

DEPARTMENT OF BENGALI
COURSE OUTCOME: BENGALI (HONS.)

1stSem. (Hons.):

Developing literary thought among the students at the same time increases the hard work of the imagination. The knowledge of the place of change of geographical range centering on the epochs of the age and the movement of religious thought in the society and culture of that time enlarged their minds. The stories of the mythical gods and goddesses reveals the glory of motherhood among the students on the one hand and on the other hand the father's anxiety towards the daughter seems to be burning.

2ndSem.(Hons.):

Innovation of various aspects and subjects of literature inspires new ideas of style building among the students. Teach the students about the famous personalities who built the various path of creation in the stage of literary activities. Rhetoric and rhyme awaken in students the power to appreciate the beauty and sweetness of literature.

3rdSem.(Hons.):

Ramayana helps students to develop a sense of brotherhood, ethics, responsibility, conscience, etc. Birangana develops special ideas and thoughts about the condition of girls and the changing nature of the environment. Saradamangal and Banalata Sen these literature taught the students to developed their own thinking, creative mind and built within them writing skills.

4thSem.(Hons.):

The morphology of essays and literature opens the eyes of students to theoretical analysis of subjects such as social literature, language, politics, etc. These literatures have a special effect on the character of a person through arguments etc. among the students. Fragments of Rabindranath's biography, on the one hand, evoke a sense of pre-independence nationalism in the students and on the other hand, various philosophical information takes their place.

5thSem.(Hons.) - 5th Paper:

Different linguistics and its divisions, use of words to change the meaning of words over different periods of time evokes analytical thinking in students. Madhusudan Dutt's *Is It Call Civilization* reveals the real truth of healthy culture and civilization among the Students.

5th Sem.(Hons.) - 6th Paper:

These literatures, on the one hand, inculcate the tenderness of the child's mind in the students, and on the other hand, the drama entitled *The Right to the Forest* reveals its form in the history struggle against the caste of the hero Birsa Munda. Novel, short story, poetry help the students to face real life challenges.

6th Sem.(Hons.) - 7th Paper:

Curiosity opens up a new world of thought in students where students become aware of the fact that the soul of poetry is not a sound word ornament but their juice.

6th Sem.(Hons.) - 8th Paper:

Students can realize the message of world love in their hearts by reading historical drama of Tripura. This literature reveals Rabindranath's theory of dynamism among the students. This paper gives the students a good idea of the nature of literature and its features.

COURSE OUTCOME: BENGALI (PASS.)

1st sem Pass:

Students became acquainted with the Charyapadas, the pattern of language literature in the first period of Bengali literature. Vaishnav Padabali highlight the sacred life story of Radhakrishna among the students. Students become aware of different genres of Bengali prose and its nature. Through this unit, students get rich information about the fathers and reformers of Bengali prose. Students can go beyond the traditional thinking in Meghnadabadh poetry lessons and come up with new ideas.

2nd Sem pass:

Through this unit, the students feed their talents and thoughts about the eminent writers of Bengali fiction and their works. This unit reveals the nature of information and truth among the students. This unit enhances the knowledge of the students about the history of India, the food of thought about the medium of instruction and the new form of mythological thought.

3rd Sem pass:

Rajarshi' the novel exposes the historical conspiracy of the kings of Tripura .As the historical knowledge of the students about the Nil Rebellion is enhanced through the play Nildarpan. A metaphorical drama Dakghar opens the door to an ugly and infinite world for students.

4th Sem pass:

In this unit, the student will know the complexities hidden in the hearts of the people above the historical, socio-political, etc. issues fully highlight the game of mental conflict, conscious and unconscious. Society and policy of the state instincts express the idea of human religion and its nature beyond selfishness etc. The inseparable relationship of man with nature is revealed in the novel padmanadirMajhi.

5th Sem pass:

This unit informs the students about Bangla Rhythm and its various sections and its requirements in Bengali language. The poetry "Sanchita" written by Kazi Nazrul Islam highlights the exploited and exploiter form among the students. Nazrul's accumulation

also creates a protest mentality among the students as well as encourages humanity to spread among the world.

DEPARTMENT OF ECONOMICS
COURSE OUTCOME: ECONOMICS (HONS.)

Sl No	Semester	Course Content	Course Outcome
1	I	Introduction to Economics	<ol style="list-style-type: none"> 1. Makes the learner familiar with the basic concepts of Economics. 2. Provides in depth idea regarding behavior of consumer with detailed analysis of Marshallian Utility Analysis, Indifference Curve Approach and Revealed Preference Theory 3. Develops the ability to analyse the behavior of a producer along with concepts of Cost and Revenue. 4. The learner gets acquainted with the concept of national income, its various measures, different methods of calculating national income and the problems associated with the methods.
2	II	Microeconomic Theory	<ol style="list-style-type: none"> 1. Develops the ability of the learner to understand and analyse the behavior of firms under different market structures. 2. Makes the learner able to distinguish different market forms on the basis of their features. 3. Provides a distinct idea about factor market. 4. Gives a detailed idea about Pareto Optimality and Social Welfare.
3	III	Macroeconomic Theory	<ol style="list-style-type: none"> 1. Develops the ability of the learner to connect the different macro economic variables and analyse the macro economic issues. 2. Develops the ability to figure out the factors that influence consumption and

			<p>investment at macro level.</p> <ol style="list-style-type: none"> 3. Makes the learner aware of the nominal economy with proper understanding of theories relating to demand and supply of money. 4. Learner gets acquainted to the details of inflation and business cycle.
4	IV	Public Finance and Basic Statistics	<ol style="list-style-type: none"> 1. The learner gets in depth idea about various sources of public revenue and the various channels of public expenditures along with the theories determining the same. 2. Creates ability to understand various sources of public debt 3. Provides knowledge on Tax and various types. 4. Statistical part disseminates the concepts on various measures of central tendency and dispersion.
5	V	Development Economics	<ol style="list-style-type: none"> 1. Creates ability amongst the learners to distinguish the difference between growth and development and understand the various measures of development including the concepts of sustainable development and human development. 2. Develops the ability to understand the various stages of economic growth and the structural approach of development including the theories on labour surplus economy. 3. Creates the concept of the nexus between economic development and environmental issues.
		Mathematical Economics and International Trade.	<ol style="list-style-type: none"> 1. Develops the ability to understand the basic concepts of some of the fundamentals of mathematics and their application in Economics. 2. Creates ability to interpret the economics behind the results obtained using various mathematical tools. 3. Creates concepts on international trade,

			<p>comparative advantage of trade and various policies on trade.</p> <p>4. Gather conceptual clarification on balance of trade and balance of payments.</p>
6	VI	Issues in Indian Economy	<p>1. Gives a detailed account of structure and trends of Indian economy along with detailed analysis of its broad sectors namely, the primary, secondary and tertiary sector.</p> <p>2. Creates ability to understand the financial system prevailing in India namely the money market and the capital market.</p> <p>3. The learners get acquainted to the concepts of Economic planning in India and New Economic Reforms.</p>
		Economic History of India and Basic Econometric Method	<p>1. Helps in conceptualizing the Economic history of India during 1857 to 1947.</p> <p>2. Develops knowledge on sampling technique and theoretical distributions and statistical inference.</p> <p>3. Develops knowledge on introductory Econometrics namely Classical Linear Regression Model and goodness of fit.</p>
		Project	<p>This part of the course content creates abilities amongst the learners to validate the theories, which they have learnt in previous semesters, through empirical verification.</p>

COURSE OUTCOME: ECONOMICS (GENERAL)

Sl.No	Semester	Course Content	Course Outcome
1	I	Economic Theory –I	<ol style="list-style-type: none"> 1. Provides basic concepts of both micro and macro economics. 2. Creates ability to understand the market and its equilibrium using the tools of demand and supply. 3. Develops ability to analyse consumer's behavior. 4. Develops ability to understand the interplay of macro- economic variables relating to concepts of national income, income determination model etc.
2	II	Economic Theory –II	<ol style="list-style-type: none"> 1. Learners learn the behavior of a producer and various concepts relating to cost and revenue. 2. Gets ability to distinguish between commodity market and factor market and identify various forms of market based on their features. 3. Gets acquainted with the theories of consumption and investment. 4. Gets ability to analyse the money market from money supply point of view.
3	III	Indian Economy	<ol style="list-style-type: none"> 1. Creates ability to make an assessment of Indian economy 2. Learners gather idea about the basic features of Indian Economy along with the issues of poverty and unemployment. 3. Understands the dynamics of agriculture and industrial sector of the country. 4. Provides concepts relating to economic planning in India, financial market of India and the

			agricultural and industrial issues of Tripura.
4	IV	Development Economics	<ol style="list-style-type: none"> 1. Elucidates the concepts of development, human development and various stages of economic growth. 2. Gets knowledge about various development models and choice of techniques. 3. Makes the learners understand the nexus between trade and development and planning and development.
5	V	Public Finance and international trade	<ol style="list-style-type: none"> 1. Makes the learner understand the role of State in development process and taxation system in India including the theories on taxation. 2. Creates in depth understanding of internal and external burden of Public debt. 3. Learners conceptualize trade and theories relating to comparative advantage. 4. Learners develop enough understanding on tariff and quota and exchange rate.

**DEPARTMENT OF EDUCATION
COURSE OUTCOME: EDUCATION (HONS.)**

Department of Education became functional since the year 1979 and has been offering courses in honours and general. The Department of Education became functional since the year 1979 and has been offering courses in honours and general. The department integrates content knowledge across disciplines and construct pedagogical content knowledge to provide culturally relevant instruction that prepares all students for the literacies needed in a changing and interdependent world. Learning outcomes are simple statements that describe what students should achieve and be able to do at the end of a specific period of time. They are observable and measurable by knowledge, skills, abilities, values, etc. on completion of the honours course; students are expected to hone all the skills.

Education (Hons)

SEMESTER	COURSE CONTENT	LEARNING OUTCOME
I	<p>Title of 1st Paper: Philosophical and Sociological foundation of Education Number of Units: 4 Course Content: Unit – I: Concept of Education Unit – II: Introduction to Philosophy of Education Unit – III: Basics of Sociology of Education Unit – IV: Education and Social System</p>	<ul style="list-style-type: none"> • Understanding the periphery and paraphernalia of Education as a discipline. • Education and its utility in society at large. • Tracing the changes taking place in socio-cultural human life from the glance of Education.
II	<p>Title of 2nd Paper: Educational Psychology Number of Units: 4 Course Content: Unit - I : Concept and Methods of Educational Psychology.</p>	<ul style="list-style-type: none"> • Understanding behavioral psychology with relation to Education. • Comprehending various emotional quotients and building of persona.

	<p>Unit – II : Learning process Unit – III : Intelligence and Creativity Unit – IV: Developmental Psychology</p>	<ul style="list-style-type: none"> • Steps of learning: scope, method and result with reference to learner’s psychology.
III	<p>Title of 3rd Paper: Development of Education system in India Number of Units:4 Course Content: Unit- I: Education in Ancient and medieval India Unit – II: Education during Pre independence period Unit- III: Education during post independence period Unit- IV: Recent issues in Education</p>	<ul style="list-style-type: none"> • To make familiar with the great Indian tradition of Education system. • Understating Education System in India from the perspective of History. • Scrutinizing the existing hindrances into the Education system of India for various socio-economic reasons.
IV	<p>Title of 4th Paper: Contemporary Trends and Issues in Education Number of Units: 4 Course Content: Unit – I : Education and Child Welfare Unit – II : Educational Organization and their roles Unit –III : Contemporary Trends in Education Unit – IV: Emerging Issues in Education</p>	<ul style="list-style-type: none"> • Understanding several layers of Education prevailing in India with pros and cons. • Understanding the Indian Education System from global lens. • Making aware on the trending topics in the field of Education.
V	<p>Title of 5th Paper: Measurement & Evaluation in Education Number of Units: 4 Course Content : Unit- I : Measurement, Assessment and evaluation in education. Unit - II: Tools and Techniques of assessment. Unit – III:Characteristics of a</p>	<p>5th Paper – The Course Outcome</p> <ul style="list-style-type: none"> • Understanding several nuances of Applied Education. • Making acquainted with Test Based Education System. • Developing problem-solving aptitude in a

	<p>good test.</p> <p>Unit – IV: Modern trends in evaluation</p> <p>Title of 6th Paper: Educational Technology & Management</p> <p>Number of Units: 4</p> <p>Course Content :</p> <p>Unit –I: Concept of educational technology, concept of Communication.</p> <p>Unit – II: System Approach, Programmed learning and computer in education.</p> <p>Unit – III: Concept of educational management.</p> <p>Unit –IV: Concept of educational planning.</p>	<p>comprehensive manner.</p> <p>6th Paper – The Course Outcome</p> <ul style="list-style-type: none"> • Understanding Education from technical perspective. • Making acquaintances towards modern approaches to Education like Virtual Media. • Making aware of the utility of educational planning and management.
VI	<p>Title of 7th Paper: Basics of Educational Research and Statistics</p> <p>Numbers of Units: 4</p> <p>Course Content :</p> <p>UNIT I: Concept and Types of Research</p> <p>Unit II : Major Approaches of Research</p> <p>Unit III: Basics Statistics and their uses</p> <p>Unit – IV : Inferential data Analysis</p> <p>Title of 8th Paper : Educational Theories and Ideas of Great Educators</p> <p>Number of Units: 4</p> <p>Course Content :</p> <p>Unit - I : Raja Ram Mohan Roy, Iswar Chandra Vidyasagar and Swami Vivekananda</p> <p>Unit – II : Rabindranath Tagore, Mahatma Gandhi and Sri Aurobindo</p> <p>Unit – III : Jean Jacques</p>	<p>7th Paper – The Course Outcome</p> <ul style="list-style-type: none"> • Importance, scope and nature of research in the field of Education. • Understanding methods and methodologies of educational research. • Imparting the basics of Data Analysis. <p>8th Paper – The Course Outcome</p> <ul style="list-style-type: none"> • Knowing great thinkers of Oriental and Occidental Education System. • Discussing various aspects and relevance of educational theories of thinkers. • Distilling the tenets of thinkers to make comprehensive awareness among learners.

	Rousseau, Johann Heinrich Pestalotzzi and F. W. August Froebel Unit - IV:Herbert Spencer, John Dewey and Madam Maria Montessori	
VI	PROJECT	<p>Project</p> <ul style="list-style-type: none"> • Make students critically sound to prepare projects. • Enkindling the spirit of research in the module of projects. • To grow logical and reasonable mindset through miniature research during the project making process.

COURSE OUTCOME: EDUCATION (GENERAL)

SEMESTER	COURSE CONTENT	OUTCOME
I	<p>UNIT-I : INTRODUCTION TO EDUCATION</p> <ol style="list-style-type: none"> 1. Meaning, nature and scope of education 2. Functions and factors of education 3. Aims of education – individual, social, vocational and democratic 4. Equalization of educational opportunity and the steps taken towards its attainment. <p>UNIT–II: CURRICULUM AND CHILD CENTRIC EDUCATION</p> <ol style="list-style-type: none"> 1. Meaning of curriculum 2. Types of curriculum 3. Principles of curriculum construction 4. Child centered education <p>UNIT-III: EDUCATION AND SOCIAL SUB-SYSTEM</p> <ol style="list-style-type: none"> 1. Agencies of education – formal, non-formal and informal 2. Role of education as an instrument of social change 3. Human rights education with special reference to child’s right 4. Culture and education - meaning, characteristics of 	<p>On completion of the course, students will be able to -</p> <ul style="list-style-type: none"> • Justify education as a social process and explain its function • List various agencies of education and their function • Appreciate the importance of education for social change, national integration and international understanding in a diverse social context. • Justify education as a sub-system of society and how other sub-system affects education.

	<p>culture and its relationship with education</p> <p>5. Socialization and social cohesion</p> <p>UNIT –IV: CURRENT ISSUES RELATING TO EDUCATION</p> <ol style="list-style-type: none"> 1. Inclusive education 2. Problems of education of the deprived classes : scheduled cast (SC), scheduled tribes (ST), women and rural population of the poor 3. Constitutional provision related to education 4. Liberalization, globalization and privatization in education 	
II	<p>UNIT- I: INTRODUCTION TO EDUCATIONAL PSYCHOLOGY</p> <ol style="list-style-type: none"> 1. Concept, need and scope of educational psychology 2. Methods of educational psychology 3. Application of educational psychology in teaching and learning 4. Stages of growth and development 5. Problems of adolescence <p>UNIT-II: INTELLIGENCE AND CREATIVITY</p> <ol style="list-style-type: none"> 1. Intelligence: concept and nature 2. Determinants of intelligence 3. Theories of intelligence 4. Creativity: concept and nature, characteristics of a creative person <p>UNIT-III: PERSONALITY</p>	<ul style="list-style-type: none"> • To enable the students to understand the nature of educational psychology • To enable them to understand different aspects of personality and its development • To develop and understanding of the process of learning • To make them understand the nature of intelligence and creativity

	<p>AND INDIVIDUAL DIFFERENCE</p> <ol style="list-style-type: none"> 1. Concept of personality 2. Types and trait approaches to personality 3. Development of personality 4. Individual differences : it's educational significance <p>UNIT-IV: LEARNING</p> <ol style="list-style-type: none"> 1. Learning: meaning and nature 2. Factors associated with learning 3. Theories of learning : Trial and error, Classical conditioning and Gestalt theory of learning 4. Transfer of learning 	
III	<p>UNIT-I: EDUCATION IN ANCIENT AND MEDIEVAL PERIOD</p> <ol style="list-style-type: none"> 1. Vedic education: aims, curriculum, methods of teaching, rituals and ceremonies 2. Brahmanic education: aims, curriculum, methods of teaching, rituals and ceremonies 3. Buddhist education: aims, curriculum, methods of teaching, rituals and ceremonies 4. Islamic education: aims, curriculum, methods of teaching, rituals and ceremonies <p>UNIT-II : EDUCATION IN EARLY BRITISH PERIOD</p> <ol style="list-style-type: none"> 1. Activities of Serampore 	<ul style="list-style-type: none"> • Understanding the Indian Education System from global lens. • To create an awareness about the various commissions and their recommendations.

	<p>mission and Fort William College</p> <ol style="list-style-type: none"> 2. Historical perspective of Macaulay's Minutes and Bentinck's resolution, Adam's report and its recommendation 3. Bengal Renaissance; educational contribution of Raja Rammohan Roy , Derozio and Vidyasagar 4. Woods Despatch(1854): historical perspective and its influence on the subsequent development of Indian education <p>UNIT-III:EDUCATION DURING PRE-INDEPENDENCE PERIOD</p> <ol style="list-style-type: none"> 1. Recommendations of Indian Education Commission-1882 2. Lord Curzon's educational policies and their impact on Indian education 3. National Education Movement 4. Sadler commission -1917: historical perspective , reports and their influence on the subsequent development of Indian education <p>UNIT-IV: EDUCATION IN POST-INDEPENDENCE PERIOD</p> <ol style="list-style-type: none"> 1. Radhakrishnan Commission – 1948 with special reference to Rural University 2. Mudaliar Commission- 1952-53 3. Kothari Commission – 1964-66 4. National Education Policy 	
--	---	--

	(NEP) and Revised Education Policy of 1992	
IV	<p>UNIT-I: INTRODUCTION TO MEASUREMENT AND EVALUATION</p> <ol style="list-style-type: none"> 1. Concept of measurement and evaluation 2. Distinction between measurement and evaluation 3. Needs and types of evaluation 4. Bloom's Taxonomy of Educational Objectives under Cognitive Domain <p>UNIT-II: TOOLS AND TECHNIQUES OF EVALUATION</p> <ol style="list-style-type: none"> 1. Different types of tools and techniques of evaluation 2. Concept of standardized and teacher made test 3. Characteristics and method of determining Reliability by Test – Retest method 4. Validity and methods of determining concept validity 5. Factors effecting Reliability and Validity <p>UNIT-III: BASIC CONCEPT OF EDUCATIONAL DATA</p> <ul style="list-style-type: none"> • Tabulation of educational data • Measures of Central tendency : Mean, Median and Mode • Measures of Dispersion: Range, Quartile Deviation (QD) and Standard Deviation(SD) • Graphical Representation of Educational data(Histogram, Frequency Polygon and Cumulative Frequency Curve) 	<ul style="list-style-type: none"> • To enable the students to understand the concept of measurement and evaluation as applied to education. • To familiarize the students about the various types of educational and psychological tests. • To enable the students to develop the competency in solving various statistical problems

	<p>UNIT-IV: CORRELATION AND NORMAL PROBABILITY CURVE</p> <ol style="list-style-type: none"> 1. Concept of Correlation 2. Spearman's Rank Difference Method of Correlation 3. Product moment method of correlation 4. Normal Probability Curve: concept and characteristics 	
V	<p>UNIT-I:</p> <ol style="list-style-type: none"> 1. Swami Vivekananda(1863-1902) 2. Sri Aurabindo(1872-1950) <p>UNIT-II:</p> <ol style="list-style-type: none"> 1. Rabindranath Tagore(1861-1941) 2. Mahatma Gandhi(1869-1948) <p>UNIT-III:</p> <ol style="list-style-type: none"> 1. Jean Jacques Rousseau(1712-1778) 2. F.W. August Froebel (1782-1852) <p>UNIT-IV:</p> <ol style="list-style-type: none"> 1. John Dewey(1859-1952) 2. Madam Maria Montessori(1870-1952) 	<ul style="list-style-type: none"> • Discussing various aspects and relevance of educational theories of thinkers. • Distilling the tenets of thinkers to make comprehensive awareness among learners.
VI	PROJECT	<ul style="list-style-type: none"> • Make students critically sound to prepare projects. • To grow logical and reasonable mindset through miniature research during the project making process.

DEPARTMENT OF ENGLISH

COURSE OUTCOME: ENGLISH (HONS.)

The Department of English started its journey in the year 1979 and since then it has been offering honours and general courses in English. It exposes its students to English language, literatures in English, and anglophone culture through the study of literary theory as well as literary texts on poetry, dramas, essays and novels. Students are expected to strive, to be imaginative, rhetorically dexterous, and technically proficient and as a result, to gain a deeper insight into life. On the completion of the undergraduate programme, students are expected to:

- Account for the significance and the history of British and contemporary literatures of the world.
- Articulate an appreciation and understanding of diverse voices in literary history.
- Think about literary texts both critically and creatively.
- Write effectively and persuasively about a broad range of texts in English.
- Contribute to existing scholarly discourses in the field as a literary critic.
- Understand the diversity of experiences registered in texts by authors writing in English.
- Possess the advanced level of proficiency in English and thus acquire skills for interpersonal transactions in the competitive world.

COURSE OUTCOMES

HONOURS COURSE		
Semester	Course content	Learning outcomes
I	Students are introduced to the origin and development of British Literature from Old English Period to the Age of Pope, understand various literary types like tragedy, comedy, sonnet, lyric and novel, analyse	After the completion of this semester, students will be able to trace the developmental history of English Literature from Old English Period to 19th century. Be acquainted with major religious, political

	poetic structures of sonnet through the sonnets of Sir Philip Sidney, Thomas Wyatt as well as comprehend metaphysical poets with reference to the poems of Donne and Marvell.	and social movements from 14th to 19th century and their influence on literature. Learn various interpretative techniques to approach literary texts of varied genres.
II	Students will study the literary features of 19th and 20th century history of English Literature. Examine and study the dramas of Shakespeare, Ben Jonson, Marlowe, Synge & Shaw. Besides, the above, they will also study the sonnets of Shakespeare, namely —Let me not to the Marriage of True Minds & Shall I Compare to A Summer's Day.	Show familiarity with major literary works by British writers in the field of Drama and Poetry. Be competent enough to describe and discuss the themes brought up in Shakespeare's plays, poems and sonnets. Analyse the structures and organizations of his dramatic works and be able to identify major literary characters in Shakespeare's works
III	Students will study Milton's Paradise Lost Book-1, Dryden's MacFlecknoe, essays of Bacon, Addison and Steele, critically study and analyse the mock-heroic epic of Alexander Pope's The Rape of the Lock and examine 18th century dramas like Sheridan's The Rivals and Goldsmith's She Stoops to Conquer.	Distinguish literary texts that reflect the socio-cultural and political interest of the period and be equipped with the idea of comprehending concepts like epic poetry, mock-heroic epic poem and restoration comedy of manners. Analyse the distinctive prose styles of Bacon, Addison and Steele.
IV	Analyse critically the Romantic poetry of Wordsworth, Coleridge, Keats and P.B Shelley and the Victorian poetry of Tennyson, Browning, Arnold. Study the essays of Lamb and Hazlitt and 19th century fiction with reference to the novels like Jane Austen's Pride and Prejudice, Hardy's The Mayor of Casterbridge, Emily Bronte's Wuthering Heights and Charles Dickens' A Tale of Two Cities.	Trace the development of poetry during the romantic and Victorian age of literature. Understand the historical, socio-cultural and political interest of the period through its literary works. Define various elements of poetry such as diction, tone, form, genre. Determine the romantic age authors and their style. Identify the experiment of novel concepts and its structure

		through the powerful texts given.
V	<p>Analyse and critically study the history of English Language and examine the Scandinavian, Latin and Greek and French influence on the English Language. Critically analyse phonetics, rhetoric and prosody, and linguistics- Study its branches and Allied fields, European and American schools, contribution of Saussure, Phonology, Morphology, Syntax, IC analyses and morphological analysis.</p> <p>Analyse and critically study the poems of late 19th and 20th century poets like G.M. Hopkins, W.B. Yeats, T.S. Eliot, WH Auden, W. Owen. Study 20th century short stories of Joyce, Lawrence, Mansfield & Maugham.</p>	<p>Students will gain an overall idea about the external influences on the development of English language through ages. They will also attain greater understanding of the human communicative action through an objective study of language. Move towards better and intelligible pronunciation and improve the general standard of pronunciation in everyday conversation. Be familiar with the key concepts of linguistics and develop awareness of the latest trends in language study. Illustrate the differences in phonetics, phonology, morphology, syntax, semantics and pragmatics.</p> <p>In addition, students will be able to recognize and analyse 20th century poetry in terms of different schools of poetry and comprehend the development of 20th century fiction and elements of fiction- style, narrative forms and point of view.</p>
VI	<p>Analyse and describe the distinct features of Indian English Literature and study the works of New Poets, dramatists, new prose writers and R.K. Narayan's The Guide. Study and analyse North East Literatures in English with reference to the works of Temsula Ao, Mamang Dai, Robin S. Ngangom, Nanda Kumar Debbarma, Sachlang</p>	<p>Students will be able to explain the reasons behind the emergence of Indian English literature a distinct field of study. Trace the development of history of English literature from its beginning to the present day. Interpret the works of great writers of Indian writers in English. Demonstrate, through</p>

	<p>Tripura, Indira Goswami, Dhruva Hazarika and Mitra Phukan.</p> <p>Critically study and analyse literary theory of Aristotle, Longinus, Wordsworth, Coleridge, Arnold, Eliot.</p> <p>Study New Literature with reference to African, Canadian, Australian, Caribbean and American writers.</p>	<p>discussion and writing, an understanding of significant cultural and societal issues presented in Indian English literature.</p> <p>Possess an idea about the history of literary criticism and various literary theories. Apply critical and technical theory and vocabulary to describe and analyse, and formulate an argument about literary and other texts.</p> <p>Be well acquainted with the world literatures and know how a literary text, explicitly or allegorically represents various aspects of colonial oppression.</p>

COURSE OUTCOME: ECONOMICS (GENERAL)

I	Students will study British poetry (starting from Precursors of Romanticism) of Blake, Wordsworth, Coleridge, Keats and Shelley, Romantic nonfictional prose of Charles Lamb and a novel by Jane Austen (Pride and Prejudice)	Enable students to outline the development of romantic poetry and prose through the respective age. Also identify the romantic age authors and their styles.
II	Study short fiction of Mansfield, Lawrence, O. Henry, Maupassant, non-fictional prose of Lynd, Woolf, Foster& Lucas, Hardy's novel, The Mayor of Casterbridge and a comprehension of an unseen prose.	Enabled to develop critical thinking and imagination through long and short fiction and be familiar with cultural diversity through different representative samples of fiction. Enable them to write and appreciate different types of prose. Comprehension will develop the four LSRW language skills.
III	Study Phonetics, lyric as a literary type, rhetoric and prosody.	Comprehend the articulation of English speech sounds. Gain ability to read and write phonetic transcription. Identify the manner of articulation and classification of vowels and consonants. Adopt the functions of stress and intonation and experience advanced levels of English pronunciation. Have mastery over language by employing figures of speech in communication. Identify and analyse different types of lyric.

