnosis and the treatment of infectious pathogens. Microbiology studies will offer a new perception on the potential microorganism with various clinical applications for the improvement of health. Microbes are vitally important to all life on Earth. As versatile organisms, they play a major role in various biochemical processes such as biodegradation, biodeterioration, climate change, food spoilage, epidemiology and biotechnology. Parasitology is the study of parasites, their hosts, and the relationship between them. As a biological discipline, the scope of parasitology is not determined by the organism or environment in question but by their way of life. Domesticated animals and birds are parasitized by a vast array of different parasites like helminths, protozoa and arthropods, many of which are fairly harmless, but others are lethal. This means that the impact of a parasitic infection varies considerably according to the species of the parasites involved. Parasitic organisms may be facultative or require obligate interactions with the host. Knowledge of the life cycle and developmental stages of parasites are critical for diagnostic identification. Immunology is the study of human immune system. The immune system is the ultimate personalised army, protecting us from any bacterial or viral invaders, but also in recognising and destroying potentially cancerous cells. The immune system protects us from infection through various lines of defence. If the immune system is not functioning as it should, it can result in disease, such as autoimmunity, allergy and cancer. Immunology focuses on maintaining and restoring the natural balance of the human immune system. In-depth study of immunology provides an opportunity to know the diseases caused by immune system dysfunction and develops new treatments that can manage or cure conditions by altering the way the immune system functions.

Unit -II: Tools and techniques in Biology

Long back, the biologists could learn about living things, only from what they could see with the naked eye. New tools and techniques were invented which helped in the study of finer structure of various kinds of organisms and their parts. Microscope not only revealed a world of minute organisms but also minute details of internal structure of organisms. In the course of history of biology, various new tools and techniques have developed, like microscopy, chromatography, electrophoresis etc. Cytochemical Methods is well developed and this method is using used to specific chemical constituents within the cells by differentiating a specific part from other parts with a specific stain or dye. Staining is done either by the use of certain dyes or by using the substrates of enzymes. These tools and techniques are the basic pillars on which all information regarding cell structure and function is based.

SEMESTER V

Unit -I: Adaptation, Zoogeography & Ethology

In evolutionary theory, adaptation is the biological mechanism by which organisms adjust to new environments or to changes in their current environment. This enables better survival and reproduction compared with other members of the species, leading to evolution. Adaptation, in biology, the process by which a species becomes fitted to its environment it is the result of natural selection's acting upon heritable variation over several generations. Organisms are adapted to their environments in a great variety of ways: in their structure, physiology, and genetics, in their locomotion or dispersal, in their means of defense and attack, in their reproduction and development, and in other respects. Zoogeography is very important for understanding and studying the factors in and modes of speciation. In addition to mapping the



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present distribution of species, zoogeographers formulate theories to explain the distribution, based on information about geography, physiography, climate, and geologic history, as well as knowledge of the evolutionary history and relationships of the animals involved. Ethology focuses on human and animal behaviour as it occurs in natural environments, particularly as it occurs in the environments to which a species has to adapt during the course of its evolutionary history. Ethology is the scientific study of animal behaviour including animal communication, predation, defense, aggression, mating, migration etc., most often in their natural conditions.

Unit -II: Animal Physiology

Studying of animal physiology is crucial for understanding and evaluating underlying biological processes, behavioural states and animal response to different biological, social and environmental stimuli. The various processes of animal body studied under physiology include gaseous exchange, osmoregulation, blood and circulation, digestion system, nervous system and endocrinology. Animal physiology is the study of how animals work, and investigates the biological processes that occur for animal life to exist. These processes can be studied at various levels of organization from membranes through to organelles, cells, organs, organ systems, and to the whole animal.

Unit -III: Biodiversity and Conservation

Biodiversity conservation, the practice of protecting and preserving the wealth and variety of species, habitats, ecosystems, and genetic diversity on the planet, is important for our health, wealth, food, fuel, and services we depend on. Biodiversity conservation is vital for economic growth and poverty reduction. Biodiversity conservation can help address the effects of climate change. Conserving habitats can reduce the amount of carbon dioxide released into the atmosphere. Conserving mangroves and other coastal ecosystems can lessen disastrous impacts of climate change such as flooding and storm surges. Projects that reduce the vulnerability of species and ecosystems to climate change impacts can safeguard essential ecosystem services such as air and water purification, pollination and food production, and carbon sequestration. Scarce or contested natural resources are often at the root of conflict. Mismanaging natural resources and harming biodiversity can increase poverty and instability. Helping communities and individuals secure rights to use natural resources, and involving local communities in responsibly managing them, can prevent or minimize conflict and provide opportunities for economic growth.