IV	<p>Students will study an Indian English Novel (The Guide), Indian English Poetry of Taru Dutt, Sarojini Naidu, Tagore, Nissim Ezekiel, Short Stories from Indian English by J. Lahiri and Keki. N. Daruwalla and North Eastern English writings of Indira Goswami, Robin S. Nangom, Nanda Debbarma, Sachlang Tripura and Temsula Ao.</p>	<p>Students will gather an authoritative knowledge about the varieties of poetry and prose of major Indian writers as well as identify the literary, cultural, historical, political influence of these fictional works in the literary world.</p>
V	<p>Students will study British drama, British poets like Shakespeare, Milton, John Donne, Andrew Marvel, Matthew Arnold, Robert Browning, Wilfred Owen & T.S. Eliot. They will also study how to attempt questions on Substance and Critical Appreciation of an unseen passage.</p>	<p>Students will be able to identify and analyse the distinct characteristics of Shakespearean pastoral drama. Studying of the British poets shall enrich the students through various perspectives readings in poetry. On the completion of the whole course, students will also be able to write analytically in a variety of formats, including essays, research papers, reflective writing, and critical reviews of secondary sources.</p>

DEPARTMENT OF GEOGRAPHY
COURSE OUTCOME: GEOGRAPHY (GENERAL)

COURSE OUTCOME OF GEOGRAPHY (GENERAL)		
SEMESTER	CONTENT	COURSE OUTCOME
SEM-I	<p><u>PAPER-I</u> <u>(THEORETICAL)</u></p> <p>PHYSICAL GEOGRAPHY</p> <p>Unit – 1: Nature of Geography</p> <p>Unit-2: Geotectonic and Geomorphology</p> <p>Unit-3: Climatology</p> <p>Unit-4: Hydrology and Biogeography</p>	<p>Unit – 1: This introductory course provides knowledge to the students with distinctiveness of geography as a field of learning in social science as well as in natural science. The philosophy and methodology of the subject is discussed in such a way that the students develop a keen interest in the subject and pursue it for higher study. It describes what Geography and Physical Geography are. Develop the knowledge on latest concepts in physical geography, geomorphology, oceanography, soil and biogeography and Human Geography. Understand the origin of various celestial bodies and the evolution and changes in various features on earth surface from past to present.</p> <p>Unit-2: Understand the principles of geomorphology and the processes (endogenetic and exogenetic processes) that shape the landscape. Knowledge and understanding on geomorphic processes, cycle of erosion etc.</p> <p>Unit-3: Understand the physical principles and processes governing the circulation and characteristics of the atmosphere and climates on Earth. Students will introduce with the component of climatology. Students will acquaint with the different aspects of climate and identification of climatic difference on the earth and consequences of human activities on the atmospheric processes.</p> <p>Unit-4: Understand the physical principles and processes governing the circulation and</p>

		<p>characteristics of water on Earth. Understand the distribution and dynamics of organisms and their environments. Students will acquire the Knowledge on ecology, ecosystem and sustainable development. Students will acquire the Knowledge of soil and soil forming processes</p>
<p>SEM-II</p>	<p><u>PAPER- II A</u> <u>(THEORETICAL)</u></p> <p>HUMAN GEOGRAPHY Unit-1: Population Geography Unit-2: Cultural and Settlement Geography</p> <p><u>PAPER- II B</u> <u>(PRACTICAL):</u></p> <p>Scale, Study And Interpretation Weather Maps Of India, Interpretation And Drawing Of</p>	<p>Unit-1: Students will introduce with the meaning, nature of Human geography and growth and distribution of Population. Understand population dynamics and migration. Understand political systems, states, territory, and borders</p> <p>Unit-2: Understand the basic elements of culture. Understand the variations on races and languages and distribution. Understand urban structure and development. Develop the knowledge of various settlement system depending upon the geographical features and phenomenon</p> <p><u>PRACTICAL:</u> Students will acquaint with the topographic study and representation of climatic data and their analysis. Understand various types of map scale. Students will acquire the knowledge of various Climatologic instruments reading. Students will acquaint with the study and interpretation of Topographical sheets and weather</p>

	<p>Temperature-Rainfall Graph, Climatological Instrument Reading, Concept Of Contour, Major Relief Features, Drainage Patterns, Broad Physiographic Division</p>	<p>map of India.</p>
SEM-III	<p><u>PAPER- III A (THEORETICAL):</u></p> <p>ECONOMIC GEOGRAPHY</p> <p>Unit-1: Economic Resources</p> <p>Unit-2: Minerals, Energy and Industrial Resources</p> <p><u>PAPER- III B (PRACTICAL):</u></p> <p>CARTOGRAMS: Concepts, drawing and interpretation</p>	<p><u>PAPER- III A (THEORETICAL):</u> Unit-1: Students will introduce with the meaning, nature of Economic geography, resources and economic activities in India and World. Understand the role of historical, environmental, cultural, and other factors in determining economic activities. Students will introduce with various types of farming and agriculture of the World.</p> <p>Unit-2: Students will introduce with various industries like iron, steel, cotton textile, chemical etc. Students will introduce with the various sectors of economy and the importance and spatial distribution of resources. Understand the various sources of energy resources and their importance and measures for conservation.</p> <p><u>PAPER- III B (PRACTICAL):</u> Students will acquaint with the use of different methods to represent different socio-economic and physical data and their analysis.</p>

<p>SEM-IV</p>	<p><u>PAPER- IV A (THEORETICAL):</u></p> <p>ENVIRONMENTAL ISSUES IN GEOGRAPHY</p> <p>Unit-1: Extreme events of Environment</p> <p>Unit-2: Environmental Pollution</p> <p><u>PAPER- IV B (PRACTICAL):</u></p> <p>Basic statistical techniques</p> <p>Computer assisted mapping using MS Excel</p>	<p><u>PAPER- IV A (THEORETICAL): Unit-1:</u> Students will introduce with the meaning and nature of Environment. Students will acquaint with the knowledge of extreme events and issues related to environment. Describe what are soil and its conservation.</p> <p>Unit-2: Students will gather knowledge about various environmental pollution and their sources and impact on living beings. Students will acquaint with the various controlling factors of pollution.</p> <p><u>PAPER- IV B (PRACTICAL):</u> Students will be able to organize, manage and present data graphically using frequency distribution, measures of central tendencies, and measures of partition values, scatter diagram and drawing of regression line.</p> <p>Students will acquaint with knowledge of present data graphically by using MS Excel.</p>
<p>SEM-V</p>	<p><u>PAPER- V A (THEORETICAL):</u></p> <p>REGIONAL GEOGRAPHY</p> <p>Unit-1: Geography of India</p> <p>Unit-2: Geography of North-East India with special reference to Tripura</p> <p><u>PAPER- V B (PRACTICAL):</u></p> <p>Map Projection: Concept, Classification And Drawing</p>	<p><u>PAPER- V A (THEORETICAL): Unit-1:</u> The introductory part of this semester will acquaint the students with the knowledge of region and regional geography and its divisions. From the unit-1, students will acquire the knowledge of geography of India in various aspects of physical and human geography.</p> <p>Unit-2: In this unit students will acquaint with the knowledge of various aspects of all physical and human geography of North-East India and with special reference to Tripura.</p> <p><u>PAPER- V B (PRACTICAL):</u> Students will learn about different forms of map projections and examine the difficulties in moving between two-dimensional and three-dimensional images. Define three kinds of map projections. Critically discuss the differences between two-dimensional and three-dimensional depictions of the Earth. Follow a procedure for translating a two-dimensional</p>

	FIELD REPORT	<p>image onto a three-dimensional object</p> <p>Field Report</p> <p>Students will acquire the Knowledge of communication with respondents. The students will be able to develop their knowledge base and will be able to think critically.</p>
SEM-VI	PROJECT WORK	<p>The paper will introduce the students about the fundamental aspects of research in geography. The students will be able to develop their knowledge base and will be able to think critically. The paper will prepare and encourage the students to take research as a career option in future.</p>

DEPARTMENT OF HISTORY
COURSE OUTCOME: HISTORY (HONS.)

COURSE	OUTCOME
<p>1st semester History of India (earliest times to 650 A.D)</p> <p style="text-align: center;">2nd semester History of India (650 to 1550 A.D)</p> <p style="text-align: center;">3rd semester History of India (1550 A.D to 1818 A.D)</p> <p style="text-align: center;">4th semester History of India (1818 A.D to 1947 A.D)</p> <p style="text-align: center;">5th semester Rise of the Modern West (Mid 15th to late 18th centuries) Modern Europe and the world (1800 A.D to 1939 A.D)</p> <p style="text-align: center;">6th semester History of North-East India (1826 A.D to 1949 A.D) History of China and Japan (1839 A.D to 1949 A.D)</p>	<p>As a course of History, we teach our students about Ancient India, Medieval India, Modern India. We also teach our students the History of Tripura and Assam (Regional History), History of China and Japan and History of Europe etc. By studying all these histories, students can know the social, economic, political and cultural status of different countries and nations which we need very much. Ancient history covers to the past events back to the beginning of writing and recording of events, incidents, discoveries and innovations.</p> <p>The study of ancient History extends as far as post classical History. This branch covers all continents inhabited by humans in the period of 3000 BC to 500 AD. This involves the study of Greek History, Western history and much more.</p> <p>Medieval history covers historic events which happened between the ancient period and modern period, which expands from the 6th to the 14th centuries. People learn about the Mughal Empire to the British colonized India, the history of China to the Gupta Empire.</p> <p>Modern history deals with the history of the world beginning after the Middle Ages. Generally the term “modern history” refers to the history of the world since the advent of the Age of Reason and the Age of Enlightenment in the 17th and 18th centuries and the beginning of the Industrial Revolution. There are World History and Indian History under this branch.</p> <p>The main focus in the History course at the UG</p>

level is on the stages the growth of Human civilization and the evolution of social system and on cultural and scientific development. The main aims outlined for History studying are:

1. To promote an understanding of the processes of change and development through which human societies have evolved to their present stage of development.
2. To promote an understanding of the common routes of human civilization and an appreciation of the basic unity of mankind.
3. To comprehend & get a clearer perspective.
4. Learn a basic narrative of historical events in a specific region of the world in a specific time frame.
5. Understand and evaluate different historical ideas, various arguments and points of view.
6. Evaluate competing interpretations and multiple narrative of the past,
7. Gather and assess primary historical evidence. Distinguish between primary and secondary sources.
8. Articulate factual and contextual knowledge of specific places and times, to make careful comparisons (across time, space and culture) and to discern how each generation uses the past for present purpose.

COURSE OUTCOME: HISTORY (GENERAL)

COURSE	OUTCOME
<p>1st semester History of India (earliest times to 650 A.D)</p> <p style="text-align: center;">2nd semester History of India (650 to 1550 A.D)</p> <p>Indian Heritage and Culture (FNDC)</p> <p style="text-align: center;">3rd semester History of India (1550 A.D to 1818 A.D)</p> <p style="text-align: center;">4th semester History of India (1818 A.D to 1947 A.D)</p> <p style="text-align: center;">5th semester Rise of the Modern West (Mid 15th to late 18th centuries) Modern Europe and the world (1800 A.D to 1939 A.D)</p> <p style="text-align: center;">6th semester History of North-East India (1826 A.D to 1949 A.D) History of China and Japan (1839 A.D to 1949 A.D)</p>	<p>As a course of History, we teach our students about Ancient India, Medieval India, Modern India. We also teach our students the History of Tripura and Assam (Regional History), History of China and Japan and History of Europe etc. By studying all these histories, students can know the social, economic, political and cultural status of different countries and nations which we need very much. Ancient history covers to the past events back to the beginning of writing and recording of events, incidents, discoveries and innovations.</p> <p>The study of ancient History extends as far as post classical History. This branch covers all continents inhabited by humans in the period of 3000 BC to 500 AD. This involves the study of Greek History, Western history and much more.</p> <p>Medieval history covers historic events which happened between the ancient period and modern period, which expands from the 6th to the 14th centuries. People learn about the Mughal Empire to the British colonized India, the history of China to the Gupta Empire.</p> <p>Modern history deals with the history of the world beginning after the Middle Ages. Generally the term “modern history” refers to the history of the world since the advent of the Age of Reason and the Age of Enlightenment in the 17th and 18th centuries and the beginning of the Industrial Revolution. There are World History and Indian History under this branch.</p> <p>The main focus in the History course at the UG level is on the stages the growth of Human civilization and the evolution of social system and on cultural and scientific development. The main aims outlined for History studying are:</p>

- | | |
|--|--|
| | <ol style="list-style-type: none">1. To promote an understanding of the processes of change and development through which human societies have evolved to their present stage of development.2. To promote an understanding of the common routes of human civilization and an appreciation of the basic unity of mankind.3. To comprehend & get a clearer perspective.4. Learn a basic narrative of historical events in a specific region of the world in a specific time frame.5. Understand and evaluate different historical ideas, various arguments and points of view.6. Evaluate competing interpretations and multiple narrative of the past.7. Gather and assess primary historical evidence. Distinguish between primary and secondary sources.8. Articulate factual and contextual knowledge of specific places and times, to make careful comparisons (across time, space and culture) and to discern how each generation uses the past for present purpose. |
|--|--|

DEPARTMENT OF KOKBOROK
COURSE OUTCOME: KOKBOROK (GENERAL)

COURSE OUTCOME: KOKBOROK

SEMESTER	CONTENT	OUTCOME
I	<p>Historical Development of Kokborok : Genetic classification, The Sino-Tibetan language family-its classification, position of kokborok within Sino-Tibetan language family within the Bodo – Garo- Koch sub branch of Tibeto Burman.</p> <p>Historical Development of Kokborok: Phonology, Morphology and Vocabulary, Historical Development in Phonology and morphology - comparative Vocabulary Indic loans and recent neologisms.</p> <p>History of Kokborok poetry: Poetry, Folksong, Rhymes, lullabies etc.</p> <p>History of prose, Drama: Growth of short stories, novels and non- fictional prose and Drama.</p>	<p>Students will acquire a profound knowledge about the History and development of Kokborok language and literature and apply the same for undertaking research. The study of literary texts will make the students comprehend various forms of literature like prose, poetry, drama and fiction. Knowledge of grammatical issues in the language will develop the correct usage of the language. Knowledge of the society and culture of Kokborok speaking people will be enhanced.</p>
II	<p>Kokborok Poetry: Dongoino ringdi by Bongshi Thakur, Lamao phaidi by Ramcharan Debbarma, Ogo sa kwrwini nukhung by Jugendra Chandra Debbarma, Naisingma by Kumud Ranjan Debbarma, Hachwk gwnagwi maichwlwi pino chung by shyamlal Debbarma, Haping garingo chibuksa Ringo by Chandra Kanta Murasing, Simalwng sakao holonggni khum by Nanda Kumar Debbarma, Norogno khlumjao by Budurai Debbarma, Phirogwi phaidi by Sunacharan</p>	<p>Students will gather basic knowledge about the elements of poetry. It will also enrich the students critical and analytical skills through various perspectives readings in poetry. Enhanced knowledge about the life and culture of people through the literary texts.</p>

	<p>Debbarma, Tabuk phano raima sormani kothoma by Sudhanya Tripura, Tal kwchang yorkhwlai thango by Sefali Debbarma, Achaima ha by Nabokishore Jamatia.</p>	
<p>III</p>	<p>Kokborok Phonology and Morphology: Kokborok phonology and Morphology Kokborok Vowels and Consonants (articulation and distribution) - Contrastive pairs, Clusterisation, Assimilation, Syncope (vowel deletion and Consonant deletion) - Syllable, its types and Structure Free and Bound Morphemes - Pronouns and Case particles - Verbal postpositions - Lexical Tone and its role in meaning distinction</p> <p>Kokborok Syntax and Semantics: Distinction between Roots and Affixes - Types and Functions of affixes in Kokborok - Comparative Vocabulary - Indic Loans and Recent Neologisms - Semantics of words (Synonyms, Antonyms, Homonyms) Semantics of Sentences elements (Agent, Experiencer, Relativiser, Nominalizer, Positioner, Causativizer and Transitivity, Instrument, recipient and Beneficiary)</p> <p>Basic Concepts of Translation and Transcription: Differences between Translation and Transliteration, Transliteration and Spelling Pronunciation - differences between translation and Transcription - Source language and Target Language - Basic concepts of Orthography, Symbol, Alphabet, Grapheme, Alpha Syllable, IPA and Phonetic Alphabet - Types of Transcription</p>	<p>Completion of this semester will equip the students to illustrate the differences in phonetics, phonology, morphology, syntax, semantics and pragmatics. Students will be able to comprehend the articulation of English speech sounds. They will identify the manner of articulation and classification of vowels and consonants. Students will also be able to adopt the functions of stress and intonation. They shall gain the ability to read and write phonetic transcription. Concepts of translation will enable the students to explore wide avenues in research.</p>

	<p>Exercises in Translation and transcription: Translation of words, Phrase and Sentences (Source Language: English / Bengali, target Language: Kokborok) Transcription of words and Sentences (Kokborok to IPA and / or IPA to Kokborok)</p>	
IV	<p>Novel : Hachuk khurio(part-1) by Sudhanya Debbarma,Langmani Rukungo by Suni Debbarma. Short Stories: Hathairai by Nagendra Jamatia, Choba kaisani ulo by Shyamlal Debbarma, Swmai by Binoy Debbarma, Mahajon kusu by Atul Debbarma, Kokborok Dramas: Hakor bisingni nokharbai sidi by Nagendra Jamatia, Longtraini Ekyalavya by Nanda Kumar Debbarma Literary Essays: Samaj bai Sonskriti by Alindralal Tripura,Jora tai tongthai hano rwgwi kokrbai by Naresh Chandra Debbarma, Sachwlangnikungkila & Aming by Nagendra Chandra Debbarma.</p>	<p>Completion of the semester will develop the critical thinking and imagination through long and short fiction and familiarize students with cultural diversity through different representative samples of fiction like novels, short stories, dramas and literary essays.</p>
V	<p>Kokborok Poetry: Sejama kwrwi by Gupibollap Kalai, Holong koksao Bolong Bisingo by Chandra Kanta Murasing,Khapang Rutugo Tabuk Rangchakni Satung by Nanda Kumar Debbarma, Chumwi Kolopjak Salo by Budhrai Debbarma, Tabukbo Korojak by Utpal Debbarma, Ang Bwrwi Wngmabai by Sifali Debbarma, Chwng Rojong by Narendra Debbarma, Blai Kwkhwrang by Gitya Kumar Reang,</p>	<p>Study of the texts will enable students to interpret and analyse the important works of Kokborok literature. It will also enable them to demonstrate poetry using poetic devices and metrical analysis.Students will be critically inclined and be inspired to contribute</p>

	Khapango Ehu Ehu Khorang by Sachlang Tripura, Hamya jora by Suranjan Kundu Chaudhry, Hayungni Thani by Sabita Debbarma Twimani Swrainwng by Laxmidhan Murasing.	their creativity.
--	---	-------------------

DEPARTMENT OF PHILOSOPHY
COURSE OUTCOME: PHILOSOPHY HONS AND GENERAL

Semester	Contents	Course Outcome
1 st Hons	Concepts of Pramana, Prtyaksa, Anumana, Upamana, Sabda, Self, Brahman, God, World, Body, Mind, Indian Philosophy-Carvaka, Jaina, Buddha, Nyaya, Vaisesika, Samkhya, Yoga, Mimamsa, Vedanta Philosophy,	Students will learn about Indian Philosophy
1 st Pass	Indian Philosophy-Carvaka, Jaina, Buddha, Nyaya, Vaisesika, Samkhya, Western Philosophy-Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant	Students will learn about Indian and western Philosophy
2 nd Hons	Western Philosophy: concepts of Soul, God, Knowledge, Belief, Truth, Substance, Idea, Image, Different Philosopher Views- Plato, Aristotle, Descartes, Spinoza, Leibnitz, Locke, Berkeley, Hume, Kant.	Prepared and Encourage students for research studies in Indian and Western Phiosophy.
2 nd Pass	Western Symbolic Logic, Mill Methods,	Students will learn about Symbolic Logic
3 rd Hons	Methods of Psychology, Behaviourism, level of Mind, Memory, Learning, Dream, Man and Society, Community, Group, Culture, Law and Custom, Democracy, Socialism, Gandhi Concepts of Truth, Sarvodaya, Ahimsa	Students are moral and ethical Development and active learning exercises teaching on Ethics, political theory and Psychology.
3 rd pass	Indian Ethics-Purusarthas, Low of Karma, Budha's Four Noble Truth, Jaina's Triratnas, western Ethics-	Students will learn about Indian and Western Ethics

	Moral Judgement, Hedonism-Mill, Bentham, Rigorism of Kant, Perfectionism of Hegel, Human Rights, Feminism, Environmental Ethics,	
4 th Hons	Introduction to logic: I.M.Copi Chapter-5,6,8,9, 10, 11, 12	Students will learn about introduction of logic: I.M.Copi
4 th Pass	Psychology. Nature and scope of psychology method of psychology, Philosophy of religion : Tribal, National and Universal Religion, Origin of Religion, Social Philosophy:	Students will learn about Psychology, Social, Political theory and Idea of Religion.
5 th Hons 5 th paper	Annambhatta, Tarkasamgraha with Dipika Section: 27, 28 and 29 Details buddhi, Anuvyavasaya, Smriti, anubhava, section-30,31,32,33,34 Details karana, karana-cause, three kinds of karana, pratyaksa, Sannikarsa Anumanakhanda; section-1,2,3,4,5, and 6 Details anumiti, paramarsa, paksata, vyapti, Svarta and parartha anumana, members of parartha anumana, different kinds of linga, Hetvabhasa and its different kinds, Sabda khandas, Sections 12,13,14 Details: sabda, concept of sakti, vyakti-saktivada, akriti saktivada, jati saktivada, vyakti, akriti and jati-saktivada, laksana and its different kinds, Guni -vriti and vyanjana, akamksa, yogata and sannidhi as the cause of the knowledge of a sentence, kinds of sabda, paratha, pramayavada, svatah pramayavada, upamana khanda.	After successful completion of course, Students will be able to understand various aspect of John Hospers, Sartre's, Swami Vivekananda, Ambedkar and Gandhi Philosophy.

5 th Hons 6 th paper	John Hospers-Word meaning, Definition, sentence Meaning, concepts, Truth, Knowledge, Logical Positivism, Existentialism,	Students will learn about john Hospers Philosophy and logical positivism, existentialism
5 th Pass	Swami Vivekananda- Karma and Jnana Yoga, Ambedkar-social Justice, Anihilation of Caste, Gandhian Ambedkar, Untouchables.	Students will be able to know about Swami Vivekananda, Ambedkar and Gandhi Philosophy
6 th Hons 7 th paper	Western Ethics: Nature and object of moral judgement, moral standards –Hedonism and its different forms, regorism, perfectionism, applied ethics: envirnmental ethics, professional ethics-educational,medicalethis, ethics of management, philosophy of religion: theories of origin of religion-anthropological an phychological,theistic and atheistic theories of God, National and Universal Religion, Swami Vivekananda: Jnana –Yoga,-concept of God, Maya and evolution of the concept of God, God in everything, the ideal of Universal Religion	Students will be able to understand his/her religion, make a good behaviour and a good responsibility for society.
6 th Hons 8 th paper	The Bhagavat Gita- Chapter-3,4,5,6, 7, 12,Karma , Jnana, Bhakti, Abhyas Yoga, Sannyas Yoga, Russell-chapter-5,8,11,12,13,14 The Problem of Philosophy,	Students will learn about the Bhagavat Gita and Russel-problem of Philosophy, he/ she will be attained new knowledge about world and life.

**DEPARTMENT OF PHYSICAL EDUCATION
COURSE OUTCOME: PHYSICAL EDUCATION (GENERAL.)**

The Department of Physical Education offers B.A. Programme of General Course. It Covers all important parts of Physical education theory and practical Sections. Because this is a interdisciplinary and interlinks with Science, Psychology, Historical and Philosophy Subjects. Its develops theoretical and Practical Under standing of the subjects. It develops the over all personality of students and prepared them to compete & succeed in their life. It develops the value of tolerance, progressiveness and make healthy Society.

Programme Specific Outcomes

After the Completion of B.A with Physical Education Subject Students will move to take Admission in B.P. Ed. ; Post graduate defoliant in Yoga and food and Nutrition Courses. Some players makes for NSNIS diploma courses in different games. Some are may take admission in M.A. in Physical Education.

	Context	Course Outcome
Semester I	Paper I (Pass) Physical Education (Theoretical) Unit – I Principal & History of Phy. Edu.	Unit – I : This is introductory course, provides Knowledge to the students with A to Z History, meaning , Aim, objects, Nature Scope of the Subjects. This is also focus on the developments of this subjects in Indian, Misconception about this subjects after that How many Schemes launches by govt. for browed way.
	Unit – II Health	This Units provides browed Knowledge for personal & community concept regarding health, habits, dicases etc. prevention – control and first Aid concepts.

	Edu.	
	Unit – III Anatomy & Physiology (Part – I)	Unit – III : This units introduced first concept, regarding Human Anatomy & Physiology because max. students come from different Courses like Arts, Science, Commerce. So that this is provides Knowledge about body.
	Unit IV : Managem ent of Physical Education.	This Units provides all Knowledge about Managements of Sports and games. This is also provides Care and maintenance of sports equipment and facilities of grounds etc.
Semester II	Paper – II (A) Theory Principle & History of Phy. Edu. (II) Unit - I	This Unit Provide the knowledge of need and importance of Phy- Education in modern Society. This is also provide Knowledge of Olympic games ; Asia games Common Wealth/ games. This is also focus Philosophical aspect of PHE. In this Units students gain Knowledge about BMI & Concept of body types.
	Unit – II Anato my & Physiology (II)	In this Units students gain Knowledge about all human body systems and functions.
	Paper II (B) Practi cal	Athletic a) Track & Field : In this Section Students learn fundamentals of the matters like running, starting, action, Walking and Relay race.

		<p>b) Formal Activity : Students learn about Callisthenics & Drills.</p> <p>c) Yoga : In this section students learn about Suryanamaskar and 15 types Asanas for healthy life style.</p>
Semester III	Paper – II (A) Theory Unit I – Psychology & Phy. Edu.	This Unit provide the Knowledge of Psychology and sports psychology use in sports field for the betterment of players and his performance.
	Unit – II – Physiology of Exercise	This Unit Provide the Knowledge of human body and effect of exercises on the different types of human systems.
	Paper– III (B) Practical	<p>a) Athletic (Track & Field) This part provide the students Knowledge of long Jump, Tripla Jump, Shot put & Discus Thrown events.</p> <p>b) Gymnastic : This part provide general Knowledge for some gymnastic activities.</p> <p>c) Ball Games : This part provide the knowledge of students regarding Football/ Netball / Handball.</p>
Semester IV	Paper : IV (A) Theory Unit – I (Sports Training)	<p>This Unit provide the Basic Knowledge of the components of sports training speed, strength Endurance, Agility, Flexibility, Co-ordination, Warming up and Cooling down.</p>
	Unit – II Fitne ss	This Units provide the Knowledge & Scope of fitness and wellness and health Benefits of Modern Life style and Hypo Kinctiic Discuses.

	Paper – IV (B) Practical	Athletic : (Field Events) a) In this section students learn about High Jump, Javelin throw b) Indian games : (Kabaddi/ Kho-Kho)- students learn about rules and games skills. c) Ball games : (Volley ball/ Basket ball) students learn about rules and games skills.
Semester V	Paper – V (A) Theory Unit (Theoretical) I) Aspects	In this unit students learn about Common sports injuries, Different types of therapeutic exercises, prevention & care of sports Injuries.
	Unit – II Test, Measurements	In this units students learn about different types of Test & measurements uses in Sports fields.
	Paper : V (B) Practical I	a) In this Section students learn about. Badminton, Table tennis. b) Pranayama and Meditation. c) First Aid Box Uses d) Activity Record Book (Sem. II to V)
Semester: VI	Project Work	In this Semester only pass students those are interested for Physical Edu. Project they were chose any games and make a project (80 marks) and 20 Marks viva. Total = 100 Marks.

DEPARTMENT OF POLITICAL SCIENCE
COURSE OUTCOME: POLITICAL SCIENCE HONS AND
GENERAL

Programme Outcomes
<p>The Department of Political Science offers B.A. Programme of both Honours and General courses. It covers number of areas in Political Science like, Political Theory, Western and Indian Political Thought, Indian Government and Politics, Public Administration, International Relations and Organizations, Comparative Government and Politics, Political Sociology, Indian Constitution and Planning and Human Rights. The learning outcome of the programme as follows.</p> <ul style="list-style-type: none"> • It develop comprehensive understanding of the subject Political Science by teaching both conventional and new areas of political theory, political philosophy, Indian politics, comparative politics, public administration and international politics, Political Sociology, Public Administration and Human Rights and Gender Studies. • It develops comprehensive and interdisciplinary knowledge by emphasizing interlinkages between various political, economic and social issues and challenges. • It generates socially-informed knowledge and caters to the educational upliftment of marginalized communities through papers like Human Rights, Political Ideas in Modern India and Women and Politics in India. • It develops theoretical understanding of the subject Political Science and empirically grounded knowledge of the subject. • It motivates and informs students about the opportunities and future prospects in the field. • It develops the overall personality of students and prepare them to compete and succeed in their endeavors. • It provides a progressive, healthy and vibrant environment to its students as well as teachers for the purpose of developing a department known for its academic and intellectual pursuit. • It inculcates the values of tolerance, progressiveness and fraternity that contribute towards the making of a healthy and prosperous society.
Programme Specific Outcomes

On completion of the BA with Political Science, students will be able to.....

- Understand the basic themes, concepts and understanding of Political Science.
- Acquaint with range of issues relation to politics across the globe.
- Understand Political Science in a comparative approach.
- Develop critical thinking and aptitude of logical deliberation.
- Helps to prepare for various type of competitive Examination.
- Help to become an accountable and responsible citizen.
- Inspire to participate in the active politics.

Course Outcomes			
Sl No	Semester	Course	Course Outcomes
1.	1 st Semester (Hons)	Political Theory(Paper-1)	<ol style="list-style-type: none"> 1. Makes understand about the origin of politics, state and government 2. Explains about number of theories, approaches in understanding politics, state, government and governance. 3. Makes understand about sovereign state and its changing nature in the age of globalization. 4. It explains the significance of democracy and its most important aspects like liberty, equality, rights and justice etc. 5. It makes understand about the most contesting ideologies among the states like the capitalism and socialism. 6. It teaches about Gandhian concept of state, his idea of Sarvodaya and Satyagraha 7. It explains about social change and theory of evolution 8. It makes understand about the theories of change, viewed by Lenin, Mao and Gandhi.

<p>1st Semester (General)</p>	<p>Political Theory(Paper- 1)</p>	<ol style="list-style-type: none"> 1. Makes understand about the origin of politics, state and government 2. Explains about number of theories, approaches in understanding politics, state, government and governance. 3. Makes understand about sovereign state, its theories and its changing nature in the age of globalization. 4. It explains about the concept of democracy, nationalism and internationalism 5. It makes understand about the importance of law, liberty, rights and equality. 6. It explains about political parties, pressure groups and their roles in modern states. 7. It makes understand about the important concepts like individualism, socialism and welfare state etc. 8. I t explains about Marxian class struggle, revolution and Lenin's concept of imperialism
--	---	---

2.	2 nd Semester (Hons)	Western Political Thought (Paper-II)	<ol style="list-style-type: none"> 1. It gives the idea of political thought of western political thinkers and its contribution to the development of the discipline Political Science. 2. It explains about the ideas of state and government viewed by thinkers like Plato, Aristotle and Machiavelli etc. 3. It makes understand about sovereignty viewed by Hobbes, Locke and Rousseau. 4. It discusses the political thoughts of Utilitarian school like Bentham, J.S. Mill 5. It makes understand about the Hegelian concept of state. 6. It explains about political ideas like scientific socialism and democratic socialism.
	2 nd Semester (General)	Political Thought(Paper-II)	<ol style="list-style-type: none"> 1. It gives the idea of political thought of western political thinkers and its contribution to the development of the discipline Political Science. 2. It explains about the ideas of state and government viewed by thinkers like Plato, Aristotle and Machiavelli etc. 3. It discusses the political thoughts of Utilitarian school like Bentham and J.S. Mill concept of liberty. 4. It makes understand about Marxism and neo-Marxism. 5. It makes understand about the political ideas of Raja Ram Mohan Roy, Bankim Chandra and Vivekananda 6. It too explains about the political ideas of M.K. Gandhi, M.N. Roy, B.R. Ambedkar and Jawaharlal Nehru.

3.	3 rd Semester (Hons)	Indian Government and Politics (Paper – III)	<ol style="list-style-type: none"> 1. It makes understand about the framing of Indian Constitution and the role of Constituent Assembly. 2. It discusses about the Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, procedures of amendment and centre-state relations. 3. It makes understand about the functioning of Union Executives, State Executives and Union and State legislature. 4. It discusses about justice system and the
----	---------------------------------------	--	---

			<p>composition and function of Supreme Court and High Court.</p> <ol style="list-style-type: none"> 5. It too discusses about the Election Commission, Public Service Commission and its function. 6. It makes understand about the issues of caste and identity politics in India. 7. It too discusses about the political parties, interest groups of India and local self government in Tripura.
3 rd Semester (General)	Indian Government and Politics (Paper – III)		<ol style="list-style-type: none"> 1. It makes understand about the framing of Indian Constitution and the role of Constituent Assembly. 2. It discusses about the Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, procedures of amendment and centre-state relations. 3. It makes understand about the functioning of Union Executives, State Executives and Union and State legislature. 4. It discusses about justice system and the composition and function of Supreme Court and High Court. 5. It too discusses about the Election Commission, Public Service Commission and its function. 6. It makes understand about the issues of caste and identity politics in India. 7. It too discusses about the political parties, interest groups of India and local self government in Tripura.

4.	4 th Semester (Hons)	Public Administration (Paper – IV)	<ol style="list-style-type: none"> 1. It makes understand about the evolution of Public Administration as a separate discipline of Political Science. 2. It explains the differences between public and private administration and number of theories in understanding the dimension of administration. 3. It makes understand about principles of formal organizations, which distinguishes from informal organizations. 4. It explains about the function of Bureaucracy and their role in administration and policy making. 5. It makes understand about the evolution of Public Administration in India.
----	---------------------------------------	---------------------------------------	---

			6. It teaches about the status of Public Administration and its changing dimensions in the age of globalization.
4 th Semester (General)	Comparative Government and Politics(Paper – IV)		<ol style="list-style-type: none"> 1. It makes understand about the major constitutions of the world like UK, USA, China, USSR and France. 2. It explains about the salient features of UK Constitution, Rule of Law, the position and power of Crown, Prime Minister, Parliament and a comparative study between UK Cabinet and US Cabinet. 3. It makes understand of the salient features of the Constitution of USA, power and position of President, Congress, Supreme Court and a comparative study between US President and UK President. 4. It makes understand about the salient features of the French Constitution, power and function of President, Prime Minister, Parliament and the comparison between US President and French President. 5. It makes understand about features of the China constitution, Fundamental Rights, Fundamental Duties, role of Communist Party and makes comparison with UK and USA constitution.

5.	5 th Semester (Hons)	Indian Political Thought (Paper – V)	<ol style="list-style-type: none"> 1. It makes understand about the sources and salient features of Indian political ideas. 2. It teaches the theory of kingship viewed by Manu, Sukra and Kautilya. 3. It makes understand about the rise of liberalism India and the role of Raja Ram Mohan Roy. 4. It discusses the ideas of nationalism viewed by Bankim Chandra, Aurobindo Ghosh and Rabindranath Tagore. 5. It discusses about the state and socialism viewed by Vivekananda, S.C. Bose, M.K. Gandhi, and M.N. Roy's concept of Neo- Humanism and Gokhale's economic ideas. 6. It makes understand about the political ideas of Jaya Prakash Narayan and B.R. Ambedkar.
----	---------------------------------------	---	---

		Comparative Government and Politics(Paper – VI)	<ol style="list-style-type: none"> 1. It makes understand between the difference between Comparative Government and Comparative Politics. 2. It explains about parliamentary form of government, especially of UK. 3. It discusses about federalism and the presidential form of government, especially of US, and analyses how it is different from other federal states. 4. It discusses about political parties, interest groups, pressure groups of countries like UK, USA, China and France. 5. It explains about the legislature and executive, and its functioning method of UK, USA, China and France.
5 th Semester (General)		International Relation sand Organizations (Paper – V)	<ol style="list-style-type: none"> 1. It makes understand about state and nystate actors and their role in international society. 2. It discusses about the element of national power and how it shapes the foreign policy of a country. 3. It too makes understand about role of national interest in shaping the foreign policy of a country and it discusses the foreign policy of India, UK, USA and China. 4. It discussed about the Cold War and Neo- colonialism and how it influenced onThird World countries. 5. It makes understand about the NonAligned Movement and how it influenced the international politics during the Cold War. 6. It too discusses about the role of League of Covenant, United Nations and number of international organizations like SAARC, OPEC, WTO and IMF.

5 th Semester Foundation Course	Public Administration	<ol style="list-style-type: none"> 1. It makes understand about the evolution of Public Administration as a separate discipline of Political Science. 2. It explains the differences between public and private administration and number of theories in understanding the dimension of administration. 3. It makes understand about principles of formal organizations, which distinguishes from informal organizations.
--	-----------------------	--

			<p>4. It explains about the function of Bureaucracy and their role in administration and policy making.</p> <p>5. It makes understand about the evolution of Public Administration in India.</p> <p>6. It teaches about the status of Public Administration and its changing dimensions in the age of globalization.</p>
6.	6 th Semester (Hons)	International Relations (Paper – VII)	<p>1. It makes understand about the nature and scope if International Relations as a separate branch of academic discipline.</p> <p>2. It discusses about the element of national power and how it shapes the foreign policy of a country.</p> <p>3. It too makes understand about role of national interest in shaping the foreign policy of a country and it discusses the foreign policy of India, UK, USA and China.</p> <p>4. It discussed about the Cold War and Neo-colonialism and how it influenced on Third World countries.</p> <p>5. It too analyses about the changing dimension of international relations in the age of globalization.</p> <p>It makes understand about the Non - Aligned Movement and how it influenced the international politics during the Cold War.</p> <p>6. It too discusses about the role of League of Covenant, United Nations and number of international organizations like NTO, OPEC, ASEAN and SAARC.</p>

		Political Sociology (Paper – VIII)	<ol style="list-style-type: none"> 1. It makes understands about the meaning of political sociology, defining the relations between society, state and politics. 2. It discusses about social stratification I terms of castes, class and elites and these factors influence politics. 3. It makes understand about power, authority and legitimacy and discusses role of political culture and political socialization in shaping state’s political participation. 4. It makes understand about state and the role of military and types of states like autocracy, dictatorship and democracy.
			5. It explains about the role of tradition and modernity in shaping political development and social change.
6 th Semester Soft Study Course		Indian Constitution and Planning	<ol style="list-style-type: none"> 1. It makes understand about the historical development of the Constitution of India. 2. It discusses about the Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, procedures of amendment and centre-state relations. 3. It makes understand about the functioning of Union Executives, Union Legislature, Judiciary and the amendment procedure of the constitution. 4. It makes understand about the role of Planning Commission and NITI AYOOG in shaping India’s development and planning. 5. It too analyses about state development planning and the role of state government, districts and local bodies.
6 th Semester Project Work		Here, students choose their own subjects in consultation with his/her allotted project supervisor and submit a project to the department.	<ol style="list-style-type: none"> 1. It develops critical thinking. 2. It develops research aptitude. 3. It develops writing skill. 4. It introduces students to explore other areas of study besides their prescribed syllabus.

DEPARTMENT OF PSYCHOLOGY
COURSE OUTCOME: PSYCHOLOGY HONS. AND
GENERAL

1st Semester Major (H1: Basic Psychological Processes)

The syllabus of this semester (Major) has been arranged by few topics of general psychology in four units, which includes basic psychological process. General psychology is an important discipline because it focuses on understanding, explaining and predicting human behavior, emotions and mental processes. The principles of general psychology have an impact on relationships, in the workplace and in many other environments. General psychology is a science that relies heavily on observation and empirical data such as statistics. As a science, empirical data is vital to ensuring the concepts and principles of the science are accurate. Although psychology is defined as the study of the mind, there are many applications of general psychology that can help solve practical problems and issues. For instance, those suffering from repeated relationship problems can rely on the principles of psychology to understand and correct the issues for better relationships in the future. The theories that form general psychology are used in both practical settings such as a therapist's office and in research to better understand human behaviors, emotions and mental processes, according to the British Psychological Society. The principles of general psychology can help solve issues such as bullying, recovering from emotional, mental and physical trauma or stress. General psychology theories also promote personal development as the result of identifying and treating mental or emotional disorders that result from a variety of situations. Educationally, students studying psychology need to understand general psychology because it is the foundation of the discipline. Therapists,

counselors and psychiatrists each need to have a comprehensive, working knowledge of general psychology in order to work with clients in a professional setting.

1st Semester General (C1P1: Basis of Psychology)

The syllabus of this semester (General) is also divided into four units which comprises of basics of psychology, physiological psychology, developmental psychology and statistics. Studying this chapter will help students to:

- define Psychology and its goals
- trace the historical development of Psychology
- understand modern approaches to Psychology
- know the fields of study related to Psychology
- discover why Psychology is a science
- learn neural mechanisms of perception and behaviour
- know the body's response to a behavior or activity in an organism.
- Know how the nervous system intertwines with other systems in the body to create a specific behavior
- understand the interaction of Nature and Nurture
- trace human development from conception to death
- know the various stages of human development
- describe the changes at the prenatal stage
- trace growth from infancy to adolescence
- identify the issues of adolescence
- understand the process of cognitive, emotional, social, moral development of various stages
- understand to organize data, describe data, make inferences based on data

2nd Semester Major (H2: Biological Bases of Behaviour)

From this semester students are gaining both theoretical as well as practical knowledge. The theoretical portion of the syllabus provides the idea on the biological bases of behaviour. By studying physiological psychology students will learn human behaviour, emotion, perception motivation, learning and all other elements of psychology in terms of biological structures (different regions of the brain and organs of the endocrine systems) and physiological processes. Students will know that human beings biological machine, so mind and consciousness arise from biological processes. The students can impart knowledge on how the brain controls physical movements or regulates eating; the role of sex hormones in violent behavior; the effects of drugs on memory and personality; the physiological basis for sleep and dreaming; and the areas of the brain devoted to language functions. After studying physiological psychology the students will feel that there is no soul or spirit behind the mind; it's merely a physiological phenomenon.

The practical portion includes Psychophysics. The empirical laws of psychophysics are based on such measures as the magnitudes of stimuli just noticeably different from each other, the proportion of errors made when comparing two stimuli, the time required to complete such judgments, and self-reports of the confidence in comparative judgments or the strength of a stimulus. The main purpose to study psychophysics is to study the relationship between physical stimuli that occur in the "outside world", and the sensations they produce in the body's "inside world".

2nd Semester General (CIP2: PSYCHOLOGY OF LEARNING)

In this portion the whole syllabus, including theory and practical, the focus is on learning mainly the theories and related practical. The main outcomes are:

- Cognitive learning theory impacts students because their understanding of their thought process can help them learn. Teachers can give students

opportunities to ask questions, to fail, and think out loud. These strategies can help students understand how their thought process works, and utilize this knowledge to construct better learning opportunities.

- Teachers in a classroom can utilize positive reinforcement to help students better learn a concept. Students who receive positive reinforcement are more likely to retain information moving forward, a direct result of the behaviorism theory.
- Social learning theory focuses on the concept of children learning from observing others by acting on or not acting on what they see exhibited by their classmates.
- Through Trial and Error theory of learning the students can realize that they have to make a number of unsuccessful attempts before they arrive at the desired result. They should, therefore, be trained to make attempts over and over again, and without feeling bored. The students' motto should be 'try, try again'.
- Through the practical on learning disability students can learn to assess learning disability among the child of the age of 13-15 years. Early diagnosis not only improves the child's ability to reach their academic potential, but also prevents the development of low self-esteem and behavior problems that further interfere with their ability to learn.

3rd Semester Major (H3: Statistical Methods in Psychological Research)

The theory and practical portion here is all about statistical methods and research methodology. Here the objective is to

- introduce basic statistical methods like calculation of combined mean, measures of variability, measurement of percentile and percentile rank
- understand to organize data, to describe data, to make inferences based on data

- know population and sample, sampling distribution.
- understand theoretical concept of standard error of mean for both large and small sample
- gather knowledge on nature and assumptions of parametric and non-parametric statistics and their uses for testing hypothesis.
- introduce the concept of hypothesis and degrees of freedom.

3rd Semester General (C1P3: Psychology of Intelligence)

This syllabus is purely on intelligence, whether it is general intelligence, emotional intelligence and social intelligence. Intelligence is important because it has an impact on much human behaviour. Psychologists believe that there is a construct, known as general intelligence (g) that accounts for the overall differences in intelligence among people. In their practical syllabus the students of this semester have non-verbal intelligence test and emotional intelligence test where they learn to measure concrete intelligence, intelligence functioning and also learn to measure emotional quotient of a person/s.

4th Semester Major (H4: Developmental Psychology)

This is on developmental Psychology only. The developmental psychology is a study of the major transitions from fetal development through death in the physical, cognitive, social and emotional domains. The major learning outcomes are

- Identify the major issues, tasks and milestones of human development, such as physical, cognitive, social and emotional development throughout the lifespan.
- Evaluate core concepts, strengths, and weaknesses of the major theories of lifespan development.
- Evaluate how ethnicity, culture, class, and gender influence lifespan development.

- Explain the impact of biological/genetic influences on physical growth, cognition and behavior.
- Assess how current research supports and critiques the major theories of development.
- Identify examples of physical and psychological changes occurring during adolescence
- Describe risk factors of behaviors common during adolescence, including drug abuse, suicide, eating disorders and forms of treatment available
- Discuss psychosocial and cultural factors which influence adolescent behaviour
- Describe and discuss a wide range of issues related to the psychology of exceptional individuals, with particular reference to learning characteristics.
- Demonstrate competence in identifying educational and related needs and to design appropriate instructional strategies which take account of both psychological characteristics and particular learning requirements.
- Demonstrate a high level of competence in critically evaluating research in the field and integrating significant findings with teaching practice.
- Outline and describe approaches to the delivery of special education services which provide for a satisfactory compromise between legal and practical constraints and sensitivity to the needs of the individual.
- Describe, discuss and analyse recent progress in Australia and overseas, in policy developments which affect the delivery of educational services to children and young people with disabilities.
- Describe and analyse social and political issues which affect the provision of special educational services.

4th Semester General (CIP4: Social and Industrial Psychology)

The syllabus includes Social and Industrial Psychology along with practicals on both the issues. Social psychology is concerned with the study of an individual's social behavior in his social attitudes. The knowledge of Social psychology will help students to manage their stress, depression and other social issues and improve their decision making and predict accurate future behavior based on

the understanding of past behavior. Through social psychology students come to know how the family environment may affect the personality of a child as well as what are the important considerations for proper socialization of children so they can achieve their potentials and become productive members of society. By studying social psychology students can learn thoroughly how society works and responds. The societal norms and their origin can be vividly understood. Conformity, discrimination, the occurrence of stereotypes, and prejudice could be known after a brief understanding of social psychology itself.

As Industrial Psychology is mainly concerned with studying different aspects of human behavior in the work environment, it has tremendous scope. The entire process of industrial management, dealing with people at work, and the problems linked with industry and personnel management are all included in Industrial Psychology. Hence, the major outcomes of studying Industrial Psychology are

1. Understanding Human Relations
2. Human Engineering
3. Recruitment, Selection and Placement
4. Development and Training of Personnel
5. Accident Prevention
6. Promotional Schemes and Wage and Salary Administration
7. Motivation, Attitude and Morale.

5th Semester Major (H5; Educational Psychology {5th paper} & Psychology and Social Issues {6th paper})

The syllabus of this semester is divided into two papers. There is Educational Psychology in 5th paper and Social issues in 6th paper along with practical in each paper. The outcomes are:

- By gathering knowledge in Educational Psychology the learner will understand the importance of role of Psychology in educational setting.
- The learner will understand applications of various theoretical perspectives to learning.
- The Learner will be able to understand the key elements of & approaches to counseling
- The Learner will understand the basic skills required for counseling
- The Learner will be oriented to the various ethical considerations in counseling
- The Learner will be able to appreciate the applications of counseling in various settings
- The Learner will be able to comprehend the steps of planning an intervention programme

The knowledge of Social psychology will help students to manage their stress, depression and other social issues and improve their decision making and predict accurate future behavior based on the understanding of past behavior. Through social psychology students come to know how the family environment may affect the personality of a child as well as what are the important considerations for proper socialization of children so they can achieve their potentials and become productive members of society. By studying social psychology students can learn thoroughly how society works and responds. The societal norms and their origin can be vividly understood. Conformity,

discrimination, the occurrence of stereotypes, and prejudice could be known after a brief understanding of social psychology itself.

5th Semester General (C1P5: Abnormal Behaviour)

The syllabus is purely on abnormal psychology along with practical.

- The learner will be able to understand the changing views of abnormality from ancient to modern times
- The learner will be able to recognize the various mental disorders, their symptoms, causes and treatments
- The learner will be able to understand the classification of mental illness through the global diagnostic systems
- The learner will be able to understand how prevention can be implemented from the micro to the macro levels.

6th Semester Major (H-6; Abnormal & Industrial {6th paper} & Practical {7th Paper})

In the theoretical portion students will learn abnormal psychology and industrial psychology. In the practical portion they will gather knowledge regarding psychological testing on mental state and issues related with organization and industry.

The outcomes of Abnormal Psychology:

- The learner will be able to understand the changing views of abnormality from ancient to modern times
- The learner will be able to recognize the various mental disorders, their symptoms, causes and treatments
- The learner will be able to understand the classification of mental illness through the global diagnostic systems

- The learner will be able to understand how prevention can be implemented from the micro to the macro levels.
- The students will know the concept of psychotherapy and brief outline of its kinds along with the implication of psychotherapy.

The outcomes of Industrial Psychology are:

As Industrial Psychology is mainly concerned with studying different aspects of human behavior in the work environment, it has tremendous scope. The entire process of industrial management, dealing with people at work, and the problems linked with industry and personnel management are all included in Industrial Psychology. Hence, the major outcomes of studying Industrial Psychology are

1. Understanding Human Relations
2. Human Engineering
3. Recruitment, Selection and Placement
4. Development and Training of Personnel
5. Accident Prevention
6. Promotional Schemes and Wage and Salary Administration
7. Motivation, Attitude and Morale.
8. Organizational behaviour
9. Causes, effects and management of stress
10. Consumer behaviour

DEPARTMENT OF SANSKRIT
COURSE OUTCOME: SANSKRIT (HONS.)

SEMESTER	CONTENT	OUTCOME
1	<p>UNIT 1- Maheshwar sutra & Pratyahrara,Sanskrit Alphabets:Places of Articulation & articulatory efforts , Samna& Paribhasa Prakaranam(Elementary Knowledge Technical Grammatical terms viz. Savarna, dirgha,guna,vridhi,samprasarana,upasarga,pratipadika,pada,it,ti,pragrhya ,ajahalinga,ades,agama,anubhritti,upadha Sandhi prakaranam(swara byanjana,visarga) Subhanta prakaranam UNIT 2- Tinganta prakaranam Krit Prakaranam UNIT 3-Hitopadesa(Mitralabh) UNIT 4-Manusamhita-Chapter 7(Slokas 1-79)</p>	<p>The word Sanskrit means purified and well ordered.Maheshwar Sutra or Shiva Sutra are 14 verses that organize the phonemes of Sanskrit as referred to in the Astadhtayayi of Panini, the foundational text of Sanskrit Grammar.Grammar is very important part of this language to make a sentence to know appropriate meaning of texts, oral communication and perfection.Grammar is the only way to know this language well.Studentswill get the basic knowledgeabout grammar. The Mitalabh is introduced with the statement that wise and sincere friends maybe poor or destitute but it is they who may help one achieve success in life. The book recommends that the good find good friends, they are like a vessel in which one deposits both joys and sorrows and it is not words that define a friend but their behavior and actions.Students will learn from mitralabh intelligent people become helpless and wealthy and fulfill their purpose together</p>

		like a good friend. Manusamhita is a Dharmasastra. The book helps the students know the Indian polity system and the importance of dharmasastra in Indian culture.
2	<p>UNIT 1- Karakprakaranam(Case ending, Account for Case Ending) Samasa Prakaranam(Naming and expounding Samasa of compounded words)</p> <p>UNIT 2 – Matrics:Gangadasa:Chhandomanjari (upto Samavritta-Indrabajra,Upendrabajra,Rathoddhat a,Shalini,Vamsasthabilm,druvilambitam,Prarharsini,Rucira,Vasantatilokm ,Malini,Mandakranta,Sikharini,Harini,Sardulabikritam,Sragdhara)</p> <p>UNIT 3- Kalidasa:Abhijnana Shakuntalam(1st to 4th Act)</p> <p>UNIT 4- Kalidasa:Abhijnana Shakuntalam(5th to 7th Act)</p>	<p>Karakprakaranam is most important topic in Sanskrit. When we are going to make any sentence in Sanskrit that time its necessary to use KarakPrakarana as per grammatical rules in Sanskrit samas means to make shortened.Students will learn from karaka and samasa correct factor division and application of compound. Identify of the process of Sanskrit slokas is fully based on Aksra and pause (yati).Ussually, placed at the end of a verse of a foot after 7,8 or 12 letters and sometimes within a word.Students can learn from chhanda of Gangadasa capacity to understand rhythm motion and composition.</p> <p>Complete introduction of Sanskrit drama and poetic style of Mahakabi Kalidasa.Students will learn from this drama we should not ignore or neglect our responsibilities.</p>
3	<p>UNIT 1- Bana-Kadamavari-Shukanasopadesha</p> <p>UNIT 2- Bharabi-Kiratarjuniyam(Canto-1)</p> <p>UNIT 3- BhattiKavyamm(Canto-2)</p> <p>UNIT 4- Kautilya-Arthashastra-Vinayadhikaranam(Chapter-</p>	<p>Shukunaupadesh-the advice given by minister Shukunasha to the prince Chandrapida, is one of the most popular portions of Banabhatta's Kadambari.Comprehensive Understanding of the popular</p>

	2,3,4,6,7,8,15,16)	<p>PROSE portion from Kadambari.</p> <p>Kiratarjuniyam is one of the mahakavyas or great epic of the classical Sanskrit literature. Bharavi author of this kavya is famous for the depth of meaning (Artha – gourabam). Students will learn from kiratarjuniyam Verse by verse understanding of complete 1st Sarga of Kiratarjuniyam. Appreciation of advanced poetic and linguistic aspects of Sanskrit Literature. Focussed explanations are helpful in exam preparation.</p> <p>Students will learn about from the Bhattikavya, the style of epic.</p> <p>Kautilya's Arthashastra provides on insight into the ancient Indian anthology of political wisdom, theory, and the art of State Craft. It is one of the major political and strategic treaties that constitute a collection of timeless concept.</p>
4	<p>UNIT 1- Bhasa: Swapnavasavadattam UNIT 2- History of Classical Sanskrit Literature Ramayana, Mahabharata, Puranas, Origin and Growth: lyrics Sanskrit Drama, Prose Literature, Fables, Historical Kavyas. Authors and their works: Aswaghosa, Bhasa, Kalidasa, Bhavabhuti, Sudraka, Bhatti, Visakhadatta, Bhattanarayana, Harsa, RajSekhara,</p>	<p>Verse by Verse and Line by line understanding of the complete drama of Swapnavasavadattam. Appreciation of basic poetic and linguistic aspects of Sanskrit literature. Focussed explanations helpful in exam preparation..</p> <p>The course will enable students to familiarize themselves with some leading classical prose works and the individual literary</p>

	<p>vana,.Subandhu,Dandin,Jayadeva. UNIT 3-History of Ancient Indian Science&Medicine- Susruta,Caraka,Jibaka,Aryabhatta,V arahmihira,Brahmagupta,Bhaskarach arya,Bhoja UNIT 4-History of Modern Sanskrit Literature Brief idea on authors and their works : Birendrakumar Bhattacharya,Srijeev Nyayatirtha,Siddheswar Chattopadhyaya,Rama Chowdhury,Jyotindrabimal Chowdhury,Tarapada Bhattacharya,Haridasasidhantabaghi sa, Radhaballav Tripathi,Abhirajrajendra Mishra, Revaprasad Dwivedi</p>	<p>styles of their authors. After the completion of this course the learner will be exposed to the socio-cultural condition of the Indian society as reflected in the prescribed texts. They will acquire skills advanced Sanskrit communication. This course will enable the students to appreciate short story and various story and general survey of modern Sanskrit literature. It will create an awareness of the modern history of the modern Sanskrit Literature. Graduates who read this course should be able to know the ancient tradition of Indian medicine system, which is focused not only to the physical health but a healthy lifestyle. After reading this paper, students will know the history of Ayurveda through original sources of ancient medicine system enshrined in Sanskrit texts like Charaka Samhita, Susruta Samhita, Astanga etc. and they will also get the basic knowledge of 8 departments of ayurveda.</p>
<p>5 (5th Paper)</p>	<p>UNIT 1- Vedic selection: Rig Veda: Agni,Surya,Indra,Pusan,Yama, Aksha,Hiranyagarva,Samjnana UNIT 2-Vedic Grammar&Padapath UNIT 3-History of Vedic Literature 1. SecularHymns, dialogueHymns, PhilosophicalHymns, educational system, Socio-Economic Condition,</p>	<p>The students would know about the vedic mantras and vedic grammer also.The students would know general grammar. The students would know about the vedic Brahmans texts and its importance.The students can take tye knowledge about</p>