Unit- IV: Biostatistics

Biostatistics deals with statistics and biology. Statistics is a branch of applied mathematics which deals with collection, presentation analysis and interpretation of numerical data. Elementary knowledge of biostatistics is a prerequisite for the study of animal and plant breeding as well as genetics. Both geneticists and animal and plant breeders deals with two types of characters viz., qualitative and quantitative characters. Qualitative traits are studied in mendelian genetics and qualitative traits in biometrical genetics. Course objective of Biostatistics are understand and infer results from Analysis of Variance and this technique compares means between two autonomous populations, understand the importance of survival data and why it requires its type of analysis technique and comprehend and clarify relevant risk ratios while comparing two populations.

SEMESTER VI

Unit -I: Evolutionary Biology

Evolutionary biology provides the key to understanding the principles governing the origin and extinction of species. It provides causal explanations, based on history and on processes of genetic change and adaptation, for the full sweep of biological phenomena, ranging from the molecular to the ecological. In Evolutionary Biology, some of the things you will learn about are: analysis of



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genomic data, behaviour of genetic variation in populations, animal diversity and the processes that have led to this diversity. "Nothing in biology makes sense except in the light of evolution" as emphasized by Theodosius Dobzhansky. Evolutionary Biology is the study of not just the principle of evolution but also the history of life, how did life evolve and why did life evolve.

Unit -II: Biochemistry

Biochemistry combines biology and chemistry to study living matter. It brings together all of the sciences to study the chemical and physical processes that occur in living organisms. It truly is the science of life. It powers scientific and medical discovery in fields such as pharmaceuticals, forensics and nutrition. With biochemistry, students will study chemical reactions at a molecular level to better understand the world and develop new ways to harness these. The findings of biochemistry are applied primarily in medicine, nutrition and agriculture. In medicine, biochemists investigate the causes and cures of diseases. Nutrition studies how to maintain health and wellness and also the effects of nutritional deficiencies.

Unit -III: Endocrinology and Reproductive biology

Endocrinology is the study of medicine that relates to the endocrine system which is the system that controls hormones. The objectivity of study of endocrinology are to explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, to describe the synthesis and modes of secretion of hormones, to explain how the secretion of hormones is regulated including the principles of negative and positive feedback mechanisms, to explain the consequences of under- and overproduction of hormones, to describe and discuss the roles of hormone receptors in hormone action including their location, type and signalling pathways, to compare and contrast the different mechanisms of action of hormones etc. The knowledge of reproductive biology will take a comprehensive look at this interesting and relevant process by examining the components of reproductive system and its processes in detail. For studying Reproductive biology, students will investigate the biological processes of reproduction, including the endocrinology and physiology of male and female reproduction, puberty, lactation and menopause.

Unit -IV: Molecular biology and Genetic Engineering

Molecular biology also plays a critical role in the understanding of structures, functions, and internal controls within individual cells, all of which can be used to efficiently target new drugs, diagnose disease, and better understand cell physiology. Molecular Biology gives you in-depth knowledge of biological and/or medicinal processes through the investigation of the underlying molecular mechanisms. Students will gain an understanding of chemical and molecular processes that occur in and between cells. Students will gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology. The prime objectivity of study of Genetic Engineering to illustrate creative use of modern tools and techniques for manipulation and analysis of genomic sequences, to expose students to application of recombinant DNA technology in biotechnological research.

Zoology (General)

Semester I (General)

Unit-I: Non-chordates-I(Without coelom)

Porifera, Cnidaria, Platyhelminthes, Aschelminthes, fall under Non-chordates without coelom. This unit deals with the structure, locomotory organ, conjugation process in *Paramoecium*, canal system and spicules of sycon, metagenesis in *Obelia* and morphological features of *Fasciola*. Continuous multiplication by binary fission is interrupted by conjugation as it is necessary for the survival and rejuvenation of the race of *Paramoecium*. The water circulatory system of *Sycon* also called



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as canal system is the characteristic feature of the phylum Porifera. Canal system is also known as aquiferous system. The canal system of sponges helps in food acquisition, respiratory gas exchange and also in excretion. The life cycle of *Obelia* represents a remarkable example of alternation of generation where the asexual and sessile phase of *Obelia* reproduces asexually by budding and gives rise to sexual and free-swimming medusa. This phenomenon of alternation between two diploid phases is termed as metagenesis.

Unit-II: Non-chordates-II(With coelom)

This unit elaborately dealt with digestive system of earthworm, pila, respiratory system of prawn cockroach, *Pila*, open and closed type of circulatory system, excretory system of earthworm and nervous system of cockroach and *Pila* which is extremely important for studying different system of nonchortes.

Unit-III: Chordata-I(Protochordates to Pisces)

This unit elaborately dealt with ciliary mode of feeding, excretion of *Branchiostoma*, retrogressive metamorphosis in *Ascidia*, respiratory system of *Petromyzon*, digestive, circulatory system of Lates and accessory respiratory system in fishes which is extremely important for studying different system of protochordates up to Pisces.