	<p>Status of Women. 2. Main Contents and importance of Sama veda, yadur veda and atharva veda 3. Definition, Division and Importance of Brahmans, aranyakas nad Upanishads. 4. Introduction to Vedangas. Unit-4 Upanishads: Brhadaranyakopanisad (Adhyaya: 4:4th and 5th Brahmanas)</p>	<p>classification of Vedas, Date of Rig Veda, Socio-economic life in the age of rig veda, The different hymns of rig veda and its philosophical importance. The Brihadranyaka Upanishads is one of the principal Upanishads and one of the 1st upanishadic Scriptures of Hinduism. A key scripture to various schools of Hinduism the Brihadranyaka Upanishad is 10th in the muktika or canon of 108 upanishads. The primary message of the Upanishads urges us to dedicate ourselves in a way that we can always experience our best moments, they want us to be in a state of being where we feel to the core of our brings that place of connection between the small and the large. The students will learn different spiritual matter through this Upanishads.</p>
<p>5 (6th Paper)</p>	<p>UNIT 1- Elements of Linguistic: 1. Introduction to Historical Linguistics 2. Division of Indo-European Family of Languages 3. Indo-Iranian branch of Language family 4. Comparative Study of Vedic and Classical Sanskrit 5. Characteristics of epic Sanskrit 6. Avesta and Veda 7. Pali and Prakrit languages. 8. Comparison Between prakrit and Sanskrit languages. 9. Non-Aryan influence on Sanskrit.</p>	<p>Students will develop a scientific approach to the study of languages, they will become aware of the linguistic structure of Sanskrit and see its close relation with the avestan and ptakrits. The student will learn the most important laws. The student will learn the grammatical system of Panini. Bhattajidixit was a 17th century Maharastrian Sanskrit Grammarian, author of the siddhanta kaumadi, literally "Illumination of the established</p>

	<p>10. Phonetic laws; Grimm's Law, Verner's law, Grassman's law 11. Assimilation, Dissimilation, Metathesis, Haplology, Epenthesis, Prothesis, Anaptyxis, Ablaut, accent UNIT 2- History of Panini System Panini, Katyana, Patanjali, Kaiyata, Bhat- rihari, Bhattaji Dixit, Baradaraja, Ishwarchandra Vidyasagar. Structure of Astadhyayi: Some relevant sutras for Understanding Methodology of Panini 1. Svamrupam sabdasya abdasamjana, sasthaneyo ga, anuditsabarnasya ca pratyaya, taparrastatkalasya, adyanto u takitou, mideohantyatporah, sthane ntaratamah, tasmadityattarasya, tasm nniti nirdiste purvasya, aloantyasya, yena vidhistadantasya, vipratishedhe paramkaryam, adeh parasya, anekal sit sarbasya, purvatrasiddham</p> <p>UNIT 3-Bhattaji dixit: Vaiakarana Siddhanta Kaumudi(Karaka Prakaranam) UNIT 4-Bhattaji dixit: Vaiakarana Siddhanta Kaumudi(Karaka Samasa prakaranam)</p>	<p>(position). He was active in a revival of the grammatical methods of Panini, in his work arranging Panini's sutras with a commentary for teaching purposes. It has been described as an encyclopedia of the opinions and views of the great Sanskrit Gramarians of antiquity. After completion of this course, students will understand the basic structural nuances of Panini's Grammar. They will become familiar with fundamental sandhi and compounding patterns, they will also understand some most important primary and secondary suffixes of Sanskrit. The practice of application of the rules learnt from the reading of the texts will further enhance their knowledge of the structural patterns of Sanskrit language.</p>
<p>6 (7th Paper)</p>	<p>UNIT 1- Kavyalamkarsutravritti (Adhikarana- 1) UNIT 2- Sahitya Darpana (Chapter 10)</p>	<p>Students will learn from Kavyalamkarsutravritti the style of alamkara. Knowledge of Sanskrit Literature alamkars. capacity to</p>

	<p>Topics: Anuprasa, Yamaka, Slesa, Upama, Rupaka, Utpreksa, Arthantaranyasa, Vibhana, Viseshokti, Ekavoli, Drishta, Nidarshana, Kabyalinga, Vyajastuti, Vrantiman.</p> <p>UNIT 3- Yajnavalkyasamhita (Beboharadhya, Slokas 1-94) (Rinadana, Vriddhi, adhi, pratibhu, upanidhi, lekhyas, vukti, saksi)</p> <p>UNIT 4- Yajnavalkyasamhita (Beboharadhya, Slokas 114-282) (Dayabhaga, Stridhana, Simabibada, Vakparusya, Dandaparushya, Saha saprakarana)</p>	<p>understand meaning of literary words and poets expressions. The students will take the knowledge about the Yajnavalkyasamhita, what was the legal system like in Ancient India. The provisions of the Yajnavalkyasamhita are recognized as the source of the Indian Penal Code.</p>
<p>6 (8th Paper)</p>	<p>UNIT 1- Samkhya, yoga and vedantas</p> <p>UNIT 2- Charvakas, Baudhya and Jaina</p> <p>UNIT 3- Nyaya, Vaishasika (Annambhatta: Tarkasamgraha (Saptapadratha, Pratyaksha, Anu mana)</p> <p>UNIT 4- a). Srimadbhagabat Gita: Chapter 2 (Samkhayoga) b). Upanishads: Isopanisad</p>	<p>The outcome of the course is to understand the basics of Indian ethics which includes Hindu, Jaina and Buddhist ethics. The outcome of the course is to understand the valid argument from which includes proportional and predicate logic. This Course will help students to learn to read the Gita as a multi polar text which is open to several alternative interpressions. Reading the Bhagavat Gita helps students understand the importance self control and how to practice it. Teachings of the bhagavat gita will teach the students how to practice Nishkam karma or action without desire. By reading the bhagavat gita they will learn to shun materialism and vices.</p> <p>Assimilation of Ishavashyaponishad special</p>

		thoughts and learning Tyagopurvabhog, Vidhya- avidya, Samvuti-asumvuti parmatiman. General Knowledge of Indian philosophy ability to understand padarthavichar ppramanas nya- Vaisheshik.
--	--	--

COURSE OUTCOME: SANSKRIT (GENERAL)

SEMESTER	CONTENT	OUTCOME
1	<p>UNIT 1- Maheshwar sutra & Pratyahara,Sanskrit Alphabets:Places of Articulation & articulatory efforts , Samna & Paribhasa Prakaranam(Elementary Knowledge Technical Grammatical terms viz. Savarna, dirgha,guna,vridhdi,samprasarana,u pasarga,pratipadika,pada,it,ti,pragrhya,ajahalinga,ades,agama,anubhritti ,upadha Sandhi prakaranam(swara byanjana,visarga) Subhanta prakaranam</p> <p>UNIT 2- Tinganta prakaranam Krit Prakaranam</p> <p>UNIT 3-Hitopadesa(Mitralabh)</p> <p>UNIT 4-a.Comprehention test b.Acquaintance with Sanskrit equivalents as aid to conversational Sanskrit</p>	<p>The word Sanskrit means purified and well ordered.Maheshwar Sutra or Shiva Sutra are 14 verses that organize the phonemes of Sanskrit as referred to in the Astadhtayayi of Panini, the foundational text of Sanskrit Grammar.Grammar is very important part of this language to make a sentence to know appropriate meaning of texts, oral communication and perfection.Grammar is the only way to know this language well.Students will get the basic knowledge about grammar.</p> <p>. The Mitalabh is introduced with the statement that wise and sincere friends may be poor or destitute but it is they who may help one achieve success in life. The book recommends that the good find good friends, they are like a vessel in which one deposits both joys and sorrows and it is not words that define a friend but their behavior and actions.Students will learn from mitralabh intelligent people become helpless and wealthy and fulfill their purpose together like a good friend.</p> <p>Students will get the knowledge about comprehension and Sanskrit equivalents words.They can know the Sanskrit meaning of different words.After read comprehension</p>

		they became more proficient in sanskrit.
2	<p>UNIT 1- Karakprakaranam(Case ending, Account for Case Ending) Samasa Prakaranam(Naming and expounding Samasa of compounded words)</p> <p>UNIT 2 – Matrics:Gangadasa:Chhandomanjari (upto Samavritta- Indrabajra,Upendrabajra,Rathodhdhat a,Shalini,Vamsasthabilm,druvilambitam,Prarharsini,Rucira,Vasantatilok m,Malini,Mandakranta,Sikharini,Harini,Sardulabikritam,Sragdhara)</p> <p>UNIT 3- Kalidasa:Abhijnana Shakuntalam(1st to 4th Act)</p> <p>UNIT 4- Kalidasa:Abhijnana Shakuntalam(5th to 7th Act)</p>	<p>Karakprakaranam is most important topic in Sanskrit. When we are going to make any sentence in Sanskrit that time its necessary to use KarakPrakarana as per grammatical rules in Sanskrit. samas means to make shortened.Students will learn from karaka and samasa correct factor division and application of compound. Identify of the process of Sanskrit slokas is fully based on Aksra and pause (yati).Usually, placed at the end of a verse of a foot after 7,8 or 12 letters and sometimes within a word.Students can learn from chhanda of Gangadasa capacity to understand rhythm motion and composition. Complete introduction of Sanskrit drama and poetic style of Mahakabi Kalidasa.Students will learn from this drama we should not ignore or neglect our responsibilities.</p>
3	<p>UNIT 1- Dandin:Dasakumaracharitam:Rajbahanacharitam.</p> <p>UNIT 2- Bharabi- Kiratarjuniyam(Canto-1)</p> <p>UNIT 3- Manusaamhita-chapter-7(Slokas 1-79)</p> <p>UNIT 4-)Manusaamhita-chapter-7(Slokas 80-207)</p>	<p>Rajbahanacharitam is a prose romance in Sanskrit,attributed to Dandi.The source of Rajbahanacharitam is Dasakumaracharitam.The students will get the knowledge about Rajbahanacharitam.</p> <p>Kiratarjuniyam is one of the mahakavyas or great epic of the classical Sanskrit literature.Bharavi author of this kavya is famous for the depth of meaning(Artha – gourabam).Students will learn from</p>

		<p>kiratarjuniyam Verse by verse understanding of complete 1st Sarga of Kiratarjuniyam. Appreciation of advanced poetic and linguistic aspects of Sanskrit Literature. Focussed explanations are helpful in exam preparation</p> <p>Manusamhita is a dharmasastra .The book helps the students know the Indian polity system and the importance of dharmasastra in Indian culture.</p>
4	<p>UNIT 1 Rgveda(General idea with reference to secular Hymns, Dialogue hymns, Philosophical hymns, educational system, , Status of Women.) Sama veda, yaujr veda and atharva veda9main contents and importance) Overview of Brahmins and Vedangas. (Definition, Division and Importance .)</p> <p>UNIT-2 Ramayana, Mahabharata, Puranas, Origin and Growth: lyrics Sanskrit Drama, Prose Literature, Fables, Historical Kavyas. Unit-3 Authors and their works: Aswaghosa, Bhasa, Kalidasa, Bhavabhuti, Sudraka, Bhatti, Visakhadatta, Bhattanarayana, Harsa, RajSekhara, vana, ., Subandhu, Dandin, Jayadeva. UNIT 4-History of Ancient Indian</p>	<p>The students can take knowledge about classifications of Vedas, date of rig veda, the different hymns of rig veda and its philosophical importance. The students would know about the vedic Brahmins texts and its importance.</p> <p>.Appreciation of basic poetic and linguistic aspects of Sanskrit literature. Focussed explanations helpful in exam preparation.. The course will enable students to familiarize themselves with some leading classical prose works and the individual literary styles of their authors. After the completion of this course the learner will be exposed to the socio-cultural condition of the Indian society as reflected in the prescribed texts. They will acquire skills advanced Sanskrit communication.</p> <p>Graduates who read this course</p>

	<p>Science & Medicine- Susruta,Caraka,Jibaka,Aryabhata,V arahmihira,Brahmagupta,Bhaskarac harya,Bhoja</p> <p>-History of Modern Sanskrit Literature Brief idea on authors and their works : Birendrakumar Bhattacharya,Srijeev Nyayatirtha,Siddheswar Chattopadhyaya,Rama Chowdhury,Jyotindrabimal Chowdhury,Tarapada Bhattacharya,Haridasasidhantabaghi sa, Radhaballav Tripathi,Abhirajrajendra Mishra, srinibash ratha</p>	<p>should be able to know the ancient tradition of Indian medicine system, which is focused not only to the physical health but a healthy lifestyle. After reading this paper, students will know the history of Ayurveda through original sources of ancient medicine system enshrined in Sanskrit texts like Charaka Samhita, Susruta Samhita, Astanga etc. and they will also get the basic knowledge of 8 departments of ayurveda.</p> <p>This course will enable the students to appreciate short story and various story and general survey of modern Sanskrit literature. It will create an awareness of the modern history of the modern Sanskrit Literature.</p>
5	<p>UNIT 1- Vedic selection: Rig Veda:Agni,Ushas,,Pusan,Yama,Aks a,Devi,Samjnana</p> <p>UNIT 2- a.Upanishad;Ishoponishad. b. SrimadbhagabatGita:Chapter - 2(Samkhayaga)</p> <p>UNIT 3-Viswanatha kabiraja : Sahityadarpana:Chapter - 10(Selected alamkaras only): Anuprasa,Yamaka,Upama,Rupaka, Utpreksa,,Vibhana,Visesokti,Ekavol i,,Kabyalinga,Vyajastuti .karanmala</p> <p>b.Annambhatta:Tarkasamgraha:Sapt apadatha.</p> <p>Unit-4) Elements of Linguistic: 1.Introduction to Historical Linguistics</p>	<p>The students would know about the vedic suktas and vedic grammar also.</p> <p>The primary message of the Upanishads urges us to dedicate ourselves in a way that we can always experience our best moments , they want us to be in a state of being where we feel to the core of our brings that place of connection between the small and the large. The students will learn different spiritual matter through this Upanishads . Assimilation of Ishavashyaponishad special thoughts and learning Tyagopurvakhog,Vidhya- avidya,Samvuti-asumvuti</p>

	<p>2.Division of Indo-European Family of Languages</p> <p>3.Indo-Iranian branch of Language family</p> <p>4. of Vedic and Classical Sanskrit</p> <p>5. Pali and Prakrit languages.</p> <p>6. Non-Aryan influence on Sanskrit.</p> <p>7.Assimilation,Dissimiliton,Metathesis</p>	<p>paramatman.</p> <p>This Course will help students to learn to read the Gita as a multi polar text which is open to several alternative interpressions.Reading the Bhagavat Gita helps students understand the importance self control and how to practice it.Teachings of the bhagavat gita will teach the students how to practice Nishkam karma or action without desire.By reading the bhagavat gita they will learn to shun materialism and vices. .</p> <p>Knowledge of Sanskrit Literature alamkars capacity to understand meaning of literary words and poets expressions.</p> <p>The outcome of the course is to understand the valid argument from which includes proportional and predicate logic.</p> <p>Students will develop a scientific approach to the study of languages, they will become aware of the linguistic structure of Sanskrit and see its close relation with the avestan and ptakrits.The student will get the knowledge about the most important laws.</p>
--	---	---

DEPARTMENT OF CHEMISTRY
COURSE OUTCOME: CHEMISTRY (HONS.)

B.Sc. Semester-I	Major	Subject: Chemistry	Paper H1
		<p>Atomic Structure: Limitations of Bohr's atomic model; idea of the de Broglie matter waves, Heisenberg's uncertainty principle; Schrodinger's wave equation and its importance; quantum numbers; concept of wave function; physical concepts of Ψ and Ψ^2; radial and angular wave functions; shapes of s, p and d-orbitals, Aufbau principle, Pauli's Exclusion Principle, Hund's rule, Variation of orbital energies with atomic number and energy level diagram, electronic configurations of atoms, screening effect and effective nuclear charge, extra stability of half-filled and completely filled orbitals.</p>	<p>Students are expected to develop knowledge of location of three subatomic particles, protons, neutrons and electrons, in atoms.</p> <p>Students are expected to develop knowledge of quantum numbers used to describe atomic & difference between excited and ground states.</p>
		<p>Periodic properties: Modern periodic table, classification of elements on the basis of electronic configuration; periodic variation in properties – atomic and ionic radii, oxidation states, ionization potential, electron affinity, electronegativity (Mulliken scale, Pauling's scale and Allen Rochow scale); diagonal relationship.</p>	<p>Students are expected to develop knowledge of arrangement of element in the periodic table.</p> <p>Students are expected to develop knowledge of reactivity of elements and the reasons of anomalous behaviour.</p>
		<p>Redox Reactions: Ion electron method of balancing equations; calculation of equivalent weights of oxidants and reductants; standard electrode potential; formal potential; electrochemical series; redox potentials and its applications; choice of indicators in redox titrations.</p>	<p>Students are expected to develop knowledge of balancing equations and choice of indicators in redox titrations.</p>

<p>Ionic Bonding: Types of ionic solids; radius ratio effect; limitation of radius ratio rule; concept of lattice energy, Bond-Lande equation; Born-Haber cycle; solvation energy and solubility of ionic solids; ionic potential, polarizing power; polarizability of ions and Fajan's rule.</p>	<p>Students are expected to develop knowledge of ionic bonding and the influencing factors.</p>
<p>Covalent Bonding: Basic idea of valence bond theory and its limitations; Concept of hybridization of orbitals; Bent's rule; valence shell electron pair repulsion (VSEPR) theory and its application to shapes of molecules and ions: BeF_2, BF_3, H_3O^+, NH_3, NH_4^+, ICl_2^+, H_2O, PCl_3, PCl_5, SF_4, SF_6, XeF_2, XeF_4, XeF_6, XeOF_4, ClF_3; formal charge, polarity of covalent bonds and dipole moment, percentage of ionic character of covalent bond, LCAO-MO theory and its application to homonuclear (H_2, N_2, O_2, O_2^{2-}, O^{2-}, O^{2+}); heteronuclear diatomic molecules (CO, NO, HF) and polyatomic molecules (BeH_2, H_2O, NH_3).</p>	<p>Students are expected to develop knowledge of covalent bonding, the influencing factors and shapes of molecules.</p>
<p>Bonding in Metals, Semiconductors and Hydrogen Bond: Qualitative idea of free electron theory and band theory in solids; elementary ideas on semiconductors (n and p types); hydrogen bonding – concept and types of H-bonding – application to inorganic molecules, van der Waal's forces, π-π and C(H)-π interactions.</p>	<p>Students are expected to develop knowledge of weak and mobile bonding in materials.</p>
<p>Structure, Reactivity in Organic Molecules: Hybridization ($\text{sp}^n, n=1,2,3$) of organic compounds, bond lengths, bond angles, bond energy, bond polarity, bond polarizability, formation of σ and π bonds, localized and delocalized chemical bonds, van der Waals interaction, resonance, tautomerism, steric inhibition of resonance, hyperconjugation, inductive and field effects, H-bonding, dipole moment - bond moment and group moment,</p>	<p>Students are expected to develop knowledge of hybridization of orbitals and the resultant properties of molecules.</p>

<p>physical properties(mp, bp, solubility) related to molecular structures. Activation energy and Transition state. Energy profile diagrams for reactions with single or multiple steps. Concepts of kinetic and thermodynamic control.</p>	
<p>Organic reaction mechanism in aliphatic compounds: Alkanes, Corey-House synthesis of alkanes; Synthesis of alkenes, alkynes and alkadienes. Synthesis (preparation) of alcohols and ethers, aldehydes and ketones, carboxylic acids and their derivatives, alkyl nitrates, nitro alkanes, nitriles, amines. Study of a) Electrophilic and free radical addition at C=C, b) Nucleophilic addition at the C=O group of aldehydes and ketones; c) Nucleophilic substitution reactions - S_N1, S_N2, S_Ni; d) Elimination reactions - α and β -eliminations, syn - and anti-elimination; E₁ and E₂-mechanism.</p>	<p>Students are expected to develop knowledge of various reaction mechanisms in organic aliphatic compounds.</p>
<p>Important reactions with mechanism of aliphatic compounds:</p> <p>Alkane: free radical halogenations, Alkenes: halogenation, hydroxylation, hydrogen halides, ozonolysis, hydroboration-oxidation, Woodward-prevost hydroxylation, oxymercuration, catalytic hydrogenation of alkenes.</p> <p>Alkadienes: conjugated addition; 1,2- vs 1,4-additions. Alkynes: acidity, use of Lindlar's catalyst, Birch reduction; hydration.</p> <p>Alcohols: Dehydration, oxidation, pinacol-pinacolone rearrangement, carbonyls: Oppenauer oxidation, MPV reduction, Rosenmund reduction, Stephen's reaction, Sommelet reaction, Baeyer-Villiger oxidation, Wolff-Kishner reduction; Aldol, Claisen and Darzen-glycidic ester condensation; Cannizzaro and</p>	<p>Students are expected to develop knowledge of important reaction mechanisms in different classes of organic compounds with different functional groups.</p>

Tischenko reactions.	
Gas laws: Postulates of kinetic theory of gases; derivation of the kinetic theory of gas equation- $PV = (1/3) mnc^2$; mean free path; collision diameter; collision number; collision frequency; heat capacity of gases; viscosity of gases & effect of temperature.	Students are expected to develop knowledge of laws for ideal and real gases.
Real gases: Deviation from ideal behaviour – Regnault, Andrews and Amagat's experiments on gases; causes of deviation- van der Waals equation; critical phenomenon - critical constants, inter-relationships between critical constants and van der Waal's constants; law of corresponding states.	Students are expected to develop knowledge of deviation of properties of real gases from ideal gases.
Maxwell distribution of molecular velocities (no derivation) – most probable, average and root mean square velocities- their inter-relationship; Boltzmann equation (without derivation).	Students are expected to develop knowledge of distribution of molecular velocities.
Crystalline state: Three laws of crystallography: Weiss and Miller indices; unit cell, seven crystal systems; 14 Bravais lattices; crystal packing; radius ratio - co-ordination number, X-ray diffraction (XRD) of crystals- derivation of Bragg's equation; determination of crystal parameters of cubic systems- crystal structure of KCl, NaCl, CsCl, diamond, graphite, boron nitride and ice, defects in crystals - point defects - Schottky and Frenkel defects, colour center, semi- conductors.	Students are expected to develop knowledge of crystals, their parameters, properties and defects.
Fundamentals of computer: History of development of computers, computer systems (mainframe, minis, micros and super computers); general awareness of computer hardware i.e. CPU and other peripheral devices (Input/Output and auxiliary storage devices);block diagram of computer; representation of characters, integers in computers (Bit, Byte, Word) and conversions	Students are expected to develop knowledge of basic computer fundamentals.

<p>–decimal to binary, decimal to hexadecimal; introduction to computer software (system & application); introduction to computer languages; introduction to computer programming; Basic knowledge of computer programming in BASIC.</p>		
<p>B.Sc. Semester-II</p>	<p>Major</p>	<p>Subject: Chemistry</p>
		<p>Paper H2 (A)</p>
<p>Acid-Base Concept: Arrhenius and Bronsted-Lowry concept, the solvent-system concept (Franklin) and its limitations; Lewis concept; SHAB principle; pH and pH scale; effect of solvent on relative strengths of acids and bases – leveling effect; Relative strengths of acids and bases (pK_a and pK_b concept).</p>		<p>Students are expected to develop knowledge of concepts to classify acids and bases and also the concept of pH.</p>
<p>s-Block Elements: Group discussion of the elements with respect to position in the periodic table: electronic configuration, atomic and ionic radii, ionization enthalpy, electron affinity (electron gain enthalpy), electronegativity, oxidation states, variation in properties of oxides and hydroxide, solvation and complexation tendencies of alkali and alkaline earth metals. Chemistry of lithium and beryllium their anomalous behavior and diagonal relationship.</p>		<p>Students are expected to develop knowledge of s-block elements.</p>
<p>Noble Gas: Preparation, properties and structure of xenon oxides, fluorides, oxyfluorides.</p>		<p>Students are expected to develop knowledge of noble gases and their compounds.</p>
<p>p-Block Elements: Group discussion of the elements with respect to position in the periodic table: electronic configuration, atomic and ionic radii, ionization enthalpy, electron affinity (electron gain enthalpy), electronegativity, oxidation states, variation of acidic and basic properties of their oxides and oxy-acids, inert</p>		<p>Students are expected to develop knowledge of p-block elements.</p>

<p>pair effect and catenation.</p>	
<p>Preparation, properties and structure in the following compounds: Diborane (with emphasis on bonding), Carbides, Hydrazine, hydroxylamine, hydrazoic acid, oxy acids of nitrogen, sulphur and halogens; per acids and salts of carbon and sulphur; interhalogen compounds, Pseudo-halogens, polyhalides, basic properties of Iodine. Sodium thiosulphate, Sodium dithionite, potassium iodide, boric acid, lithium aluminium hydride, lead tetraacetate.</p>	<p>Students are expected to develop knowledge of preparation, properties and structures of various compounds.</p>
<p>Types of stereoisomers – configurational and conformational, enantiomers and diastereomers, geometrical and 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.</p>	<p>Students are expected to develop knowledge of stereo-chemistry of organic compounds with idea of isomers, diastereomers and conformers.</p>
<p>Conformation: 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.</p>	<p>Students are expected to develop knowledge of various forces influencing stereochemistry.</p>

<p>Aromatic compounds: Aromaticity, non-aromatic, antiaromatic, homoaromatic (benzenoid and nonbenzenoid). Preparation and properties of benzene, naphthalene, anthracene and phenanthrene.</p>	<p>Students are expected to develop knowledge of aromaticity, non-aromaticity, antiaromaticity and homoaromaticity.</p>	
<p>Organic reaction mechanism in aromatic compounds: Electrophilic substitution in benzene (general mechanism): alkylation, acylation, halogenations, nitration, sulphonation. Synthesis and reactions of arenes, aromatic alcohols, aromatic halides, phenols, carbonyls, quinones, amines, nitrocompounds, carboxylic acids and name reactions of these compounds.</p>	<p>Students are expected to develop knowledge of various organic reaction mechanisms in aromatic compounds.</p>	
<p>B.Sc. Major Semester-II</p>	<p>Subject: Chemistry</p>	<p>Paper H2 (B)</p>
<p>Inorganic Qualitative Analysis:</p> <p>Basic Radicals: Silver, lead, bismuth, copper, cadmium, arsenic, antimony, tin, iron, aluminium, chromium, manganese, cobalt, zinc, nickel, calcium, barium, strontium, magnesium, potassium, ammonium.</p> <p>Acid Radicals: fluoride, chloride, bromide, iodide, sulphate, sulphide, sulphite, phosphate, arsenite, arsenate, borate, nitrate, nitrite, ferrocyanide, ferricyanide, chromate, bromate, iodate, thiocyanate, silicate.</p>	<p>Students are expected to develop knowledge of how to analyse inorganic salts qualitatively and identify cations and anions present in a given unknown mixture of salts.</p>	
<p>B.Sc. Major Semester-III</p>	<p>Subject: Chemistry</p>	<p>Paper H3 (A)</p>
<p>Coordination Compounds: Werner's Coordination theory, coordination number, ligands and their classification, chelation, chelate effect and its applications; nomenclature of coordination compounds, isomerism in coordination compounds, stereoisomerism: geometrical and optical isomerism in 4- and 6-</p>	<p>Students are expected to develop knowledge of ligand, chelate, coordination number and use standard rules to name coordination compounds. Students are</p>	

<p>coordinate complexes; inner metallic complexes; stabilization of unusual oxidation states; Sidgwick's effective atomic number rule.</p>	<p>expected to develop knowledge of types of isomerism possible and understand the types of isomerism possible in a metal complex.</p>
<p>Bonding in transition metal complexes: Valence bond theory (VBT) and Crystal Field Theory (CFT) for octahedral, tetrahedral and square planer complexes; Explanation of magnetic properties, structures and colour of coordination complexes on the basis of the above theories; Nephelauxetic effect, elementary idea of adjusted crystal field theory (ACFT).</p>	<p>Students are expected to develop knowledge of use VBT to predict the structure and magnetic behaviour of metal complexes and understand the terms inner and outer orbital complexes</p> <p>Students are expected to develop knowledge of pairing energy, CFSE, high spin and low spin and how CFSE affects thermodynamic properties like lattice enthalpy and hydration enthalpy. Students are expected to develop knowledge of magnetic properties and colour of complexes on basis of CFT.</p>
<p>Magnetochemistry: 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 Gouy methods. Curie law, Curie-Weiss law, explanation of magnetic behaviour of $K_4[Fe(CN)_6]$, $K_3[Fe(CN)_6]$, $[Co(NH_3)_6]Cl_3$, $K_3[CoF_6]$, $K_2[Ni(CN)_4]$,</p>	<p>Students are expected to develop knowledge of calculation of the magnetic susceptibility by Gouys methods. Students are expected to develop knowledge of Curie law, Curie-Weiss law and magnetic behaviour of different complexes.</p>

Ni(CO) ₄ .	
<p>Thermodynamic systems: Systems, surroundings, various types of systems and processes isothermal, isobaric, isochoric processes, reversible, irreversible, adiabatic, cyclic etc. processes thermodynamic parameters, perfect and imperfect differentials; thermodynamic laws - zeroth law.</p>	<p>Students are expected to develop knowledge of state and path functions, extensive and intensive properties. Students are expected to develop knowledge of derivation of the expressions of ΔU, ΔH, ΔS and ΔG for ideal gases under different conditions.</p>
<p>First law of Thermodynamics: Statement, mathematical form, concept of enthalpy and heat capacity of gases, C_p and C_v, their interrelationships, Joule's experiment, Joule-Thompson effect, liquefaction of gases.</p>	<p>Students are expected to develop knowledge of three laws of thermodynamics. Students are expected to develop knowledge of Joule's law and its application.</p>
<p>Thermochemistry: Exothermic and endothermic reactions, enthalpy (heat) of formation, reaction, combustion, solution, neutralization, atomization, etc.; laws of thermochemistry, bond dissociation energy, Born-Haber cycle.</p>	<p>Students are expected to develop knowledge of energy change and heat capacities at constant volume and pressure and their relationship.</p>
<p>Chemical Kinetics: Order and molecularity of reaction, rate of reaction, rate laws and rate equations, differential and integral forms of rate equation- zero order, first order and second order reactions, half-life and average life, experimental methods for the determination of order of reactions, effect of temperature on the rate of reaction, Arrhenius equation, concept of activation energy, collision theory and transition state theory of reaction rates and their comparisons.</p>	<p>Students are expected to develop knowledge of rate expressions and pseudo-first order kinetics. Students are expected to develop knowledge of integrated rate equations, activation energy and Arrhenius equation.</p>

<p>The Liquid State: Physical properties of liquids including their experimental methods of determination, internal pressure, vapour pressure, surface tension, viscosity, effect of temperature on these properties, structure of liquid and liquid crystals(elementary idea).</p>	<p>Students are expected to develop knowledge of liquid state and its physical properties w.r.t. temperature and pressure variation.</p>
<p>Solution Properties: General features of solutions:Types of solutions, ideal and non- ideal solutions, modes of expression of composition of solutions - molarity, molality, normality, mole fraction and percentage, solutions of gases in liquids, Henry's law.</p>	<p>Students are expected to develop knowledge of Henry's law of solubility of gases in liquids.</p>
<p>Properties of dilute solutions: Extensive and intensive properties, additive, constitutive, and colligative properties, Raoult's law of relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmosis-laws of osmosis, experimental methods of determination of properties of dilute solution-determination of molecular weight of substances based on these properties-their inter-relationships and their thermodynamic derivation, analogy between ideal gas and dilute solution , abnormal solution properties, van't Hoff factor.</p>	<p>Students are expected to develop knowledge of colligative properties of solution like elevation of boiling point, depression of freezing point with relatively lowering the vapour pressure. Students are expected to develop knowledge of thermodynamic basis of colligative properties and applications in surroundings. Students are expected to develop knowledge of van't Hoff factor in abnormal properties of non-volatile solute.</p>
<p>Physical properties: Additive and constitutive properties- molar volume at boiling point, parachor, rheochor, molar refraction, optical activity , specific and molar rotation-optical rotatory dispersion (ORD) and circular dichroism (CD), dielectric constant, molar polarization, induced and orientation</p>	<p>Students are expected to develop knowledge of molecular structure in relation to optical rotation. Students are expected to develop knowledge of polarisation, Clausius-</p>

polarizations, polar and non-polar molecule dipole moment – Clausius-Mosotti equation, Debye equation, experimental methods for the determination of dipole moment, magnetic properties; paramagnetism, diamagnetism and ferromagnetism. Ascertaining structure of molecules using above properties.		Mosotti equation and Debye equation.
B.Sc. Major Semester-III	Subject: Chemistry	Paper H3 (B)
Organic qualitative analysis: Identification of a pure solid organic compound through detection of special elements (nitrogen, sulphur, halogens) and functional groups (phenolic-OH, -COOH, -CHO, >CO, -NH ₂ , -NO ₂ , -CONH ₂ , >C=C<). (Determination of mp, solubility test, detection of special elements, detection of functional groups, preparation of suitable derivative, determination of R _f value on TLC and survey of literature).		Students are expected to develop knowledge of identification of a special elements and functional groups in organic compounds.
List of compounds to be identified: Adipic acid, Cinnamic acid, succinic acid, benzoic acid, salicylic acid, o-chlorobenzoic acid, benzamide, phthalimide, benzil, benzoin, p-nitro benzoic acid, 4-hydroxy benzoic acid, benzophenone, glucose, urea. Sulphanilic acid, p-nitroaniline, β-naphthyl amine, resorcinol, β-naphthol, hydroquinol, anthranilic acid, benzoic acid, p-nitrobenzoic acid, 4-hydroxy benzoic acid.		Students are expected to develop knowledge of identification of a pure solid organic compound.
B.Sc. Major Semester-IV	Subject: Chemistry	Paper H4 (A)
Reactive intermediates: Carbocations, Carbanions, carbenes (electrophilic and nucleophilic), arynes and nitrenes – synthesis, stability, structure and reactivity. Synthetic applications of active methylene compounds and organometallic reagents:		Students are expected to develop knowledge of reactive intermediates and factors affecting their stability. Students are expected to develop knowledge of active

<p>Synthesis and synthetic applications of diethyl malonate and ethyl acetoacetate; Preparation and synthetic applications of Grignard reagents, Organolithium and Organocopper reagents.</p>	<p>methylene compounds and Grignard reagents. Students are expected to develop knowledge of active methylene groups in organic mechanism and preparation of new organic compounds.</p>
<p>Rearrangements reaction: Pinacol-pinacolone, Dienone-phenol, Wagner-Meerwein, Beckmann, Wolff, Hoffmann, Curtius, Lossen, Schmidt, benzil-benzilic acid, Favorskii, Fries and Claisen, Demjenov.</p>	<p>Students are expected to develop knowledge of fundamental principles of rearrangement reaction and predict the outcome of the products through suitable mechanism.</p>
<p>Second law of thermodynamics: Need for the law, spontaneous process, statements of second law, Carnot engine, Carnot cycle, efficiency of heat engine, concept of entropy, entropy change in simple systems, physical significance of entropy – entropy and probability. Gibb's free energy and Helmholtz free energy. Gibb's Helmholtz equation, thermodynamic criteria for spontaneity and equilibrium state of system. Nernst Heat Theorem – third law of thermodynamics (statement only).</p>	<p>Students are expected to develop knowledge of concepts of thermodynamics and derivation of the Gibb's Helmholtz equation & explain the thermodynamic criteria for spontaneity and equilibrium state of system. Students are expected to develop knowledge of third law of thermodynamics and the Nernst Heat theorem.</p>
<p>Chemical equilibrium: Reversible and irreversible reactions, law of mass action, equilibrium constant, expression for equilibrium constants in various equations, thermodynamic derivation of law of mass action using free energy change and van't Hoff equilibrium box, Le Chatelier principle. Interrelationship between K_p, K_c and K_x. Reaction isotherm, reaction</p>	<p>Students are expected to develop knowledge of thermodynamic derivation of relations between equilibrium constants K_p, K_c and K_x. Students are also expected to develop knowledge of Le Chatelier</p>

<p>isochore, van't Hoff equation, equilibrium in phases – Clapeyron equation, Clausius-Clapeyron equation.</p>	<p>principle and its applications as well as Clausius-Clapeyron equation.</p>
<p>Electrical transport: Conductance of electricity through metals. Arrhenius theory of electrolytic dissociation; mode of transport of electricity through electrolytic solutions; transport number; experimental determination of transport number of ions by Hittorf's method and moving boundary method; abnormal transport number and causes thereto; measurement of conductance of solution; specific and equivalent conductance; ionic mobility; Kohlrausch law and its application; theory of strong electrolytes- Debye Huckel-Onsager equation (no derivation), ionic strength, Debye-Huckel limiting law (no derivation); activity and activity co-efficient; application of conductance measurements – conductometric titrations, solubility of sparingly soluble salts.</p>	<p>Students are expected to develop knowledge of electrolyte and their behaviour in different solvents. Students are also expected to develop knowledge of Kohlrausch law and its applications, theory of strong electrolytes.</p>
<p>Ionic Equilibrium: Ostwald dilution law; ionization of water; ionic product of water; pH; buffer solution, buffer action and buffer capacity. Henderson equation, hydrolysis of salts, common-ion effect, solubility product, application of solubility product principle in analytical chemistry. Indicators – types, criteria for good indicators, theory of acid base indicators.</p>	<p>Students are expected to develop knowledge of ionic conductance of electrolytes in terms of mobility of ions, calculation of pH, buffer solution, salt hydrolysis, degree of hydrolysis and hydrolysis constant.</p>
<p>Phase equilibrium: Phase, component, degree of freedom, phase rule equation: $F = C - P + 2$ and its thermodynamic derivation. One Component Systems – water, carbon dioxide, sulphur system. Two Component Systems - salt solutions: KI – water; Fe_2Cl_6 – water systems, salt hydrate – $CuSO_4 \cdot 5H_2O$. Binary alloys:</p>	<p>Students are expected to develop knowledge of phase, component, degree of freedom and phase rule. Students are also expected to develop knowledge of phase diagrams in the field</p>

antimony–lead; aluminium–magnesium; gold–tin systems. Liquid–liquid mixture: Phenol–water, water–triethyl amine; water–nicotine; their miscibility; steam distillation, fractional crystallization; zone refining; partial miscibility of solid and liquid solutions. Thermal analysis, cooling curves, eutectic points, different alloys.		of materials science and engineering.	
B.Sc. Semester-IV	Major	Subject: Chemistry	Paper H4 (B)
Physical Experiments: Determination of surface tension of a given liquid/solution with a stalagmometer by drop weight method, determination of viscosity coefficient of a given liquid/solution by Ostwald’s viscometer, determination of distribution coefficient of iodine between water and an organic solvent, determination of distribution coefficient of an organic acid between water and an organic solvent, determination of pH of a buffer solution by colour matching of indicator, conductometric Titration of Strong Acid (HCl) vs Strong Base (NaOH) and conductometric Titration of Weak Acid (CH ₃ COOH) vs Strong Base (NaOH).		Students are expected to develop knowledge of performing physical experiments to evaluate various physical parameters of materials with respect to changes in temperature.	
B.Sc. Semester-V	Major	Subject: Chemistry	Paper H5
d- and f-Block Elements: Electronic configuration of d-block elements, general properties of transition metals, relative stability of oxidation states, comparison of properties of first, second and third row transition metals. Electronic configurations of lanthanides and actinides, comparison of their oxidations states; variation in their atomic and ionic radii – lanthanide contraction, difficulty in the separation of lanthanides and ion exchange method of separation. Preparation, important reactions, structures and uses of nickel tetracarbonyl, Sodium nitroprusside, sodium cobaltinitrite, potassium ferrocyanide, potassium ferricyanide, potassium dichromate, potassium		Students are expected to develop knowledge of characteristics and properties of the d- and f-block elements. Students are also expected to develop knowledge of how to prepare selected transition metal compounds, lanthanides and actinides and compare lanthanide and actinide contraction and their	

<p>permanganate, cupric acetate, uranyl nitrate hexahydrate, uranium hexafluoride and Ziese's salt.</p>	<p>consequence.</p>
<p>Nuclear and Radio-chemistry: Nuclear particles; neutron-proton ratio and its implications, types of radioactive decay; nuclear binding energy; mass defect and packing fraction; natural and artificial radioactivity; first order rate equation of radioactive disintegration; radioactive equilibrium; radioactive disintegration series; half-life and average life period, group displacement law, unit of radioactivity; carbon-14 dating, types of nuclear reactions, concepts of fusion and fission, spontaneous fission, Q value; nuclear forces: n-n, n-p, p-p.</p>	<p>Students are expected to develop knowledge of nuclear components, and their behaviour. Students are also expected to develop knowledge of nuclear reactions and carbon dating and their applications.</p>
<p>Organometallic compounds: Definition, classification and nomenclature of organometallic compounds. Alkyls and aryls of lithium, silicon and mercury (preparation and uses). 18 electron rule and its applications to carbonyls (including carbonyl hydrides and carbonylates), nitrosyls, cyanides, sigma- and pi-bonded organometallic compounds of transition metals. Simple examples of metal-metal bonded compounds and metal clusters. Metal-olefin complexes; Zeise's salt (preparation, structure and bonding), ferrocene (preparation, structure and reactions). Hapticity (η) of organometallic ligands, examples of mono-, tri- and pentahaptocyclopentadienyl complexes. Coordinative unsaturation: oxidative addition and insertion reactions. Homogeneous catalysis by organometallic compounds (examples excluding mechanism): hydrogenation, hydroformylation and polymerization of alkenes (Zigler-Natta catalysis).</p>	<p>Students are expected to develop knowledge of organometallic compounds and nature of Zeise's salt and compare its synergic effect with that of carbonyls.</p>
<p>Bioinorganic Chemistry: Structure of cell membrane, membrane transport (active and</p>	<p>Students are expected to develop knowledge of the</p>

<p>passive transport process); essential and trace elements in biological processes, criteria of essential elements, pH of biological fluid, metalloporphyrins, structure, and functions of haemoglobin, myoglobin and chlorophyll; role of Fe and Mg in haemoglobin and chlorophyll, role of Co in vitamin B₁₂, Carbonic anhydrase, its characteristics and functions,. Non-complexing cations in biochemical processes, Na⁺-K⁺ pump; Toxic effects of metal ions with reference to mercury, lead, beryllium and aluminium; deficiency of Fe, Ca, Mg and iodine; Platinum complexes as anti-cancer drugs.</p>	<p>role of metals in biological systems.</p>
<p>Statistical treatment of data analysis: Accuracy and precision, classification of errors, detection and correction of determinant and indeterminate errors; the normal law of distribution of indeterminate errors; the F and T tests, rejection of data, methods of least squares, propagation of errors in computation, significant figures.</p>	<p>Students are expected to develop knowledge of accuracy, precision and errors as well as F and T tests.</p>
<p>Heterocyclic compounds: Introduction, five- and six-membered heterocycles, aromatic character, nomenclature, structure, synthesis and chemical reactivity of furan, pyrrole, thiophene, pyridine and basicity of pyrrole and pyridine; Introduction to condensed five- and six-membered heterocycles, synthesis and reactivity of indole, quinoline and isoquinoline with special reference to Fischer indole synthesis, Skraup synthesis and Bischler Napieralsky synthesis.</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of heterocyclic compounds.</p>
<p>Carbohydrates: Introduction, occurrence, classification, nomenclature, inter-relationship amongst monosaccharides, constitution of glucose and fructose, ribose and arabinose, reactions of glucose and fructose, osazone formation, mutarotation and its mechanism, cyclic structures, pyranose and furanose forms, determination of ring size. Haworth projection</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of carbohydrates.</p>

<p>formula, configurations and conformational analysis of monosaccharides, epimerisation, ascending and descending of sugars, interconversion of aldoses and ketoses.</p>	
<p>Amino acids and Proteins: Introduction, alpha-amino acids – synthesis, physical and chemical properties, iso-electric points, peptide synthesis, protection and de-protection strategies involved in peptide synthesis; determination of C and N terminal amino acid residues; proteins classification, primary, secondary, tertiary and quaternary structure of proteins (definitions only) and chemical test of proteins.</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of amino acids and proteins.</p>
<p>Pericyclic & Photochemical Reactions: Definition and classification, electrocyclic reactions: FMO approach, example of electrocyclic reactions (thermal and photochemical) involving 4π and 6π electrons and corresponding cycloreversion reaction, cycloaddition reactions: FMO approach, DA reaction, photochemical [2+2] reactions. Sigmatropic shifts and their orders, [1,3] and [1,5] hydrogen shifts and [3,3] shifts with reference to Claisen and Cope rearrangement.</p>	<p>Students are expected to develop knowledge of basics of pericyclic reactions through FMO approach.</p>
<p>Spectroscopy:</p> <p>Ultraviolet and Visible spectroscopy: Introduction, theory, instrumentation and solvent effects, characteristic absorption of organic compounds, application of rules for calculation of λ_{\max} polyenes and dienones.</p> <p>Infrared Spectroscopy: Introduction, theory, instrumentation, characteristic group frequencies of organic molecules, factors affecting group frequencies.</p> <p>Proton NMR spectroscopy: Introduction, theory, deuterated solvents, chemical shift and factors</p>	<p>Students are expected to develop knowledge of principles of UV, IR, NMR and Mass spectroscopy.</p> <p>Students are also expected to develop knowledge of how to elucidate the structure of simple organic compounds from their spectroscopic data.</p>

influencing it, spin-spin coupling, characteristic chemical values of different kind of protons, application of UV, IR and NMR in structure elucidation of organic molecules.		
Dyes: Relation between colour and constitution, chromophore, auxochrome, valence bond theory of colour (ultraviolet visible absorption spectrum), classification of dyes, preparation and uses of phenolphthalein, methyl orange, congo red, malachite green, alizarin and indigo.		Students are expected to develop knowledge of theory of colour and constitution and the synthesis of dyes.
Drugs and pesticides: Introduction, classification of drugs, preparation and uses of aspirin, phenacetin, sulphanilamide, sulphaguanidine, diazepam. Introduction and Classification of pesticides, natural and synthetic pesticides, preparation and uses of DDT, endrin, melathion, parathion and baygon.		Students are expected to develop knowledge of structure of drugs and pesticides and also their synthesis and applications. Students are expected to develop knowledge of the importance of different classes of drugs and their applications for treatment of various diseases.
B.Sc.	Major	Subject:
Semester-V		Chemistry
Volumetric titrations: Estimation of $\text{Fe}^{+2}/\text{Ca}^{+2}$ by EDTA, estimation of $\text{Cu}^{+2}/\text{Fe}^{+2}$ by iodometric method, estimation of $\text{CO}_3^{-2} + \text{HCO}_3^{-1}$ in a mixture, and estimation of total hardness of water samples.		Students are expected to develop knowledge of estimation of inorganic radicals by volumetric titrations.
Quantitative analysis: Estimation of Nickel(II) using DMG, estimation of SO_4^{-2} by using BaCl_2 method, estimation of percentage of mixed oxide in an ore - Hematite, dolomite, limestone.		Students are expected to develop knowledge of estimation of inorganic radicals by quantitative analysis.
Inorganic preparation & crystallization: Tris (thiourea) copper (I) sulphate, Hexamine cobalt		Students are expected to develop knowledge of

(III) chloride, Chloropenta amine cobalt III chloride, Potassium tri(oxalate) chromate (III), Potassium tri(oxalate) ferrate (III), Sodium peroxoborate, Tris(acetylacetonato) iron(III) and Sodium cobaltinitrite.	preparation of inorganic compounds.	
Organic quantitative analysis: Estimation of glycine (Sorenson's method), Estimation of aniline (bromate-bromide method), and Estimation of oxalic acid (titrimetric method).	Students are expected to develop knowledge of estimation of organic radicals by quantitative analysis.	
Organic Preparation: 7-Hydroxy-4-methyl coumarin, p-Benzoquinone, Benzimidazole, Phthalimide, and Benzilic acid from benzil	Students are expected to develop knowledge of preparation of organic compounds.	
B.Sc. Major Semester-VI	Subject: Chemistry	Paper H7
Electromotive force: Measurement of e.m.f., Weston-Cadmium cell, types of reversible electrodes, e.m.f of reversible cells, Nernst equation, single electrode potentials, sign convention of e.m.f. a cell, reference electrode – Hydrogen electrode, calomel electrode, quinhydrone electrodes, standard electrode potential, electrochemical series, setting up of simple cells, cell reaction, application of e.m.f. measurements – determination of ionic activity, equilibrium constant, potentiometric titration, elementary ideas of polarization and over-voltage, Tafel equation (no derivation), successive anodic and cathodic processes, Lead and alkali accumulators.	Students are expected to develop knowledge of e.m.f.; electrodes; equilibrium constant; polarization; over-voltage; Tafel equation; potentiometric titration; successive anodic and cathodic processes; lead and alkali accumulators.	
Concentration cells: Cells with and without transference, liquid junction potential, corrosion-types of corrosion, theory of corrosion and methods for combating corrosion.	Students are expected to develop knowledge of cells with and without transference.	
Adsorption: Absorption vis-à-vis adsorption;	Students are expected to	

<p>types of adsorption; theories of adsorption; Freundlich, Langmuir and Gibb's adsorption isotherms – their derivations; BET equation; determination of surface area of adsorbates; application adsorption phenomenon in nature and industry.</p>	<p>develop knowledge of concepts of adsorption, their properties and their applications.</p>
<p>Catalysis: Classification; criteria for a good catalyst; catalyst promoters and catalyst poisons; theories of catalysis; application of catalyst in the manufacture of ammonia; nitric acid and sulphuric acid; acid base catalysis and enzyme catalysis.</p>	<p>Students are expected to develop knowledge of catalyst, catalyst promoters and catalyst poisons. Students are expected to develop knowledge of theories of catalysis.</p>
<p>Colloids: Definition, classification, 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.</p>	<p>Students are expected to develop knowledge of colloids, their properties and their applications.</p>
<p>Macromolecules: Definition, types of macromolecules, degree of polymerization, molar mass, number-average and weight-average molar mass, distribution of molar mass, determination of molar mass by viscometry; osmometry; light-scattering; ultra-centrifuge and diffusion methods. Types of polymerization reactions – mechanism – kinetics of polymerization reactions; initiators-types functions.</p>	<p>Students are expected to develop knowledge of macromaterials, their properties and their applications.</p>

<p>Conformation and configuration of macromolecules in solution. Crystallinity of macromolecules–factors influencing crystallinity; experimental determination of crystallinity of polymers. Properties of macromolecules, their uses.</p>	
<p>Photochemistry: Interaction of radiation with matter, difference between dark (thermal) and photochemical reactions; elementary ideas of phosphorescence, fluorescence, luminescence; laws of photochemistry – Grothus – Draper law, Stark – Einstein law, Lambert’s law, Beer’s law, Lambert – Beer’s law, quantum yield and quantum efficiency; photochemical equilibrium; photosensitized reactions ; photosynthesis and photochemistry of air and air pollution.</p>	<p>Students are expected to develop knowledge of Lambert-Beer's law, quantum efficiency, photochemical processes, fluorescence and phosphorescence.</p>
<p>Atomic & Molecular Spectra:</p> <p>Electromagnetic radiation – Interaction of matter with electromagnetic radiation, different forms of energy viz. translational, electronic, vibrational, rotational energy in molecules, Born – Oppenheimer Approximation, types of spectra – absorption and emission spectra, atomic or line spectra and molecular or band spectra.</p> <p>Rotational Spectra - diatomic molecules, energy levels of a rigid rotor, selection rules.</p> <p>Vibrational Spectra: Hook’s law, expression for vibrational energy in terms of quantum number, anharmonicity, fundamental modes of vibration, overtones, Morse curves force constant, selection rules, bond energy, bond distance, isotope effect, vibrational frequency of different functional groups.</p> <p>Raman Spectra: Origin, Stokes lines and anti-stokes lines, explanation of Raman spectra based on Einstein theory, Raman frequency, selection</p>	<p>Students are expected to develop knowledge of the basics of spectroscopic techniques like Born Oppenheimer approximation, Rotational, vibrational and Raman Spectroscopy, Hooks law, Frank-Condon principle, selection rules.</p> <p>Students are expected to develop knowledge of how to interpret atomic absorption spectroscopy.</p>

<p>rules, application of Raman spectra.</p> <p>Molecular Electronic Spectra: Potential energy (PE) curves, bonding and anti-bonding molecular orbitals, Frank-Condon Principle, selection rules, qualitative description of sigma pi and non-bonding (n) molecular orbitals, their energy levels and respective transitions.</p>	
<p>Elementary Quantum Mechanics: Black body radiation, Photo-electric effect, Bohr model of hydrogen atom (no derivation) and its defects, Compton effect, de Broglie hypothesis, Heisenberg uncertainty principle, operators and observable, Hamiltonian operator; Schrodinger wave equation and its importance; interpretation of wave function.</p>	<p>Students are expected to develop knowledge of basic principles and concepts of quantum mechanics and differentiation between classical and quantum mechanics.</p>
<p>Molecular Orbital Theory (MOT): Criteria for forming molecular orbitals (MO) from atomic orbitals (AO), construction of MOs using LCAO – hydrogen molecular ion; physical picture of bonding and anti-bonding wave functions; concept of σ, σ^*, π, π^* orbitals and their characteristics; hybrid orbitals – sp, sp^2, sp^3, sp^3d, d^2sp^3 hybridization, calculation of coefficient of AOs used in these hybrid orbitals, comparison (in brief) of MOT and VBT (valence bond theory); Geometry of simple molecules like H_2O, NH_3, CH_4, H_2O_2, BF_3 in terms of molecular orbitals.</p>	<p>Students are also expected to develop knowledge of quantum mechanical model of the hydrogen atom and how to solve the Schrödinger equation for model systems.</p>
<p>Statistical thermodynamics: Limitation of classical thermodynamics, brief resume of the concept of distribution of energy; thermodynamic probability and entropy; Boltzmann distribution law (with derivation), partition function and its significance, translational partition function of ideal monoatomic gas (with derivation). Preliminaries of Maxwell-Boltzmann statistics, Bose-Einstein Statistics and Fermi-Dirac statistics,</p>	<p>Students are expected to develop knowledge of the basic postulates of statistical thermodynamics and Boltzmann equation and apply Fermi-Dirac and Bose-Einstein distributions to quantum</p>

<p>Thermodynamic functions in terms of partition functions; Sackur-Tetrode equation (with derivation), heat capacity of solids.</p>	<p>ideal gases.</p>
<p>Industrial Chemistry - Inorganic Based</p> <p>Water: Modern methods of water treatment and purification.</p> <p>Fertilisers: Different types of N and P fertilizers, manufacture of ammonia, ammonium nitrate, urea phosphates and superphosphates. Nitrogen fixation by plants.</p> <p>Glass: Various types of glass fibers, optical glass, glazing and vitrification, glass ceramics.</p> <p>Cement: Various types of cement, their composition and manufacture. Portland cement, setting of cement.</p> <p>Paints: Constituents of different paints, Role of binder and solvent, Lead and Zinc containing paints. Paints of common use.</p> <p>Metals and Alloys: General procedure of extraction of metals. Manufacture, properties, composition and uses of important alloys. Manufacture of steel and stainless steel. Galvanization, rusting and corrosion.</p> <p>Chemical Toxicology: Metal poisoning due to Pb, Cd and Hg, hazard from radioactive fallout. Definition and principles of green chemistry.</p>	<p>Students are expected to develop knowledge of different sources of water, water quality parameters, water treatment; different types of fertilizers and their applications; composition and applications of the different kinds of glass; glazing of ceramics and the factors affecting their porosity.</p>
<p>Industrial Chemistry – Organic Based</p> <p>Coal: Fisher-Tropsch process. Chemicals from coal.</p> <p>Petroleum: Manufacture and industrial reactions of ethane, propane, butadiene, acetylene and xylene. Synthesis of methanol from natural gas. Cracking of petroleum, knocking and octane</p>	<p>Students are expected to develop knowledge of coal, petroleum, Synthetic petrol, LPG and CNG. biodiesel. Students are also expected to develop knowledge of industrial preparation of ethane, propane, butadiene,</p>

<p>number. Synthetic petrol, LPG and CNG. Biodiesel.</p> <p>Oils, Fats and Detergents: Catalytic hydrogenation of vegetable oil and fat for production of soap, synthesis of detergents. Principles of cleansing action.</p> <p>Polymers: Synthetic rubber (including principle of cross-linking and vulcanization), Plastics, Resins, Silicones.</p> <p>Enzymes in industries: Production of alcohol by fermentation of starch and sugar (reaction conditions, nature of enzymes used, structural transformation during reaction). Preparation and use of cellulose.</p>	<p>acetylene, xylene, methanol, soap, detergents and polymers. Students are also expected to develop knowledge of cracking of petroleum, knocking and octane number, principle of cleansing action and enzymes in industries.</p>	
<p>Green Chemistry: Definition, Principles of green chemistry, atom economy, environmental factor; Green synthesis (acetylation of primary amines, cycloaddition, benzyl-benzilic acid rearrangement reaction, thiamine catalyzed benzoin condensation, bromination of acetanilide), reaction conditions, solvent free reaction (three components synthesis of dihydropyrimidinone, ammonium formate-mediated Knoevenagel reaction), sonochemical reaction (Ulman coupling), Use of green reagents (tetrabutyl ammonium tribromide, green oxidizing agents), green catalysts, and green solvents.</p>	<p>Students are expected to develop knowledge of twelve principles of green chemistry and toxicity, hazard and risk of chemical substances. Students are also expected to develop knowledge of atom economy, percentage yield, how to synthesise less toxic products and learn the benefits of use of renewable feed stock.</p>	
<p>B.Sc. Major Semester-VI</p>	<p>Subject: Chemistry</p>	<p>Paper H8</p>
<p>Physical Chemistry Practical: Determination of the concentration of a supplied solution by</p>	<p>Students are expected to develop knowledge of</p>	