Unit-IV: Chordata-II(Amphibia to Mammal)

This unit elaborately dealt with digestive system of Columba and Cow; respiratory system of amphibia, birds and mammals; comparative study of heart and aortic arches of amphibia, reptiles, birds and mammals; cranial nerves, exoskeletal structures of birds and mammals which is of prime importance for studying different system of amphibia up to mammals.

Semester II (General)

Unit-I: Cell Biology, Histology and Developmental Biology

Cell biology is the study of cell structure and function, and it revolves around the concept that the cell is the fundamental unit of life. Focusing on the cell permits a detailed understanding of the tissues and organisms that cells compose. Cell biology examines, on microscopic and molecular levels, the physiological properties, structure, organelles (such as nuclei and mitochondria), interactions, life cycle, division and death of these basic units of organisms. By understanding how cells work in healthy and diseased states, cell biologists working in animal, plant and medical science will be able to develop new vaccines, more effective medicines, plants with improved qualities and through increased knowledge a better understanding of how all living things live. Histology, branch of biology concerned with the composition and structure of plant and animal tissues in relation to their specialized functions. The fundamental aim of histology is to determine how tissues are organized at all structural levels, from cells and intercellular substances to organs. Developmental biology aims to understand how an organism develops—how a single cell becomes an organized grouping of cells that is then programmed at specific times to become specialized for certain tasks.

Unit-II: Biochemistry, Animal physiology and Endocrinology

Biochemistry has become the foundation for understanding all biological processes. It has provided explanations for the causes of many diseases in humans, animals, and plants. It can frequently suggest ways by which such diseases may be treated or cured. Biochemistry is the basic need of life and plays an important role in nutrition, health and deals with body substance like enzymes,



carbohydrates, amino acids, fats, proteins, hormones, DNA, RNA, pigments etc. The discipline of animal physiology is underpinned by the concept of homeostasis of the intra and extracellular environments, neural and endocrine systems for homeostatic regulation and the various physiological systems including ionic and osmotic balance, excretion, respiration, circulation, metabolism, digestion. Endocrinology is the study of medicine that relates to the endocrine system, which is the system that controls hormones. Endocrinology is the field of hormone-related diseases. The high rise in endocrine diseases such as diabetes and goiter has offered a vast field for medical practitioners. Endocrinology also entails the coordination of many of the body's systems, including metabolism, respiration, excretion, movement, reproduction and sensory perception. These systems may be examined on a chemical or cellular level and are observed based on chemical cues and secretions by various organs within the body.

Semester III (General)

Unit-I: Taxonomy & Classification, Evolution and Adaptation

Taxonomy is the functional science which deals with the identification, nomenclature and classification of different kinds of organisms all over the world. Classification is the ordering of animals or plants into groups on the basis of their relationship. Taxonomy makes us aware of and gives us information regarding the diversity of plants and animals. It makes the study of different kinds of organisms much easier. It tells us about the inter-relationship among the various organisms. Taxonomy provides basic understanding about the components of biodiversity which is necessary for effective decision-making about conservation and sustainable use. Classification helps us to learn about different kinds of plants and animals, their features, similarities and differences. Evolution is based on the theory that all species are related and they gradually change over time. The importance of studying Evolutionary biology is mainly to understand the principles behind the origin and extinction of species. *Adaptation is the physical or behavioural characteristic of an organism that helps an organism to survive better in the surrounding environment*. The study of adaptation aims to understand the fit between organismal form and function across the living world.

Unit-II: Ecology, Ethology, Zoogeography & Biodiversity

Ecology is the study of how organisms interact with one another and with their physical environment. Ecology provides information about the benefits of ecosystems and how we can use Earth's resources in ways that leave the environment healthy for future generations. Ecology enriches our world and is crucial for human wellbeing and prosperity. Ecology provides the essential basis for nature conservation. The scope of ecology is huge and it encompasses all organisms living on Earth and their physical and chemical surroundings and for the reason the field of ecology is usually divided into different levels of study including organismal ecology, population ecology, community ecology and ecosystem ecology. Ethology is the study of animal behaviour. The behaviour of animals is fundamental to whether individuals will survive and reproduce and studying their behaviour is therefore essential to fully understand evolution. Zoogeography is the branch of the science of biogeography that is concerned with geographic distribution (present and past) of animal species. Zoogeography is very important for understanding and studying the factors in and modes of speciation. Most biologists believe that so-called geographic speciation, which is caused by territorial isolation of populations, is the main if not the only way in which new forms and species are created. Biodiversity, the diversity of life on Earth is essential to a healthy functioning of ecosystems. Habitat loss and overexploitation driven by rapid population growth and unsustainable consumption patterns are the primary causes of biodiversity loss. Biodiversity



represents a wealth of systematic ecological data that help us to understand the natural world and its origins.