<p>surface tension method using stalagmometer; determination of the concentration of a supplied solution by viscosity method using Ostwald viscometer; determination of partition coefficient of ammonia between water and an organic solvent; potentiometric titration of Fe^{2+} with dichromate and determination of E^0 $\text{Fe}^{3+}/\text{Fe}^{+2}$ and of concentration of unknown iron solution; 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; determination of concentration of mixed acid by standard 0.1(N) NaOH conductometrically; Verification of Beer's law and determination of concentration of supplied dichromate solution; determination of the rate constant of acid catalyzed hydrolysis of ethyl acetate ester at room temperature; and determination of rate constant of Iodination of Acetone.</p>	<p>performing physical experiments to evaluate various physical parameters of materials with respect to changes in temperature.</p>	
<p>Industrial Chemistry Practicals: [4+2] Cycloaddition reaction (Diels-Alder reaction between furan and maleic acid using water as solvent); base catalyzed aldol condensation (Synthesis of dibenzalpropanone); and separation of reactions products by column chromatography.</p>	<p>Students are expected to develop knowledge of industrial methods of preparation of compounds.</p>	
<p>Green Chemistry Practicals: Preparation of Manganese(III) acetylacetonate by using KMNO_4 and acetylacetone; preparation of Iron(III) acetylacetonate by using FeCl_3, KOH and acetylacetone; acetylation of primary amine by using Aniline, Glacial acetic acid and Zinc dust catalyst.</p>	<p>Students are expected to develop knowledge of green methods of preparation of compounds.</p>	
<p>B.Sc. Major Semester-VI</p>	<p>Subject: Chemistry</p>	<p>Project Paper</p>
<p>Handwritten project report of 2000 to 2500</p>		<p>Students are expected to</p>

words.	develop knowledge of performing research based literature survey, sampling and experiments.
--------	---

COURSE OUTCOME: CHEMISTRY (GENERAL)

B.Sc. General Semester-I	Subject: Chemistry	Paper C1P1
Structure of atom: Atomic spectra of hydrogen atom, Bohr's atomic model and its limitations (simple mathematical treatment of hydrogen atom), Sommerfield model, Black body radiation, Plank's Equation, Qualitative idea of Photoelectric effect and Compton effect, Wave-particle duality, de-Broglie matter wave, Heisenberg's uncertainty principle, Schrodinger's wave equation for one electron system (no mathematical derivation), wave functions and physical concept of ψ and ψ^2 , shapes of s, p and d orbitals; quantum numbers and their significances, s, p, d, f orbitals, Pauli's exclusion principle, Hund's rule, , energy order of orbitals, Aufbau principle and its limitations, electronic configurations of atoms (up to $Z = 30$).	Students are expected to develop knowledge of location of three subatomic particles, protons, neutrons and electrons, in atoms. Students are expected to develop knowledge of quantum numbers used to describe atomic & difference between excited and ground states.	
Periodic properties of elements: Modern periodic table, classification of elements on the basis of electronic configuration. Periodic properties: atomic radii, ionic radii, ionization potential, electron affinity, electronegativity, oxidation states, diagonal relationship; Pauling and Mulliken scale of electronegativity.	Students are expected to develop knowledge of arrangement of element in the periodic table. Students are expected to develop knowledge of reactivity of elements and the reasons of anomalous behaviour.	
IUPAC Nomenclature of simple inorganic and	Students are expected to	

<p>coordination compounds.</p>	<p>develop knowledge of how to name inorganic and coordination compounds.</p>
<p>Redox Reactions: Ion electron method of balancing equations, calculation of equivalent weights of oxidants and reductants, standard electrode potential, electrochemical series; redox potentials and its applications, choice of indicators in redox titrations.</p>	<p>Students are expected to develop knowledge of balancing equations and choice of indicators in redox titrations.</p>
<p>Nuclear Chemistry: Stability of nucleus: neutron-proton ratio and its implications, binding energy, mass defects, Einstein's mass-energy relation, Natural and artificial radioactivity, measurement of radioactivity, radioactive disintegration and group displacement law, 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.</p>	<p>Students are expected to develop knowledge of nuclear components, and their behaviour. Students are also expected to develop knowledge of nuclear reactions and carbon dating and their applications.</p>
<p>Structure, Reactivity in Organic Molecules: Hybridization (sp^n, $n= 1, 2, 3$) of organic compounds, bond lengths, bond angles, bond energy, bond polarity, bond polarizability, formation of σ and π bonds, localized and delocalized chemical bonds, van der Waals interaction, 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.</p>	<p>Students are expected to develop knowledge of hybridization of orbitals and the resultant properties of molecules.</p>
<p>Bonding in Metals, Semiconductors and Hydrogen Bond: Qualitative idea of free electron theory and band theory in solids; elementary ideas on semiconductors (n and p types); hydrogen bonding – concept and types of H-</p>	<p>Students are expected to develop knowledge of weak and mobile bonding in materials.</p>

<p>bonding – application to inorganic molecules, van der Waal's forces, π-π and C(H)-π interactions.</p>	
<p>Organic reaction mechanism in aliphatic compounds: Synthesis of alkanes, alkenes, alkynes and alkadienes; Synthesis (preparation) of alcohols and ethers, aldehydes and ketones, carboxylic acids and their derivatives, alkyl nitrates, nitro alkanes, nitriles, amines. Study of a) Electrophilic and free radical addition at C=C, b) Nucleophilic addition at the C=O group of aldehydes and ketones; c) Nucleophilic substitution reactions - S_N^1, S_N^2, S_N^i; d) Elimination reactions - α and β – eliminations, syn – and anti-elimination; E_1 and E_2- mechanism.</p>	<p>Students are expected to develop knowledge of various reaction mechanisms in organic aliphatic compounds.</p>
<p>Important reactions with mechanism of aliphatic compounds: Alkane: free radical halogenations, Alkenes: halogenation, hydroxylation, hydrogen halides, ozonolysis, hydroboration-oxidation, catalytic hydrogenation of alkenes. Alkynes: acidity, use of Lindlar's catalyst, Birch reduction; hydration. Alcohols: dehydration, oxidation, pinacol-pinacolone rearrangement, Carbonyls: Oppenauer oxidation, MPV reduction, Rosenmund reduction, Stephen's reaction, Baeyer-Villiger oxidation, Wolff-Kishner reduction; Aldol condensation, Claisen condensation; Cannizzaro and Tischenko reactions.</p>	<p>Students are expected to develop knowledge of important reaction mechanisms in different classes of organic compounds with different functional groups.</p>
<p>The Gaseous states: Gas laws, postulates of kinetic theory of gases, gas pressure, kinetic theory of gas equation $PV = \frac{1}{3} mnc^2$ deduction of gas laws, average kinetic energy of molecules, mean free path, collision diameter, collision number, collision frequency, their dependence on temperature and pressure, heat capacity of gases, atomicity of molecule, viscosity of gases.</p>	<p>Students are expected to develop knowledge of laws for ideal and real gases.</p>

<p>Real gases: Deviation from ideal behaviour, Regault, Andrews and Amagat experiments, causes of such deviations, compressibility factor, vander Waals equation, critical phenomenon, critical constants, law of corresponding states.</p>	<p>Students are expected to develop knowledge of deviation of properties of real gases from ideal gases.</p>
<p>Maxwell distribution of molecular velocities (no derivation) – most probable, average and root mean square velocities- their inter-relationship; Boltzmann equation (without derivation).</p>	<p>Students are expected to develop knowledge of distribution of molecular velocities.</p>
<p>The Liquid state: Physical properties of liquids including their experimental methods of determination, internal pressure, vapour pressure, surface tension and viscosity, effect of temperature on these properties.</p>	
<p>Thermodynamics: Thermodynamic apparatus, definitions of various system, processes, functions, concept of heat and work. Zeroth law of thermodynamics.</p> <p>First law- mathematical relation, internal energy, Joule's experiment, heat capacity of gases at constant volume and constant pressure, relationship between C_p and C_v, Kirchhoff's equation, calculation of change in thermodynamic parameters for expansion/compression of an ideal gas under various conditions for reversible/irreversible processes, Joule-Thomson experiment, inversion temperature (elementary ideas only).</p>	<p>Students are expected to develop knowledge of state and path functions, extensive and intensive properties. Students are expected to develop knowledge of derivation of the expressions of ΔU, ΔH, ΔS and ΔG for ideal gases under different conditions. Students are expected to develop knowledge of three laws of thermodynamics. Students are expected to develop knowledge of Joule's law and its application.</p>
<p>Second law of thermodynamics: Need for second law, spontaneous process, reversible process, statements of second law, heat engine, Carnot cycle, Carnot engine and its efficiency, concept</p>	<p>Students are expected to develop knowledge of concepts of thermodynamics and</p>

<p>of entropy, entropy change in simple transformations, physical significance of entropy.</p> <p>Gibb's free energy, Helmholtz free energy, Gibbs Helmholtz equation, criteria for thermodynamic equilibrium and spontaneity of a process.</p>		<p>derivation of the Gibb's Helmholtz equation & explain the thermodynamic criteria for spontaneity and equilibrium state of system.</p>
<p>B.Sc. General Semester-II</p>	<p>Subject: Chemistry</p>	<p>Paper C1P2 (A)</p>
<p>Ionic bond: lattice energy, Born-Haber cycle, ionic solids: radius ratio rule and its limitations, ionic potential, polarizing power and polarizability, Fajan's rule.</p>		<p>Students are expected to develop knowledge of ionic bonding and the influencing factors.</p>
<p>Covalent bond: 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, LCAO-MO theory (qualitative) and its application to homo-nuclear diatomic molecules (H_2, B_2, C_2, N_2, O_2, F_2); hydrogen bond, metallic bond (electron sea model and band theory).</p>		<p>Students are expected to develop knowledge of covalent bonding, the influencing factors and shapes of molecules.</p>
<p>Chemical equilibrium: Reversible and irreversible reactions, law of mass action, derivation of expression for equilibrium constant for homogeneous and simple heterogeneous systems, temperature, pressure and concentration dependence on equilibrium state- La-Chatelier principle, simple application, inter relationship between K_p, K_c and K_x, characteristic of the equilibrium state.</p>		<p>Students are expected to develop knowledge of thermodynamic derivation of relations between equilibrium constants K_p, K_c and K_x.</p>
<p>Thermochemistry: Exothermic and endothermic reactions; enthalpy (heat of formation, reaction, combustion, solution, neutralization,</p>		<p>Students are expected to develop knowledge of energy change and heat</p>

<p>atomization, etc., laws of thermochemistry, bond dissociation energy, Born – Haber cycle.</p>	<p>capacities at constant volume and pressure and their relationship.</p>
<p>Coordination Chemistry: Werner's theory, IUPAC nomenclature, different types of ligands, multidentate ligands, coordination number and stereochemistry (up to coordination number 6); chelates, inner metallic complexes, types of isomerism in coordination compounds, bonding in coordination compounds: Valence Bond Theory (VBT). Double Salts and their applications. Molecular Orbital Theory: H₂, N₂ and O₂.</p>	<p>Students are expected to develop knowledge of ligand, chelate, coordination number and use standard rules to name coordination compounds. Students are expected to develop knowledge of types of isomerism possible and understand the types of isomerism possible in a metal complex.</p>
<p>Magnetochemistry: 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 Gouy methods.</p>	<p>Students are expected to develop knowledge of calculation of the magnetic susceptibility by Gouys methods. Students are expected to develop knowledge of Curie law, Curie-Weiss law and magnetic behaviour of different complexes.</p>
<p>B.Sc. General Semester-II</p>	<p>Subject: Chemistry</p> <p>Paper C1P2 (B)</p>

<p>Inorganic Qualitative Analysis:</p> <p>Qualitative analysis of inorganic salt mixtures containing not more than four radicals from the following list: Silver, lead, bismuth, copper, cadmium, arsenic, antimony, tin, iron, aluminium, chromium, manganese, cobalt, zinc, nickel, calcium, barium, strontium, magnesium, potassium, ammonium; chloride, bromide, iodide, sulphate, sulphide, sulphite, phosphate, borate, nitrate, nitrite, arsenate, oxides and hydroxides.</p> <p>Organic Preparation: Preparation of 7-hydroxy-4-methyl coumarin by Pechmann method, acetylation of aniline via green method, preparation of dibenzylidene acetone by condensation reaction.</p>		<p>Students are expected to develop knowledge of how to analyse inorganic salts qualitatively and identify cations and anions present in a given unknown mixture of salts.</p>
<p>B.Sc. General Semester-III</p>	<p>Subject: Chemistry</p>	<p>Paper CIP3 (A)</p>
<p>Stereochemistry of organic compounds: Types of stereoisomers – configurational and conformational, enantiomers and diastereomers, geometrical and pi-diastereomers and their nomenclatures, difference in chemical and physical properties of pi-diastereomers, optical isomers, R/S and D/L notations of optical isomers, racemic mixture and resolution.</p>		<p>Students are expected to develop knowledge of stereo-chemistry of organic compounds with idea of isomers, diastereomers and conformers.</p>
<p>Conformation: 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.</p>		<p>Students are expected to develop knowledge of various forces influencing stereochemistry.</p>
<p>Aromatic compounds: Aromaticity, non-aromaticity, anti-aromaticity, homoaromaticity (benzenoid and non-benzenoid). Preparation and properties of benzene and naphthalene.</p>		<p>Students are expected to develop knowledge of aromaticity, non-aromaticity, antiaromaticity and</p>

	homoaromaticity.
Organic reaction mechanism in aromatic compounds: Electrophilic substitution in benzene (general mechanism): alkylation, acylation, halogenations, nitration, sulphonation. Synthesis and reactivities of aromatic alcohols, aromatic halides, phenols, carbonyls, amines and carboxylic acids.	Students are expected to develop knowledge of various organic reaction mechanisms in aromatic compounds.
Chemical kinetics: Order and molecularity of a reaction, rate and differential rate of reaction, rate laws and equations, differential and integral forms of rate equation (up to second order only), experimental methods for the determination of order of reactions.	Students are expected to develop knowledge of rate expressions and pseudo-first order kinetics.
Catalysis: Criteria of catalyst, classification, catalyst promoters, catalyst poison, theories of catalysis, applications of catalysts in the manufacture ammonia, nitric acid and sulphuric acid, acid-base catalysis and enzyme catalysis.	Students are expected to develop knowledge of catalyst, catalyst promoters and catalyst poisons. Students are expected to develop knowledge of theories of catalysis.
Phase equilibrium: Phase, component, degree of freedom, phase rule equation $F = C - P + 2$ (derivation is not required), phase diagram one component systems water, sulphur and carbon dioxide, principle of sublimation, Henry's law for solubility of a gas in liquid, Nernst Distribution law, partition coefficient.	Students are expected to develop knowledge of phase, component, degree of freedom and phase rule. Students are also expected to develop knowledge of phase diagrams in the field of materials science and engineering.
General features of solution: Type of solution, mode of expressing composition of solution-molarity, normality, molality, mole fraction and percentage, Type of properties- extensive, intensive, additive, constitutive and colligative.	Students are expected to develop knowledge of Henry's law of solubility of gases in liquids.

<p>Properties of dilute solution: Raoult's law of relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmosis (thermodynamic derivation excluded), laws of osmosis, experimental method of determination, van't-Hoff factor, determination of molecular weight based on these properties, analogy between ideal gas and dilute solution, abnormal solution properties.</p>		<p>Students are expected to develop knowledge of colligative properties of solution like elevation of boiling point, depression of freezing point with relatively lowering the vapour pressure. Students are expected to develop knowledge of thermodynamic basis of colligative properties and applications in surroundings. Students are expected to develop knowledge of van't Hoff factor in abnormal properties of non-volatile solute.</p>
<p>B.Sc. General Semester-III</p>	<p>Subject: Chemistry</p>	<p>Paper C1P3 (B)</p>
<p>Inorganic Preparation: 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).</p>		<p>Students are expected to develop knowledge of preparation of inorganic compounds.</p>
<p>Organic qualitative analysis: Identification of functional group(s) in a pure solid organic compound through detection of special elements (nitrogen, sulphur, halogens) and functional groups (phenolic-OH, -COOH, -CHO, >CO, -NH₂, -NO₂, -CONH₂, >C=C<). (Determination of m. p.; solubility test, detection of special elements, detection of functional groups).</p>		<p>Students are expected to develop knowledge of identification of a special elements and functional groups in organic compounds.</p>
<p>B.Sc. General Semester-IV</p>	<p>Subject: Chemistry</p>	<p>Paper C1P4 (A)</p>

<p>Synthetic applications of active methylene compounds and Grignards reagent: Synthesis and synthetic applications of diethyl malonate and ethylacetoacetate; Preparation and synthetic applications of Grignard reagents.</p>	<p>Students are expected to develop knowledge of active methylene compounds and Grignard reagents.</p>
<p>Heterocyclic compounds: Introduction, five- and six- membered heterocycles, nomenclature, aromatic character, structure, synthesis and chemical reactivity of furan, pyrrole, thiophene, pyridine and basicity of pyrrole and pyridine; Chemistry of indole and quinolone.</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of heterocyclic compounds.</p>
<p>Carbohydrates: Introduction, occurrence, classification, nomenclature, inter-relationship amongst mono-saccharides, constitution of glucose and fructose, reactions of glucose and fructose, osazone formation, mutarotation and its mechanism, cyclic structures, pyranose and furanose forms.</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of carbohydrates.</p>
<p>Amino acids and Peptides: Introduction, alpha-amino acids – synthesis, physical and chemical properties, iso-electric points, peptide synthesis and determination of C and N terminal amino acid residues of peptides.</p>	<p>Students are expected to develop knowledge of synthesis, physical and chemical properties of amino acids and proteins.</p>
<p>Electrical conduction through solution: Arrhenius theory of electrolytic dissociation, mode of transport of electricity through solution, transport number of ions, experimental method of determination of transport number – Hittorf's method, abnormal transport number, specific, equivalent and ionic conductances, ionic mobility, absolute velocity of ions, strong and weak electrolytes, Kohlrausch's law and its applications, measurement of conductance of solutions and applications. Solubility of sparingly soluble salts.</p>	<p>Students are expected to develop knowledge of electrolyte and their behaviour in different solvents. Students are also expected to develop knowledge of Kohlrausch law and its applications, theory of strong electrolytes.</p>
<p>Ionic equilibrium: Ostwald dilution law, ionization of water, pH, buffer solution, buffer</p>	<p>Students are expected to develop knowledge of</p>

<p>capacity, mechanism of buffer action, Henderson equation, hydrolysis of salts, common ion effect, solubility product, application of solubility product principle in analytical chemistry, ionic strength.</p>	<p>ionic conductance of electrolytes in terms of mobility of ions, calculation of pH, buffer solution, salt hydrolysis, degree of hydrolysis and hydrolysis constant.</p>	
<p>Electrochemical cells: Galvanic cells vis-à-vis electrolytic cells, reversible and irreversible cells, standard cells.</p>	<p>Students are expected to develop knowledge of electrochemical cells</p>	
<p>Physical properties and molecular constitution: Additive and constitutive properties – molar volume at 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 experimental methods of determination, Clausius-Mosotti equation (no derivation), ionic character of bonds.</p>	<p>Students are expected to develop knowledge of molecular structure in relation to optical rotation. Students are expected to develop knowledge of polarisation, Clausius-Mosotti equation and Debye equation.</p>	
<p>Adsorption: Adsorption; types adsorption - Physical & Chemical adsorption; Freundlich and Langmuir isotherms, Surface Catalysis. Application of adsorption phenomenon in nature and industry.</p>	<p>Students are expected to develop knowledge of concepts of adsorption, their properties and their applications.</p>	
<p>Colloids: Preparation and purification of colloids, lyophilic & lyophobic colloids properties of colloids – physical, mechanical (Brownian motion), optical (Tyndal effect), electrical (Zeta potential), stability of colloids; Hurdy – Schulze rule, Electro-kinetic Phenomena, micelles.</p>	<p>Students are expected to develop knowledge of colloids, their properties and their applications.</p>	
<p>B.Sc. General Semester-IV</p>	<p>Subject: Chemistry</p>	<p>Paper C1P4 (B)</p>

<p>Organic Quantitative analysis: Estimation of aniline using brominating mixture, estimation of glucose by Benedict reagent.</p>	<p>Students are expected to develop knowledge of estimation of organic radicals by quantitative analysis.</p>	
<p>Physical Practical: Determination of 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, determination of the partition coefficient of iodine between water and an organic solvent.</p>	<p>Students are expected to develop knowledge of performing physical experiments to evaluate various physical parameters of materials with respect to changes in temperature.</p>	
<p>B.Sc. General Semester-V</p>	<p>Subject: Chemistry</p>	<p>Paper C1P5 (A)</p>
<p>Acid-Base Concept: Arrhenius concept, Bronsted-Lowry concept, Lewis 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.</p>	<p>Students are expected to develop knowledge of concepts to classify acids and bases and also the concept of pH.</p>	
<p>Solid state: Nature of solid state, laws of crystallography, Weiss and Miller indices, unit cell, crystal systems, Bravais lattice, symmetry elements, types of crystals, crystal forces. X-ray diffraction of crystals, Bragg's law.</p>	<p>Students are expected to develop knowledge of crystals, their parameters, properties and defects.</p>	
<p>Theory of indicators: Detailed concept of acid base indicators; types criteria and selection of indicators.</p>	<p>Students are expected to develop knowledge of indicators.</p>	
<p>s-and p-Block Elements: The oxides and hydroxides of alkali and alkaline earth elements, Boron hydrides, Silicates, Silicones, oxyacids of sulphur.</p>	<p>Students are expected to develop knowledge of s- and p-block elements.</p>	
<p>d-Block Elements: First row Transition Series: (3d) electronic configuration ,Oxidation states,</p>	<p>Students are expected to develop knowledge of d-</p>	

Reactivities, colour and Magnetic properties.		block elements.
Preparation, properties and structure in the following compounds: Potassium ferro and ferricyanide, Lithium aluminium hydride, Sodium cobaltinitrite, Nessler's reagent, Sodium borohydride, Ferrocene, Sodium nitropuraside.		Students are expected to develop knowledge of preparation, properties and structures of various compounds.
B.Sc. General Semester-V	Subject: Chemistry	Paper C1P5 (B)
Inorganic estimation: Estimation of Na_2CO_3 & NaHCO_3 present in a mixture, estimation of Fe (II) by KMnO_4 , estimation of Cu (II) by iodometric titration, estimation of Fe (III) by standard $\text{K}_2\text{Cr}_2\text{O}_7$ solution.		Students are expected to develop knowledge of estimation of inorganic radicals by volumetric titrations.
Physical Chemistry: Determination of 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.		Students are expected to develop knowledge of performing physical experiments to evaluate various physical parameters of materials with respect to changes in temperature.
B.Sc. General Semester-VI	Subject: Chemistry	Paper Project
Handwritten project report of 2000 to 2500 words.		Students are expected to develop knowledge of performing research based literature survey, sampling and experiments.

DEPARTMENT OF MATHEMATICS
COURSE OUTCOME: MATHEMATICS (HONS.)

Mathematics is the mother of all sciences. No stream in science is complete without mathematics. It provides tools which are essential in the study of other subjects and its influence is not just limited to other disciplines of science alone. The list of subjects using mathematical models and statistical tools is a long one. The significance of mathematics is however much more than what has been stated so far. It is a subject which should ideally be learnt just for the joy of it and it must be mentioned here that even though many subjects borrow from it, mathematics however is a self sufficient subject on the whole. The present undergraduate syllabus of mathematics has two frameworks - one for Mathematics major and the other for Mathematics general. We will discuss the two separately.

Mathematics major:

Designed as a first step towards understanding mathematics deeply the syllabus may broadly be divided into pure mathematics, applied mathematics, statistics and computer language even though there may be some difference of opinion in the placement of differential equations and geometry. However looking at the contents of the syllabus we will realize that the stress is more on problem solving strategies and this justifies our argument to categorize them into the application side. Content of pure mathematics of the syllabus include classical algebra, abstract algebra, linear algebra, calculus, real analysis, number theory which on the whole provides students a wide exposure into the domain of pure mathematics.. Complex numbers are included in classical algebra. The only other topic they learn is inequalities. However the study of groups goes well upto Lagrange theorem on cosets and also touches group homomorphisms. Theory of rings, integral domains and fields is also studied. The content of number theory is also justified which includes Diophantine equations, modular arithmetic, Chinese remainder theorem to mention some. Linear algebra content goes upto matrix representation of linear transformations and eigen value/eigen vectors while covering the theory of vector spaces. The content of calculus is quite expansive and mostly problem oriented in nature. Real analysis also has a very expansive coverage containing properties of real numbers, sequences, compactness, Riemann integration, improper and multiple integrals, differentiation under the sign of integration, sequences and series of functions, power series, Fourier series. Tensors provide a look into the domain of

differential geometry and the contents are justified more or less. Applied mathematics include vectors (both algebra and analysis) the vector calculus part extending upto Stoke's and Gauss theorems. Geometry (2D and 3D) are covered extensively again mainly in a problem solving oriented manner. Differential equations focus on an array of types of equations and techniques of solving these. Linear programming is designed as an application of linear algebra and matrix theory and explores several kinds of problems. Dynamics is also covered in one unit. Numerical analysis is covered fairly well with two units dedicated to theory and half a paper dedicated to practicals. Probability and statistics are also covered in a fairly detailed fashion as can be done in two units. C programming in both theory and practicals are covered just like numerical analysis. In fact numerical analysis and C programming are clubbed in paper7 for theory and paper 8 for practicals. Finally the project paper enables students to learn topics which are not typically covered in the syllabus. This provides scope for learning new things for individual students although all students have a chance to learn from the presentation of others. This course in Mathematics major enables students to learn many things and acts well for transition to M.Sc. in mathematics in the universities of the state and also for transition into courses other than mathematics as well as seeking job oppurtunities.

Mathematics general:

The course of mathematics general is designed in a way which may enable students to have an overview of higher mathematics and also to have familiarity with mathematical techniques which they may find useful in other disciplines which they might be majoring in or studying as general courses. The complex variables, inequalities vector algebra abstract algebra, matrix theory linear algebra open the course. Calculus is treated in an extensive manner mostly with problem solving techniques. Geometry both 2D and 3D do have good coverage of topics with problem solving. Differential equations are included with this viewpoint. Linear programming, probability and vector calculus are introduced next. Numerical analysis is treated in the prefinal semester along with C programming which sees both theoretical and practical sessions. The coverage and depth of the course material is less compared to honours course. Final semester has no theory or practical for mathematics general students but they have to undergo a project work in a topic which is not typically a part of their syllabus. This provides students go for several higher courses including M.Sc and also seek job opportunities.

DEPARTMENT OF PHYSICS
COURSE OUTCOME: PHYSICS (HONS.)

Students will be able to acquire a foundational knowledge of physics at the graduate level and the necessary accompanying methodological aspects of mathematics, computing, and instrumentation in general. Students will learn to identify and solve problems and inculcate themselves as educators and communicators with the ability to promote an understanding and appreciation of physics across the society.

Semester	Unit wise Topics	Outcomes
I	Unit-I: Mathematical Methods in Physics	A detail knowledge of vector calculus, Orthogonal curvilinear co-ordinate system, Matrices, Beta and gamma functions, enable students to understand the rigorous mathematical framework applicable to various branches of Physics in general as a preliminary and compulsory tool. Students also gather knowledge how to analyse different simple waveforms with Fourier series.
	Unit-II: Mechanics	Students will be able to articulate the concepts of reference frames, pseudo forces arising in rotating frames, parameters defining the motion of mechanical systems, central force fields and conservation principles.
	Unit-III: General properties of matter (Gravitation, Elasticity, Surface tension and Viscosity)	Clarify the concepts of gravitational field and potential, elastic behaviour of matter, basic properties of fluid like surface tension and viscosity.
	Unit-IV: Vibration and waves	Make students to understand free, damped and forced vibrations in detail, characteristics of stretched strings with

		detail analysis of plucked, struck and bowed string. Also they gather knowledge about the acoustics of designing a quality auditorium.
II	UNIT-I: Electrostatics and Magnetostatics	Gives the physical representations of various types of electric field patterns given the nature of charges involved, concept of image charge and fundamentals of magnetic fields in systems as a magnetic analogue of electrostatics.
	UNIT-II: Optics	Students gather a fundamental knowledge and insight about the basic properties of light including propagation, reflection, refraction, polarization, interference, diffraction and their applications.
	Practical Paper = H2-B	Imparts practical knowledge regarding handling of optical instruments like spectrometer, polarimeter along with some experimental knowledge of general physics.
III	UNIT – I: Current Electricity	A vivid understanding of basic concepts of e.m.f, potential difference, current, resistance, relationship between current and magnetic fields, application of transient and sinusoidal voltages to electrical circuits, and analysis of D. C. networks by applying various laws and theorems.
	UNIT-II: Thermal Physics	Enables understanding of specific heat of solids, law of thermodynamics and concept of entropy, low temperature physics, analyses of transport phenomenon and black body radiation.
	Practical paper=H3-B	Hands on experience of students in different electrical based experiments using meter bridge, Potentiometer, PO box, suspended and moving coil galvanometers, CRO etc.
IV	UNIT-I: Mechanics –	Enable students to understand dynamics of

	II and Relativity	rigid bodies, advantages of Lagrangian and Hamiltonian formalism over Newtonian methods and their applications, fundamental concepts of special relativity and Lorentz transformations.
	UNIT-II: Electromagnetism and Electromagnetic Theory	Enrich students with the concepts of electrodynamics and Maxwell's modification to derive Maxwell's electromagnetic equations. Students are expected to be familiar with Electromagnetic wave propagation and wave polarization and dispersion phenomenon.
	Practical Paper = H4-B	This practical paper involving Computer Programming in Basic/ Fortran, imparts logical thinking, enhances problem solving skills and teaches students how to tackle complex problems by breaking them down into smaller steps in a planned and systematic manner.
V	Unit-I: Mathematical Methods in Physics-II	Students will acquire knowledge about the functions of complex variables, Partial Differential equation, Series solution, Laplace's Transformation and their applications.
	Unit -II: Atomic and Molecular Physics, Laser and Fibre Optics	Enriches students with the knowledge about the origin of spectral lines in detail. Study of Zeeman effect, coupling schemes involved in electronic interactions, molecular spectroscopy nurtures the thinking ability regarding empirical modelling.
	Unit-III: Electronics	Employs the concept of Energy Band Theory and Fermi Levels to explain the basic principle of semiconducting materials. Demonstrates the working principle and characteristics of pn junction diodes as rectifiers, wave shaping tools, Clampers etc. Also imparts knowledge of characteristics and applications of BJT,

		FET and OPAMPs. Students also get an idea about the transmission, propagation and reception of radiowaves in various modes.
	Unit- IV: Statistical Mechanics	Enables students to find the relation between statistics and thermodynamics, idea of ensemble to explain the behaviour of systems, differentiate between classical statistics and quantum statistics and explain the statistical behaviour of ideal Bose and Fermi systems.
	Practical Paper H6	This advanced practical paper enables students to gather practical knowledge on some wave aspects of light like diffraction through grating, interference through Fresnel's bi-prism, study of hysteresis in magnetism, series resonance phenomenon in LCR circuits, etc.
VI	Unit-I: Nuclear Physics	Enables students to understand the application of models to investigate the insight of nucleus and nuclear properties and nature of interaction among the nucleons, kinematics of various reactions and decay processes, basics of elementary particles.
	Unit – II: Quantum Mechanics	Students gather knowledge about historical aspects of development of quantum mechanics, differences between classical and quantum mechanics, concept of wave function and idea of quantum mechanical operators. They learn to solve Schrodinger equation for simple potentials.
	UNIT – III: Condensed Matter Physics	Students will have achieved the ability to differentiate between different Lattice types, concepts of reciprocal lattice, crystal diffraction, electrical and thermal properties of solids, concept of energy bands, various types of magnetic phenomena.

	UNIT -IV: Digital Electronics and computer	Helps in designing and analysis of the digital circuit and system. Gives the idea of positive and negative logic systems, Boolean algebra, logic gates, idea of coding and memory devices. Students get the basic theoretical concepts of computer operation.
	Practical paper =H8	Students get a practical experience on the working principle and basic characteristics of vacuum Triode, Zener diode, Transistor, FET, OPAMPs and digital circuits.
	Project Paper=H9	Students will get acquainted with a systematic process of planning and execution of a project. It brings in conceptual clarity about project organization and feasibility analyses, improves data handling and data management capability through various software. A detail literature survey as a compulsory part of project makes them aware of current status of development and ongoing research in a particular field.

Course Outcomes: Physics(G)

Semester	Topics	Course Outcomes
I	Unit – I: Vectors, Mechanics	Students get idea of vector calculus and its applications in physical systems, moment of inertia of rigid bodies in simple 2d and 3d systems, preliminary concept of Lagrangian and Hamiltonian formalism, their advantages over Newtonian methods and simple applications.
	Unit – II: Gravitation, Elasticity And Fluid	Clarify the concepts of gravitational field and potential in simple cases, elastic behaviour of matter, basic properties of fluid like surface tension and viscosity.
	Unit – III:	Enables understanding of basics of

	Thermodynamics And Radiation	thermodynamics and concept of entropy, low temperature physics, analyses of transport phenomenon and black body radiation phenomenon.
	UNIT – IV: Optics	Students gather a fundamental knowledge and insight about the basic properties of light including propagation, reflection, refraction, polarization, interference and diffraction and their applications.
II	Unit-I: Acoustic	Students are able to understand composition of SHMs, qualitative idea about damped and forced vibrations, distribution of pressure for propagation of longitudinal wave, generation of various nodes in strings, science of designing good auditorium.
	Unit-II: Electrostatics, Magneto statics, Magnetic effect of Current	Students learn about electric fields and force due to charge distributions, various types of capacitors, calculation of magnetic induction for different systems, idea of hysteresis loop and theory of Ballistic galvanometer.
	Physics Practical Paper PH-201B	Hands on experience of students to understand the theoretical concepts through some experiments based on optics and general physics.
III	Unit I : Current Electricity –I	Gives idea about origin of thermoelectricity and its applications, electromagnetic induction and preliminary idea about application of transients to electrical circuits.
	Unit II: Current Electricity II and Atomic theory	Students learn the effect of alternating emf and current when applied to electrical circuits with capacitors, inductors and resistors and also the theory of ideal transformer. In atomic theory part students get specially introduced with vector atom model and its use in normal Zeeman effect. It also gives idea about elementary crystal structure.

	Practical Paper PH-301B	Hands on experience of students in different electrical based experiments using meter bridge, Carey Foster bridge, Potentiometer, Tangent galvanometer etc. and application of magnetometers.
IV	Unit I: Electronics	Employs the concept of Energy Band Theory to explain the basic principle of semiconducting materials. Demonstrates the working principle and characteristics of pn junction diodes as rectifiers, filter circuits. Also imparts knowledge of characteristics and applications of BJT, FET and OPAMPs. Students get an idea about various network theorems and learn to apply them in solving network problems.
	Unit-II: Relativity and Nuclear physics	Enables students to understand the fundamental concepts of special relativity and Lorentz transformations and mass energy equivalence. It gives the idea about radioactive disintegration processes, origin and properties of cosmic rays, nuclear properties and nature of interaction among the nucleons.
	Practical Paper PH-401 B	Students get a practical experience on the working principle and basic characteristics of pn junction diode, Zener diode, Transistor, FET and digital circuit designing using basic logic gates.
V	Unit I: Electromagnetic theory, Laser, Computer science, Programming and Digital electronics	Students learn Maxwell's electromagnetic equations and their propagation in free space. Students are expected to be familiar with laser and its applications, quantitative idea of co-axial cable, theoretical basics of computer programming and introductory knowledge of digital electronics.
	Unit-II: Quantum Mechanics I and Quantum Mechanics	Students gather knowledge about historical aspects of development of quantum mechanics, differences between

	II	classical and quantum mechanics, uncertainty principles, concept of wave function and idea of quantum mechanical operators. They learn to solve Schrodinger equation for one dimensional box as a model.
	Practical Paper PH-502(P)	This practical paper on BASIC Programming imparts logical thinking in students and enhances their problem-solving skills and teaches them how to tackle complex problems by breaking them down into smaller steps.
VI	Project Paper	Students will get acquainted with a systematic process of planning and execution of a project. It brings in conceptual clarity about project organization and feasibility analyses, improves data handling and data management capability through various software. A detail literature survey as a compulsory part of project makes them aware of current status of development and ongoing research in a particular field.

DEPARTMENT OF BOTANY
COURSE OUTCOME: BOTANY (HONS.)

Course outcome: Botany (Major)		
Semester	Content	Outcome
1		
	Unit -1. Fundamental Botany.	Students can learn about Fundamental Botany. Origin of life, plant and animal cell, three domains of life different system of classification, different life cycle pattern, Darwin's theory of evolution, speciation etc.
	Unit -2. Environmental Botany.	Students can learn about environment, different pollution such as -air, water, soil, noise, heavy metal, radioactive etc. and their effect on plants and animals, greenhouse effects, global warming, ozone hole etc.
	Unit-3. Industrial Botany-1 (Agri industries and microbial fermentation and food.)	Students can learn about organic farming, seed industries, seed production, production of SCP and its culture, Mushroom production. Commercial production of ethyl alcohol and citric acid, Penicillin, Biofuel its need and production etc.
	Unit 4. Industrial Botany- 2 (Plant nursery and Floriculture industry)	From this Unit students can learn about concept and types of nurseries, infrastructure requirement and commercial applications of nurseries, different propagation methods, floriculture, open cultivation practices etc.
2		

	<p>Unit-1: Algae and Bryophyte</p> <p>Unit-2: Pteridophyta, Gymnosperm and Paleobotany</p>	<p>Students can learn about lower plant groups like Algae & Bryophytes. Their life history and evolution, economic importance etc.</p> <p>Students can learn about Pteridophyta, Gymnosperm & Paleobotany. Life history of different Pteridophyte and Gymnosperm genera, Progymnosperms, different types of Fossils, geological time scale, Indian Gondwana system etc.</p>
3		
	<p>Unit -1: Fungi and plant resource utilization.</p>	<p>Students can learn about Fungi, its economic importance, general account, and type study. In plant resource utilization, students can also learn about different plant resources and cultivation of some of them.</p>

	Unit -2: Microbiology and Plant pathology	In Microbiology part students can learn about Virus, Bacteriophage, their growth cycle, Bacteria, its reproduction etc. In plant pathology students can learn about different symptoms and different plant diseases.
4		
	Unit 1: Morphology and Taxonomy Unit -2: Anatomy, Ecology and Phytogeography.	Students can learn about Morphology of higher plants along with floral structure, fertilization process, fruit types. In Taxonomy part, students can know about the taxonomy of different families. Students can learn about plant anatomy, ecology, and phytogeography of India.
5		
	Unit -1: Cell Biology Unit-2: Molecular Biology Unit-3: Cytogenetics	In Cell and Molecular Biology students can learn about cell cycle, cell division, structure and function of different cell organelles, chromosome morphology and organization, Apoptosis etc. Structure, forms and salient features of nucleic acids, DNA replication Gene Mutation, DNA damage and repair, Lac Operon etc. restriction enzymes, PCR and its application, In Cytogenetics students can know about the Mendelian inheritance, gene interaction, crossing over, linkage, Chromosomal aberration, molecular mapping, Bioinformatics

	Unit-4: Plant Breeding and Biostatistics	In Plant Breeding part, students can know about the methods of plant breeding, introduction, emasculation, hybridization and acclimatization, selection, male sterility, heterosis, hybrid vigour etc. and Biostatistics.
6		
	Unit 1: Biochemistry Unit-2: Plant Physiology	Students can learn about different biomolecules, their classification, properties, and function. In Plant Physiology part, students can learn about water potential, water absorption, photosynthesis, photorespiration, CAM, transpiration, respiration, N-metabolism, biological nitrogen fixation, photoperiodism, photomorphogenesis, plant Growth regulators etc.
	Unit -3: Pharmacognosy Unit -4: Plant Biotechnology.	Students can learn about importance of Pharmacognosy in modern medicine, Drugs, commercial production of drugs, adulteration, classification and evaluation of drugs, secondary metabolites, and organoleptic study of different drug plants. In plant biotechnology students can know about tissue culture techniques.
7		
	Project work	Students get the knowledge about details of project preparation procedure along with different laboratory and field-based work, internet surfing, statistical analysis, MS Office

		application, Photoshop designing and Presentation of project.
--	--	---

COURSE OUTCOME: BOTANY (GENERAL)

Course outcome: Botany (General)		
Semester	Content	Outcome
1		
	Unit -1. Fundamental Botany.	Students can learn about Fundamental Botany. Origin of life, Plant and animal cell, different system of classification, different life cycle pattern, Darwin's theory of evolution, speciation etc.
	Unit -2. Environmental Botany.	Students can learn about environment, different pollution such as -air, water, soil, noise, heavy metal, radioactive etc. and their effect on plants and animals.
	Unit-3. Industrial Botany-1 (Agriculture industries and microbial fermentation and food.)	Students can learn about organic farming, seed industries, seed production, production of SCP and its culture, Mushroom production. Commercial production of ethyl alcohol and citric acid etc.
	Unit 4. Industrial Botany-2 (Plant nursery and Floriculture industry)	From this Unit students can learn about concept and types of nurseries, infrastructure requirement and commercial applications of nurseries, different propagation methods, floriculture, open cultivation practices etc.
2		
	Unit-1: Algae and Bryophyte	Students can learn about lower plant groups like Algae & Bryophytes. Their life history and evolution.
	Unit-2: Pteridophyta, Gymnosperm and Paleobotany	Students can learn about Pteridophyta, Gymnosperm & Paleobotany. Life history of different Pteridophyte and Gymnosperm genera, Progymnosperms, different types of Fossils, geological time scale etc.
3		

	<p>Unit -1: Fungi and plant resource utilization.</p> <p>Unit -2: Microbiology and Plant pathology</p>	<p>Students can learn about Fungi, its economic importance, general account, and type study. In plant resource utilization, students can also learn about different plant resources and cultivation of some of them.</p> <p>In Microbiology part students can learn about Virus, Bacteriophage, their growth cycle, Bacteria, its reproduction etc.</p>
		In plant pathology students can learn about different symptoms and different plant diseases.
4		
	<p>Unit 1: Morphology and Taxonomy</p> <p>Unit -2: Anatomy, Ecology and Phytogeography.</p>	<p>Students can learn about Morphology of higher plants along with floral structure, fertilization process, fruit types. In Taxonomy part, students can know about the taxonomy of different families.</p> <p>Students can learn about plant anatomy, ecology, and phytogeography of India.</p>
5		
	<p>Unit -1: Cell and Molecular Biology, Cytogenetics and Plant Breeding.</p>	<p>In Cell and Molecular Biology students can learn about cell cycle, cell division, structure and function of different cell organelles, chromosome morphology and organization, Structure, forms and salient features of nucleic acids, DNA replication Gene Mutation, Lac Operon etc.</p> <p>In Cytogenetics students can know about the Mendelian inheritance, gene interaction, crossing over, linkage, Chromosomal aberration.</p> <p>In Plant Breeding part, students can know about the methods of plant breeding, introduction, emasculation, hybridization and acclimatization, selection, male sterility, heterosis, hybrid vigour etc.</p>

	Unit-2: Plant Physiology and Plant Biotechnology.	<p>In Plant Physiology part, students can learn about water potential, water absorption, photosynthesis, photorespiration, CAM, transpiration, respiration, N-metabolism, biological nitrogen fixation, photoperiodism, photomorphogenesis, plant Growth regulator etc.</p> <p>In plant biotechnology students can know about tissue culture techniques.</p>
6		
	Project work	Students get the knowledge about details of project preparation procedure along with different laboratory and field-based work, internet surfing, statistical analysis, MS Office application, Photoshop designing and Presentation of project.

**DEPARTMENT OF HUMAN PHYSIOLOGY
COURSE OUTCOME: HUMAN PHYSIOLOGY
(HONS.)**

HUMAN PHYSIOLOGY course enriches students in understanding the human body and their functional aspect like how does body works. Students come to know about different organ system of the body. Besides there are Nutrition and Dietetic, Sports and Exercise Physiology, Ergonomics, biochemistry, bio-physics, molecular biology, genetics, biotechnology, Microbiology and Immunology, etc which help them to get placed in the different applied biotechnical fields.

COURSE OUTCOME: DEPARTMENT OF HUMAN PHYSIOLOGY (HONS)		
SEMESTER	CONTENT	OUTCOME
1 ST SEM HONS	<u>Unit 1: Structural Units of Human System</u> Concept of animal cell, ultra-structure of cellorganelles & their respective functions, celljunction, cellinclusions,Cytoskeletonclassifi cation, Cell cycle- phases, mitosis,meiosis,General structureandfunctionsofanimal tissue, skeletal system- bones, joints- types,typesofmusclesanddistributio n,function.	After completion students will able to learn about thestructure of the basic buildingblocksof Human bodyandfunctions of cellatthemolecular level; distributionandfunctionstissu es.Students will also get acquaint bio-physical and thermodynamics principles of, radioactivity.Students will have the opportunity to

	<p><u>Unit II: Biophysical and Bio Chemical Principles</u></p> <p>Bio physical process- Osmosis, diffusion, surface tension and viscosity, Donnan Membrane equilibrium, Acid base, PH Buffer, Colloids-classification, properties, Dialysis and ultra-filtration, Radio activity, Fundamentals of subcellular fractionation, centrifugations, electrophoresis, chromatography.</p> <p><u>Unit III: Blood, other body fluids and clinical hematology</u></p> <p>Composition of blood, plasma proteins, Bone marrow, Erythropoiesis, Blood Volume, Hemoglobin and synthesis, abnormal HB, Lymph, Tissue Fluids,</p> <p>Blood Indices, Anemia, Hemostasis, Blood coagulation, disorders of Blood coagulation, Prevention of Intravascular Coagulation, Blood groups, Blood Transfusion and its Hazards Tranfusion.</p> <p><u>Unit IV: Bio chemistry and Enzymology</u></p> <p>Definition, Classification,</p>	<p>acquire knowledge about different bio-chemical techniques such as electrophoresis, chromatography, centrifugation and subcellular fractionation.</p> <p>They also lean about hematology concept and also acquire knowledge about Human Blood their composition, groups and blood transfusion and its Hazards.</p> <p>Students will get the knowledge on Basic bio chemistry like carbohydras, proteins and fats and also get knowledge about enzymology.</p>
--	--	---

	<p>Properties of carbohydrates, proteins and fats, mucopolysccarides etc.</p> <p>Enzymology: enzyme definition, classification, activation, mechanism of enzyme action.</p> <p>Determination and significance of Km value, effects of temperature, pH on enzyme action, enzyme regulation, inhibitors: their types and mechanism</p>	
<p>2nd Sem Hons</p>	<p><u>Unit V: Physiology of Excitable cell</u></p> <p>Structure, properties and classification of nerve cell and fibers, Degeneration and regeneration of nerve fibers.</p> <p>Properties of nerve fibers, modern concept of generation of resting potential, generator potential, Action potential. Propagation of nerve impulse, Structure of synaptic junction. Properties of synapse. Classification, Transmission of nerve impulse across the synaptic jinctioa, Neuro- muscular junction- structure, propagation of nerve impulse across the neuro-muscular junction,</p> <p>Mechanism of transduction of</p>	<p>Students become acquire knowledge about Nerve- muscle physiology like nerve properties, RMP, AP, synapse, reflex, synaptic properties, neurotransmitter. .</p> <p>After completion students must have gather knowledge about</p>

<p>stimuli from sensory receptor, Reflex arc & reflex action. Properties of reflex action, classification of reflexes. Conditioned and unconditioned reflexes</p> <p>E-C coupling, Sliding filament theory, Modern concept of muscle contraction, isotonic and isometric contraction.</p> <p><u>Unit VI: Cardio-vascular system:</u></p> <p>Anatomy of the heart, innervations of heart and blood vessels, Junctional tissues of heart, origin and spread of cardiac impulse, conduction defects: arrhythmia, AV block, bundle branch block;</p> <p>Cardiac output, measurements, controlling cardiac output.</p> <p>Heart sounds-significance, murmurs-causes.</p> <p>Blood pressure: factors affecting blood pressure, regulation of blood pressure with special reference to sino-aortic mechanism. Bradycardia- Tachycardia, hypertension: primary and secondary.</p> <p>E.C.G: different lead systems, different waves and intervals, their significance, Einthoven's law, determination of electrical axis,</p>	<p>Cardiac structure and how does heart works. Blood pressure control etc, many important disease like CAD, murmur, heart block, arrhythmias, hemorrhage and also know the basic about ECG and its measurements.</p> <p>After completion of the practical syllabus students can acquire practical knowledge on blood film preparation, TLC, DLC, Hb estimation etc and also know about Blood pressure measurements. Besides students may know a practical overview on Human Skeleton.</p>
---	---

	<p>significance; Courses, peculiarities of coronary circulation, Atherosclerosis, CHD, Cardiac failure, Angina pectoris, CVS shock, mitral stenosis.; Hemorrhage - effects and compensatory adjustment.</p> <p><u>Practical:</u></p> <p>Hematology: preparation blood film, measurement of TLC, DLC, Arneith count, Hb indices, Hb estimation, Haemin Crystal, blood group determination.</p> <p>Measurement of Heart rate, Blood pressure</p> <p>Study on Human skeleton</p>	
<p>3rd Sem Hons</p>	<p><u>Unit VII: Metabolic Biochemistry and Molecular Respiration</u></p> <p>Enzymatic mechanism and regulation of carbohydrate, protein and fat metabolism (glycolysis, TCA cycle, PPP, deamination, transamination, urea cycle, beta oxidation, ketone bodies amino acid metabolism, fatty acid synthesis, cholesterol biosynthesis,) Electron transport chain, ATP synthesis</p>	<p>After completion students acquire knowledge on the metabolism of carbohydrate, proteins and fats and also mechanism of ATP synthesis.</p> <p>Besides, students will gather vast knowledge on nutrition and dietetics.</p>

Unit VIII: Nutritional Biochemistry

Vitamins- water and fat soluble vitamins-sources. Daily requirements and functions. Chemical nature and structure of Vitamins; biosynthesis of vitamin-C, A and D, Co-enzymatic role of vitamins in metabolism. Vitamin deficiency symptoms and disorders: hyper vitaminosis. Bulk and trace elements and physiological roles Na, K, Iodine Iron etc. Calorific value of foods and determination by Bomb calorimeter. SDA of foods. RQ. their definition and physiological importance. BMR, factor BMR: Determination by Benedict's Roth Apparatus. Nutritional importance and dietary requirements of Carbohydrate, Protein and fat, RDA of Carbohydrates, protein fats and Other nutrients. Complete and incomplete biological value of proteins, essential amino acids and fatty acids. Food groups, formulation of balanced diet for Growing child. Adult man and woman, Pregnant and Lactating mother. Elderly people. Malnutrition. Protein calorie malnutrition (Kwashiorkor) and undernutrition (Marasmus). Their

Also acquire knowledge on Digestive system and its disease like HCL secretion, ulcer, bile secretion, Gall bladder stone, liver function test, digestion and absorption of carbohydrates, proteins and fats, role of pancreas and liver in the digestion, bile salts and its importance, large intestine role digestion, constipation, mechanism of swallowing and defecation, vomiting etc. .

Students will have the opportunity practical knowledge on the measurements of the qualitative identification of bio chemical

<p>preventive and curative measures: Obesity.</p> <p>Digestive system: Alimentary tracts anatomy and Histology. Salivary glands and its function. Composition, functions, formations, mechanism of secretions, regulation of secretions of digestive juices, enterohepatic circulation of bile salts and bile pigments, role of bile in fat digestion and absorption. Formation of HCL, concept of hyper acidity Digestion and absorption of Carbohydrates, proteins fats. Intestinal movements, GI Hormones Disorder of Digestive system</p> <p><u>Practical:</u></p> <p>Clinical biochemistry: qualitative identification of bio chemical samples of physiological importance.</p> <p>Estimation of serum/blood/plasma cholesterol, Triglyceride, glucose, protein, SGOT/SGPT. Nutritional Biochemistry: Colorimetric estimation of blood HB, Vit C, lactose, carbohydrate, moisture</p>	<p>samples of physiological importance and also gather knowledge on the colorimetric estimation of different substance present in blood like glucose, cholesterol, triglycerides, proteins etc. .</p> <p>Students can be well trained on the estimation of nutritional important substance present in food like lactose, carbohydrates.</p> <p>After completion students will have practical experience on very important topic such as Diet survey and also on anthropometric measurements and their use in Nutrition and Health.</p>
---	--

	content of food. Assessment of Nutritional status by anthropometric and diet survey	
4 th Sem Hons	<p><u>Unit IX: Respiratory system & Aviation Physiology</u></p> <p>Anatomy and histology of respiratory tract and organs : Muscles of respiration. Breathing : Mechanism of breathing, Respiratory pressures, Lung compliance, resistance. Lung function test : Lung volume and capacities; Spirometry : measurement of Vital capacity, FV C, Timed Vital Capacity (FEVI), MVV(MBC), PEFR with their significance. Course, peculiarities and control of pulmonary circulation. Transport of O₂ and CO₂, O₂ dissociation curve- factors affecting and significance. Regulation of respiration- neural and chemical. Hypoxia- Types, causes and effects; on Asphyxia, Apnea, Hyperpnoea, Cyanosis, Periodic breathing, Dyspnea, Chronic obstructive pulmonary diseases-asthma.</p>	<p>Students can acquire knowledge on mechanism of respirations and its mechanics, like lung compliance, surfacetension, surfactant, different diseases like Asthma, emphysema and measurements of lung functions.</p> <p>Students also gather unique knowledge on High altitude physiology and also underwater physiology.</p> <p>Students also acquire knowledge on space physiology and Accelerative and gravitational force effects on human body.</p> <p>After completion this unit students will have the very applied knowledge on ergonomics and</p>

<p>Restrictive pulmonary disease-emphysema. High altitude physiology: Barometric and partial pressure of O₂ at high altitude, changes in the body in high altitude, motion sickness; acclimatization to high altitude. Physiology-Accelerative and gravitational force, effects of positive and negative G body, space physiology- effects of weightlessness on Cardio-vascular system, system, blood, immune system; space motion sickness.</p> <p><u>Unit : Ergonomics and Sports Physiology</u></p> <p>Scope & application of ergonomics and work physiology Static & Dynamic work ; Classification of work and exercise. Energy cost of different physical activities – its determination; Ergometry-working principle of ergometers- bicycle and treadmill.Importance of measurement of different physiological parameters such as heart rate (pulse rate rate) , O₂ — consumption , blood pressure etc.Anthropometry in ergonomics-common anthropometric measurements used in work place design.</p>	<p>sports exercise physiology. Ergonomics will give knowledge about man-machine and milieu. They will get expose to how does man handle with different things instruments, machine, wok stations etc.</p> <p>In sports exercise physiology they will expose to sports and exercise science which are very applied now a days. They will gather knowledge on different responses of the human body during exercise and sports and will also know about general fitness training principles, glycogen loading and also idea about doping.</p> <p>After completion students acquire practical knowledge on the measurements of LFT like VC, FVC, FEV₁ etc. Determination of ECG, VO₂ max, max, BMR etc. and will find to evaluate cardio-respiratory fitness of human body. This is very much effective and</p>
--	--

	<p>Muscles in exercise-strength , power & endurance of muscles; Muscle metabolic system in exercise (energy source during muscular exercise); Nutrients used during exercise. Physiological changes during exercise- cardiovascular(circulatory) & respiratory changes; steady state; second wind.; Fatigue-causes. Metabolic changes during exercise- anaerobic power (capacity); Maximal aerobic power (V02max) — its determination & significance, Recovery of metabolic systems after exercise. Debt- lactacid & alactacid Exercise training: principles of training; aerobic & anaerobic training; Effects of training on muscles, cardiovascular systems. Nutrition/diet in athletics performance — pregame meal ; glycogen/ carbohydrate loading Doping in sports, ethical issues; harmful effect of caffeine, steroids, amphetamine and cocaine abuse in health.</p> <p>Practical:</p> <p>Measurements of LFT like VC,</p>	<p>applied.</p>
--	---	-----------------

	FVC, FEV1 etc. Determination of ECG, VO2 max, max, BMR. Stethography, ergography.	
5 th sem Hons	<p><u>Unit XI: Nervous system</u></p> <p>Structural organization of different parts of brain and spinal cord, 72. Cerebrum• Histology, 'area and centers central cortex and their functions, method of localization of functions; and Hypothalamus -their nuclei, connections and Cerebellum: Histology, nuclei connections and functions. Concepts Of ANS- classifications Structural and functional organization. Basal ganglia: Structures connection and functions,</p> <p>Electrical activities Of cerebral cortex cortex, physiological basis of EEG, waves of EEG, their significances', epilepsy; physiology of Sleep, types of sleeps effect of sleep deprivation,</p>	<p>After completion of all the units in this semester students will acquire knowledge on excretory system, nervous system, endocrine system and reproductive systems of Human Body and their control etc. In excretory system they will gather knowledge Nephron structure, GFR, Urine formation, abnormal urine, Diuretics, renal diseases, concentrating and diluting urine formation, osmolarity and blood volume maintenance, acid base balance by kidney.</p> <p>They also learn about human endocrine system, anatomy and detailed functions of different hormones, including sexual function of</p>

<p>Brain ventricles- basic Concepts: CSF- composition formations circulation and functions. Ascending tracts Carrying touch, pain, pressure, temperatures , kinesthetic sensation; descending tracts- corticospinal, extrapyramidal tracts Upper and lower motor neurons lesions Cerebral circulation-course, factors affecting. Limbic system- structure, connection and function,</p> <p>Maintenance and regulation of posture and equilibrium, Neurophysiology of learning and memory. Macromolecular neurochemistry: carbohydrate utilization in the role of proteins lipids in the brain. Neurotransmitter chemistry: Acetylcholine, catecholamines, serotonin, amino acids peptides.</p> <p><u>Unit XII: Excretory system, skin and thermoregulation</u></p> <p>Anatomy of kidney, 'Histology of nephron and function in relation to structure. Course, peculiarities and regulation Of renal circulation. GFR- factors affecting and regulation. Juxta- glomerular</p>	<p>human as well as hypo and hyperfunctions. They gather knowledge about reproductive physiology like male and female reproductive system, Sex Hormones, spermatogenesis, ovulation, female ovarian and uterine cycle, pregnancy, parturition, pregnancy test, contraception etc.</p>
---	---

<p>apparatus- structure and function, Hypo and hypertonic urine formation with reference to countercurrent exchange and multiplier mechanism. Non-excretory functions of kidney. Renal function tests- Plasma clearance concepts inulin and creatinine clearance test. 8, Composition of normal urine, composition and significance of abnormal constituents of urine. Diabetes insipidus - causes. Physiology of urinary bladder, micturition process and reflexes. Diuretics, mode of action of osmotic diuretics. Chronic renal failure,</p> <p>Cutaneous circulation and its significance. Structure of sweat glands sebaceous gland and its Mechanism and regulation of Sweat secretion. Concept of homeothermy and processes of heat loss and heat gain. Mechanism of temperature regulation. Heat stress, pyrexia, hypothermia and physiology of hibernation</p> <p><u>Unit XIII: Endocrinology and chronobiology</u></p>	<p>Acquire practical knowledge on the anatomy and histology of Nervous system, endocrine system, reproductive system,</p>
--	---

<p>Concept of anticrime, paracrine and endocrine system. ,yatomicall organization of endocrine glands ill the body. Chemical classification of of hormones, Different types of hormone receptors.Mode of action ofhormones with examples; signal transduction, second messengers. Pituitary glands- anatomy, histology and function ofpituitaryhormones. Hypothalamo-hypophyseal portal system. Thyroid, parathyroid and adrenal glands- anatomy, biosynthesis and physiological functions of their hormones.Endocrime pancreas: Hormones, functions, of insulin and glucagon.Blood sugar regulation- Role of different hormones. Diabetes mellitus and Type-II, their causes and symptoms, glucose tolerance test and its 'significance? Role of GLUTtransporters.Hormones related to hunger and satiety: leptin, ghrelin and adiponectine. Hypo and hyper functions of endocrine glands.Regulation ofhormones- feedback mechanism.</p> <p>Biological clock- concept, role ofpineal glands, pituitaryand hypothalamus.Different biological</p>	<p>excretory system.</p> <p>Biochemical analysis of Urine and Kidney function test.</p> <p>Able to know human reflexex and their utility.</p> <p>Acquire knowledge on the effects of ions, drugs on heart and intestine</p>
---	---

rhythms: circadian, infradian, ultradian etc rhythms. Gene oscillations.