Semester IV (General)

Unit I: Applied Zoology II

This unit comprises of sericulture, apiculture, vermiculture and prawn culture, each has immense culture or rearing value. Applied Zoology is a discipline that is used to apply existing scientific knowledge to develop more practical applications. Sericulture is the cultivation of Silkworms to produce silk. Sericulture provides gainful employment, economic development and improvement in the quality of life to the people in rural area and therefore it plays an important role in anti poverty programme and prevents migration of rural people to urban area in search of employment. Apiculture is important because it provides bees with a safe place to work and live. Since bees pollinate many of our food sources, it's important to keep the bee population healthy. Additionally, apiculture provides an environment for study bee habitat and behaviour. Vermiculture is the cultivation of earthworms, especially in order to use them to convert organic waste into fertilizer. For the creation of fertile land that helps the development of crops and the oxygenation of the land there is a type of discipline that was dedicated to it is called **vermiculture**. A freshwater prawn farm is an aquaculture business designed to raise and produce freshwater prawns or shrimp for human consumption. The prawns are one of the most economically important fishery organism of India. It helps to earn a sizeable amount of foreign exchange. The prawns are the most esteemed food among the marine food organisms. Therefore, they are in great demand both in the local and international markets

Unit II: Genetics and Molecular Biology

Genetics is the branch of biology concerned with the study of the DNA of organisms, how their DNA manifests as genes, and how those genes are inherited by offspring. Genetics is the branch of biology that refers to the study of genes, genetic variations, and heredity in organisms. Understanding more about diseases caused by a single gene (using genetics) and complex diseases caused by multiple genes and environmental factors (using genomics) can lead to earlier diagnoses, interventions, and targeted treatments. Understanding genetic factors and genetic disorders is important in learning more about promoting health and preventing disease. Molecular biology chiefly concerns itself with understanding the interactions between the various systems of a cell, including the interactions between DNA (deoxyribonucleic acid), RNA (Ribonucleic acid) and protein biosynthesis as well as learning how these interactions are regulated. Molecular biology has clarified the nature of genes and the sources of variation. Comparative analysis of DNA and proteins continues to give us an exquisitely detailed view of patterns of variation, common ancestry, and how evolution works.

Semester V (General)

Unit-I: Parasitology and Medical Entomology

Parasitology is the scientific discipline concerned with the study of the biology of parasites and parasitic diseases, including the distribution, biochemistry, physiology, molecular biology, ecology, evolution and clinical aspects of parasites, including the host response to these agents. Parasitology, as applied in archaeological science, reveals paleopathological adaptation of parasites to humans with climate and social change. These lessons are relevant to the present state of climate change that enhances the ranges of many parasite species. It is extremely important to understand the life cycle and have strong knowledge of the developmental stages of parasites for positive diagnostic



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identification to occur. Medical entomology the branch of science that deals with insects that cause disease or that serve as vectors of organisms that cause disease in humans. Many blood-feeding insects like ticks, horseflies, and mosquitoes inject multiple bioactive compounds into their prey. These insects have been used by practitioners of Eastern Medicine for hundreds of years to prevent blood clot formation or thrombosis. Understanding the life cycle of a parasite provides valuable information concerning the individual infested, how the particular stage in the life cycle affects the host, the most common time of year for the parasite to be in the environment, types of infestation/sickness caused by the organism, vulnerable points in the life cycle for the best treatment and prevention

Unit-II : Microbiology and Immunology

Microbiology focuses on the structure, function and classification of microbes and looks for ways to exploit and control their activities. As microbes are essential for human life and as microbes can cause human diseases, microbiology is therefore very important. As microbes are absolutely required for most facets of human life (including the air we breathe and the food we eat) and are potential causes of many human diseases, microbiology is paramount for human society. By analysing microorganisms up close, microbiologists play a crucial role in combating disease, creating chemical products for agriculture, and even helping to keep the planet healthy. There are a myriad of practical applications that microbiology contributes to, including several parts of food production and medicinal applications. Immunology has its origins in the study of how the body protects itself against infectious diseases caused by microorganisms, such as bacteria, viruses, protozoa, and fungi, and also parasitic organisms, such as helminth worms. Immunology is the branch of biomedical science that deals with the response of an organism to antigenic challenge and its recognition of what is self and what is not. It deals with the defence mechanisms including all physical, chemical and biological properties of the organism that help it to combat its susceptibility to foreign organisms, material, etc. Knowledge of immunology helps to understand how the immune system develops, how the body defends itself against disease, and what happens when it all goes wrong.