Unit IV: Reproductive physiology & Development Biology

Anatomical organization of male & female reproductive system, primary & secondary organs. Puberty. Testis- Histology, hormones of testis & their functions, Ovary- Histology, hormones of Ovary-their functions; Menstrual cycle- ovarian and uterine change & its hormonal regulation. role of hormones in Embryogenesis: Gametogenesis- Spermatogenesis, Oogenesis; gametogenesis; Fertilization process; Cleavage hormonal control; Gastrulation (formation of endoderm-its fate, formation of embryonic disc, formation of mesoderm and ectoderm -their fates, formation of embryonic cavity); Placenta- placental hormones, their function. Physiological changes during pregnancy. Pregnancy test. Physiology of parturition. Development of mammary gland,

	<p>physiology of lactation-its control. Mechanism of milk ejection. Importance of Clostrum Physiology of menopause. Fertility control hormonal.</p> <p><u>Practical:</u></p> <p>Anatomy and Histology of Nervous system, endocrine system, reproductive system, excretory system. Tissue staining. Bio chemical analysis of urea, uric acid, cretonne, Glucose tolerance test, abnormal constituents of urine. Human reflex, Rhomberg sign vestibular function. Demonstration on the effects of ions, drugs on heart and intestine</p>	
<p>6th sem Hons</p>	<p><u>Unit XV: Sensory physiology</u></p> <p>Olfaction and gestation: Structure of taste buds, mechanism of taste sensation, neural pathways for taste and smell sensation with centers involved. Audition: Structure and function of auditory apparatus, Organ of corti</p>	<p>After completion of this semester students will acquire knowledge on special senses and also modern biological science knowledge such as molecular biology, microbiology, and immunology and</p>

	<p>histology,function,propagation of sound waves through different parts of ear and their role in hearing, auditory pathway.Vision: Anatomy and structure of eyeball, histology of retina, photochemical changes of retina on exposure to light, visual pathway, reflexes of the eye, accommodation, refractive errors and their remedies.</p> <p><u>Unit XVI: Microbiology, Biotechnology & Immunology</u></p> <p>Bacteria, virus, fungus - their structure and characteristics, bacterial classification.Bacterial growth cycle and factors (pH, temperature, nutritional requirement), controlling bacterial growth.Bacteriostatic and bactericidal agents and their functions.</p> <p>Brief idea of antibiotics with examples.</p> <p>Some common diseases caused by bacteria, fungus and virus- cholera, eczema and influenza - their symptoms and preventive measures.</p> <p style="text-align: center;">Biotechnology</p> <p>Recombinant DNA technology,</p>	<p>biotechnology band genetics.</p> <p>They also exposed to modern biology like molecular biology, microbiology, immunology etc.</p> <p>They know about molecularbiology of DNA and RNA andalso about body's immuneresponse against any pathogen,vaccination and autoimmunityas well as some techniques todetermine immunologicalparameters.</p> <p>Also know about research, research methodology, sampling and data management by statistics</p>
--	--	--

	<p>DNA cloning, cloning vector, restriction endonuclease, cloning of DNA into cloning vectors.</p> <p>DNA gel electrophoresis Southern blot and western blot</p> <p>Colony Hybridisation. Basic concept of PCR</p> <p>Immunology</p> <p>Immune system, innate and acquired immunity - their components. Primary and secondary lymphoid organs, T-cell, B-cell, macrophage, neutrophil, dendritic cells and their functions.</p> <p>Antigen, Immunogen, Epitope, Hapten, Paratope, MHC molecules, CD-4 and CD-8 markers - general idea. Humoral immunity - general structure of IgG antibodies, Primary and secondary immune response, clonal selection theory of antibody production Cell mediated immunity - Complements components of classical and alternative pathways, their activation and physiological function of complement system. Unit XVII: Molecular Biology and genetics DNA - The genetic material,</p>	
--	---	--

<p>transformation in pneumococcus (Avery, Macleod and McCarty), Griffith and Hershey-Chase experiments. Semiconservative model of DNA replication. DNA polymerase I and III, DNA ligase, function of different subunits, Okazaki fragments. DNA transcription: Concept of gene, difference between Prokaryotic and Eukaryotic gene. Mechanism of gene transcription, template and nontemplate strand, promoter sites, RNA polymerase - function of different components of RNA polymerase. Protein synthesis: genetic code, codons, reading frame, Nirenberg's experiment, initiation codon, termination codon, degeneracy of genetic code, Wobble hypothesis. Mechanism of translation: Activation of amino acid, formation of initiation complex, Shine-Dalgarno Sequence, role of A site and P side. Elongation: role of elongation factors, translocation. Termination: role of terminators and release factors. Mutation: Spontaneous and induced mutation, mutagens- chemical & physical, transition and transversion of mutation - mechanism, chemicals</p>	<p>Students will gather practical knowledge on molecular biology, microbiology and immunological techniques.</p> <p>Also acquire practical knowledge on research sampling and statistical application on data analysis</p> <p>Students will have the opportunity to acquire knowledge on the research project idea by doing some practical task like identification of research area, research design, preparing review of the literature, data collection, data analysis, data presentation and making discussion and conclusion and</p>
--	---

<p>inducing transition and transversion. Chromosomal mutation: structural, inversion, translocation, deletion, duplication, chromosomal number: euploidy, aneuploidy, polyploidy. Repair of mutation: Mismatch repair, excision repair. Regulation of gene expression, operon concept, lac operon, cistron. Different stages of meiosis. Mendelian genetics- mendelian experiment, monohybrid crosses, principles of dominance, dihybrid crosses, incomplete dominance, co-dominance. Human genetics- importance, pedigree analysis, karyotyping, human genetic disorders, gene incompatibility (ABO) blood group, autosomal (phenyl ketonuria), albinism, sex linked (haemophilia, red green color blindness) disease</p> <p><u>Unit XVIII: Research Methodology and Epidemiology</u></p> <p>Meaning of research, objectives and significance of research, research ethics, types of research. Scientific methods of research, selecting the research problems, need of research design and its different steps, Need for basis of selecting a sampling procedure,</p>	<p>finally reference writing at the undergraduate level which will help them for writing research article or thesis.</p>
--	--

characteristics of good sample design, types of data. Utility of statistics in research, measures of Central tendencies (Mean, median, mode), standard deviation (SD), Standard error of mean (SEM). Basic concepts of - frequency polygon, histogram, nomogram, bar diagram, pie diagram. Definition of epidemiology, recent development in epidemiology, definition, scope and uses of epidemiology, concepts of disease occurrence, chain of infection, epidemic disease occurrence.

Practical:

Practical on microbiology and immunology, gram staining, imple colony isolation by agar streak method, Ouchterlony double diffusion test. Molecular biology practical like DNA isolation, protein separation Anatomical model on eye, ear, nose, tongue, skin etc Deafness tests. Practical on statistical analysis. Test for deafness

	Project: Research Project work	
--	---------------------------------------	--

COURSE OUTCOME: HUMAN PHYSIOLOGY (GENERAL)

<u>Course Outcome: Department of Human Physiology (pass)</u>		
<u>1st Sem</u> <u>Pass</u>	<u>Content</u>	<u>Outcome</u>
	<p>Concept of animal cell, ultra-structure of cell organelles & their respective functions, cell junction, cell inclusions, Cytoskeleton classification, Cell cycle- phases, mitosis, meiosis, General structure and functions of animal tissue, skeletal system- bones, joints- types, types of muscles and distribution, function.</p> <p>Bio physical process- Osmosis, diffusion, surface tension and viscosity, Donnan Membrane equilibrium, Acid base, PH Buffer, Colloids-classification, properties, Dialysis and ultra-filtration, Radio activity, Fundamentals of subcellular fractionation, centrifugations, electrophoresis, chromatography.</p> <p>Composition of blood, plasma proteins, Bone marrow, Erythropoiesis, Blood Volume, Haemoglobin and synthesis, abnormal HB, Lymph, Tissue Fluids, Blood Indices, Anaemia,</p>	<p>After completion students will be able to learn about the structure of the basic building blocks of Human body and functions of cell at the molecular level; distribution and function of tissues.</p> <p>Students will also get acquainted with bio-physical and thermodynamics principles, radio activity.</p> <p>Students will have the opportunity to acquire knowledge about different bio-chemical techniques such as electrophoresis, chromatography, centrifugation and subcellular fractionation.</p> <p>They also learn about hematology concept and also acquire knowledge about Human Blood their composition, groups and blood transfusion and its Hazards.</p> <p>Students will get the knowledge on Basic bio chemistry like carbohydrates, proteins and fats and</p>

	<p>Hemomostasis, Blood coagulation , disorders of Blood coagulation, Prevention of Intravascular Coagulation, Blood groups, Blood Transfusion and its HazardsTranfusion.</p> <p>Definition, Classification, Properties of carbohydtares, proteins and fats, mucopolysccarides etc.</p> <p>Enzymmology: enzyme definition, classification, activation, mechanism of enzyme action. Determination and significance of Km value, effects of temperature, pH on enzyme action, enzyme regulation, inhibitors: their types and mechanism.</p>	<p>also get knowledge about enzymology.</p>
<p><u>2nd</u> <u>Sem</u> <u>Pass</u></p>	<p>Anatomy of human heart, its innervations andcourse of circulation through it; properties ofmyocardium junctional tissues of heart; cardiaccycleanddifferentheartsounds-significance;BP,HR andcardiacoutput-measurement,significance, normal and abnormal status,regulation;ECG-determination,waves,significance; some common cardio vascularailments, anatomy of human respiratory tree,mechanism of breathing, respiratory muscles,regulation of respiration carriage of respirationgases, Lung</p>	<p>After completion students must have gather knowledge about Cardio-vascular system. Cardiac and lung structure structure and how does heart and lung works. Blood pressure control etc, many important disease like CAD, murmus, heart block, arrhythmias, hemorrhage and also know the basic about ECG and its measurements. Also gather knowledge on mechanism and mechanics of breathing, Spirometry, High altitude physiology and respiratory diseases.</p> <p>After completion students acquire knowledge on the metabolism of</p>

<p>volumes and capacities; spirometry; coronary & pulmonary circulation.</p> <p>Anatomy, Histology and functions of alimentary tracts and digestive system and digestive glands, Composition of different digestive juices, bile functions, Digestion and absorption of carbohydrates, proteins and fats, movements of alimentary tracts, absorption of Iron, Vit B12, Calcium, GI Hormones</p> <p>Enzymetic steps in glycolysis, TCA cycle, Cori Cycle and their significance, Glycogenesis, glycogenolysis, gluconeogenesis, ETC, Oxidative phosphorylation, Beta oxidation, Deamination, transamination, Urea formation</p> <p>PRACTICAL- study of compound microscope, preparation of human blood film, study of different blood corpuscles; haemoglobin content, blood group; haemin crystal, study of squamous epithelium, measurement of blood pressure, heart rate, study of human skeleton; quantitative identification of physiological importance of substances.</p>	<p>carbohydrate, proteins and fats and also mechanism of ATP synthesis.</p> <p>Besides, students will gather vast knowledge on nutrition and dietetics.</p> <p>Also acquire knowledge on Digestive system and its disease.</p> <p><u>Students will gather practical experience on basic hematology practical like preparation of human blood film, study of different blood corpuscles; hemoglobin content, blood group; haemin crystal, study of squamous epithelium, measurement of blood pressure, heart rate, study of human skeleton.</u></p>
--	---

	I	
<p>3rd sem pass</p>	<p>Neurochemistry and brain metabolism; classification of cutaneous receptors; organisation of human nervous system; properties of neuron, genesis and propagation of nerve impulses, reflex arc, reflex action; sensory and motor tracts, mechanism of skeletal muscle contraction.</p> <p>Ultrastructure of human kidney. GFR- factors and determination, mechanism of dilute and concentrated urine production, normal and abnormal constituents of urine, micturition, renal circulation, renal hypertension, renal failure; Oxidative stress, free radicals and their production in the body, antioxidants and their physiological significance, smoking- major harmful components, passive smoking.</p> <p>PRACTICAL- Identification of abnormal constituents of urine, estimation of blood creatinine, Histological slides of skin, excretory system; models of skin and human excretory system. Human reflexes (superficial and</p>	<p>Students get a generalized knowledge on Nerve Muscle physiology like Properties of Neuron, synapse, reflex, tracts, Neurotransmitter, muscle contractions.</p> <p>Students also acquire knowledge on the structure and functioning of human kidney, also about general abnormalities of excretory system. They can also learn about emerging field of stress, physiology and benefits of antioxidants. They learn why active and passive smoking are so harmful</p> <p>Students get hands-on knowledge about identifying abnormalities in renal function, they achieve a broad idea about micro and macro anatomy of skin and excretory system. They can elicit human reflex and determine muscular strength and endurance.</p>

	deep);determinationofmusclestrengthand endurance.	
4th Sem Pass	<p>Anatomy of different parts of human tract andtheir function; autonomic nervous system-anatomy and function. The CSF- circulation,blood brainbarrier; electricalactivity of the brain;sensory physiology- eye, ear, gestation andolfaction- structuralandfunctionalaspects. Generalabnormalities in functions,pathologicalaspects; anatomical organization of endocrineglands (pituitary, pineal, thyroid, parathyroid,thymus, adrenal, pancreas) various hormones,hypoandhyperactivityofdifferentglands.</p> <p>Reproductivephysiology:structureofmaleandfemale reproductive organs, male and femalegonads- ultra-structure, male and female sexualact, fertilization, gestation, parturition, test ofpregnancy.</p> <p>PRACTICAL- Study of histological</p>	<p>Students can learn aboutstructure and functions ofdifferent parts of human brain,sensory and motor physiologyas well as special senses likevision, audition.</p> <p>They alsolearnabout human endocrine system,anatomy and detailed functionsofdifferenthormones,including sexual function of human aswellas hypo andhyperfunctions.</p> <p>They also gatherknowledge about reproductive physiology like male and female reproductive system, Sex Hormones, spermatogenesis, ovulation , female ovarian and uterine cycle, pregnancy, parturition, pregnancy test, contraception etc.</p> <p>Students gather idea aboutmicro and macro anatomy oforgans of brain, special sense,endocrine and reproductivesystem, they can determinedefectsincolourvision, Deafness tests and also test for vestibular function.</p>

	<p>slides and models related to human brain and endocrine system. Slides and models on male and female reproductive organs. Model of eyes, nose, tongue, tests of colour vision, deafness, test for Rhomberg sign.</p>	
<p>5th sem pass</p>	<p>Nutrition and nutrients- carbohydrate, protein, fat, vitamins, minerals- their respective role in nutrition, BMR, RQ, SDA, RDA- definition, determination, significance. Diet survey programme; diets in different pathophysiological conditions. Structure of DNA, RNA, replication, transcription; translation process; cloning of DNA, innate and acquired immunity, primary and secondary lymphoid organs; antibody- structure, antigen-antibody interaction; haptens, epitope, paratope, MHC, CD4., CD8, vaccination, autoimmunity, AIDS, ELISA, RIA.</p>	<p>Students gather detailed knowledge about physiology of nutrition and dietetics. Also gather knowledge on malnutrition, overnutrition, nutrition in some pathophysiological condition.</p> <p>They also exposed to modern biology like molecular biology, microbiology, immunology etc.</p> <p>They know about molecular biology of DNA and RNA and also about body's immune response against any pathogen, vaccination and autoimmunity as well as some techniques to determine immunological parameters.</p> <p>Students participate in diet survey programme and determine nutritional status of the family under survey, they also determine nutritional status by anthropometric method and assess</p>

	<p>PRACTICAL- Assessment of nutrients like lactose content in milk, carbohydrate content in food, glucose-sucrose mixture by biochemical methods, assessment of antigen-antibody interaction</p> <p>Assessment of nutritional status by diet survey and anthropometry.</p>	<p>biochemically thenutritional content in a given food sample.</p>
<p>6th Sem Pass</p>	<p>Soft study course- Three soft study courses offered by the institution.</p> <p>PROJECTWORK- Detailed project work based on whole curriculum of the subject.</p>	<p>Students gather idea about research methodology and writing of thesis/research paper.</p>

DEPARTMENT OF ZOOLOGY
COURSE OUTCOME: ZOOLOGY (HONS.)

semester	Content	Outcome
1 st sem Hons	Morphology, locomotion of Protozoa, Porifera, Cnidaria, Helminths, Annelida. Morphology, digestive, respiratory, excretory, circulatory, nervous, reproductive system of cockroach, Pila, Asterias, Asterias, Echinoderm larvae. Coelom origin, types and functions of Hemichordates, Branchiostoma, Ascidia. Cyclostomata, Pisces, Amphibia, Reptilia, Aves, Mammalia, neoteny, comparative anatomy of heart, aortic arches in vertebrates, poisonous and non-poisonous snakes, Ruminant and non-ruminant Stomach. Techniques of Taxonomy, nomenclature and classification of different phyla.	Students can learn about animals without coelom, with coelom. Protochordates to mammals, zoological classification.
2 nd sem Hons	Concept of Prokaryotes, eukaryotic cells. Ultrastructure and functions of Plasma membrane, mitochondria, chromosome and other cell organelles. Cell cycle, cancer. Classification of animal tissues and their distribution, histology of skeletal muscle. Histology and functions of skin, liver etc. in mammals. Gametogenesis, fertilization, cleavage, gastrulation, extraembryonic membrane, placenta types, formation, function. Pisciculture, prawn culture, poultry, apiculture, sericulture, vermiculture, pollinators and pest.	Students learn about cell biology, histology, developmental biology. They get knowledge about applied zoology. Students get knowledge of taxonomic classification of different animals with characters.

	<p>PRACTICAL – Identification with reason Some major non-chordates and chordates, T. S of some mammalian organs. Chick embryo whole mount. Preparation and study of mitotic chromosome. Biochemistry etc.</p>	<p>They also get knowledge of developmental stages of chick embryo, T. S. of mammalian liver, kidney, etc. They learn how to prepare and stain mitotic chromosome on slide.</p>
3 rd sem Hons	<p>DNA as genetic material, concept of alleles and multiple alleles, linkage types, gene mapping, crossing over and recombination – molecular basis and significance. Sex determination in human, syndrome. Mode of inheritance autosomal and sex chromosome. Mutation--- types, agents, induction and detection. Detection of biochemical mutants, metabolic blockage of arginine. Human genetic disorders. Biotic and abiotic factors, energy flow in ecosystems, Population dynamics growth form and growth equations, demography life table types and survivorship curves, ecological succession, autogenic and allogenic succession, primary and secondary succession, ecotone etc. Behavioural ecology. Air and water pollution. Conservation and act of wild life.</p> <p>PRACTICAL – Preparation of polytene Chromosome, Pedigree analysis of some human trait, population count, estimation of dissolved oxygen etc.</p>	<p>Students learn about basic concept of genetics, concept of ecology, population ecology, community ecology, community succession, behavioural ecology, environmental pollution, conservation of threatened wild life.</p> <p>Students learn how to prepare slide of chromosome from larvae of Drosophila. They are able to determine particular hereditary trait, they also get knowledge of soil and water-biotic community.</p>
4 th sem Hons	<p>General characters and major classification of microbes, microbes in human and animal welfare. Common microbial diseases. Life cycle, pathogenicity, control measures of Plasmodium vivax etc. Host – parasitic interaction. Immune system – cell types.</p>	<p>Students learn about microbiology, parasitology, immunology. They also learn About tools and techniques.</p>

	<p>Concept of antigens – antibodies. Principle and application of PH meter, colorimeter, centrifuge, chromatography, electrophoresis, light microscope, electron microscope. Micro-techniques.</p> <p>PRACTICAL—Identification of parasites. Adaptive features of some parasites, gram staining, gut parasite collection from fowl, cockroach. Double staining.</p>	<p>Students get practical knowledge about parasites , tools and techniques and staining procedure for permanent slides.</p>
<p>5th sem Hons</p>	<p>Convergent, divergent adaptation, adaptive radiation in placental mammals with special reference to teeth,limbs. Adaptations in pigeon, camel, whale. Colouration, mimicry, continental drift, discontinuous distribution of animals. Zoogeographical realms, basics animal behaviour, communication in animals with reference to pheromone. Physiology of digestion, oxygen carbon dioxide transport in blood of mammals. Respiration in different animals, excretion in fish, bird, mammals. Osmoregulation in fresh water and marine fish, transmission of nerve impulse, mechanism of synaptic transmission. Concept of biodiversity, biodiversity as a resource, hot spots etc. Wild life conservation with reference to tiger, rhino. Wild life protection act etc. Concept of mean, median, mode and their relationship. Elementary concepts of probability and distribution. Standard deviation, error, variance, t-test, simple-correlation coefficient, chi-square test. Representation of statistical data.</p>	<p>Students understand about adaptation, zoogeography and ethology. They get a detail knowledge of animal physiology. Students get detail knowledge about biodiversity and conservation. They get enriched with the knowledge of biostatistics.</p> <p>Students are well versed with adaptive features in different chordates which help them to understand the evolutionary aspects. They learn about some</p>

	<p>PRACTICAL --- Morphological, behavioural and other adaptive features in some chordate. Studies on Zoogeography realms. Human blood group, haemin crystals in human. Identification of WBC. Problems on chi square test, t-test.</p> <p>Field study report.</p>	<p>haematological aspects. Practically they get a field knowledge on chi square and t test.</p> <p>Field excursion help them to understand and get practical knowledge on water, soil , terrestrial animal bio-diversities in natural condition..</p>
6 th sem Hons	<p>Origin of life – experimental evidence in favour of abiotic synthesis of basic biomolecules. Basic ideas on geologic time table with major example of fauna. Neo- Darwinism, genetic variations and sources of variations in a natural population. Hardy-Weinberg Principle and factors. Natural selections, isolation, speciation. Concept of buffer, structure and functions of carbohydrates, lipids, proteins, nucleic acids. Enzymes— general properties, definitions and characteristics of coenzymes. Mechanism of enzyme action, glycolysis, TCA cycle, ATP generation. Histological studies of different organs. Endocrine disorders in human with special reference to pituitary, thyroid glands. Types of hormones in vertebrates and invertebrate. Hormonal control, process of evolution. Reproductive cycles in mammals with special reference to rat. Replication, transcription, translation in prokaryotes. Lac operon, genetic basis of cancer, recombinant DNA technology and its applications.</p> <p>PRACTICAL --- Identification of</p>	<p>Students understand about evolutionary biology, biochemistry, endocrinology, reproductive biology, Molecular biology and genetic engineering.</p> <p>Students understand about evolutionary aspects of bones. They get a detail knowledge of human syndrome etc.</p> <p>Students can learn how to prepare and represent a paper.</p>

	<p>bones, comparative analysis. Study of salivary amylase action, quantitative estimation of glucose. Study of histological slides on endocrine glands. Determination of genotype and allele frequency. Detection of human syndrome or disorders.</p> <p>PROJECT --- Field based.</p>	
--	---	--

COURSE OUTCOME: ZOOLOGY (GENERAL)

semester	Content	Outcome
1 st sem gen	Morphology, locomotion, reproduction, life history, digestive, respiratory, excretory, nervous system of different invertebrates like paramecium, sycon, obelia, fasciola, metaphire, pila and cockroach. Also different systems of vertebrates like branchiostoma, ascidia, Petromyzon, lates, Columba, Bos, bufo. And comparative study of aortic arches in reptiles, birds mammals.	Students can learn about different systems and functions of organisms from protozoa to mammalia.
2 nd sem gen	Cell biology, histology, developmental biology that contain cell and cell organelles structures, chromosome structure, cell cycle, cancer, animal tissue study, fertilization gametogenesis, egg types, placentation. Applied zoology contain pisciculture, prawn culture, poultry, apiculture, sericulture, vermiculture, pollinators and pests. Practical... identification of invertebrates and vertebrates, cell division stages, T. S of mammalian tissues, chick embryos. biochemical test of glucose, protein, starch and preparation of human squamous epithelium and blood film.	Students are well versed to cell structures, chromosome, developmental stages of an fertilised ovum to embryo and different types of culture techniques of economically important insects. Students get scope to see the characteristics of different organisms, chick embryos stages. Know to prepare slides of blood film etc. and biochemical tests to identify the carbohydrate, protein and fat.

3 rd sem gen	<p>Taxonomy, classification, taxonomical hierarchy, classification of porifera, cnidarian, Annelida, Amphibia, Reptilia. Darwinism, isolation, speciation, adaptation, coloration, mimicry in different organisms in environment. Ecological structure, population ecology, community ecology, barriers, social insects, zoogeographical realms and concept of biodiversity and conservation.</p> <p>Practical- soil and water Biotic community identification, population density determination, estimation of dissolved oxygen, adaptive features of some invertebrates and vertebrates.</p> <p>Field visit...</p>	<p>Students come to know several ecological aspects, classification techniques, biodiversity and get knowledge about rare, vulnerable species, hotspots etc.</p> <p>Get knowledge about water and soil biotic community, how to estimate level of dissolved oxygen in water and adaptive features of some animals in environment.</p> <p>Field visit helps to grow observation capability and concentration amongst students.</p>
4 th sem gen	<p>Applied zoology including sericulture, apiculture, vermiculture, prawn culture. Genetics and molecular biology includes Mendalism, linkage, allelism. Sex determination, congenital abnormalities, DNA, autosomal and sex linked inheritance, replication, transcription, translation.</p> <p>Practical... spotting and economic importance of some pests and benefitted organisms, preparation of cell division stages slides, cell division stages and study of Barr body.</p>	<p>Students come to know about culture techniques of economically important animals, genetic disorders and their inheritance, DNA replication, RNA and amino acid production method in the cell.</p> <p>Get knowledge about pests and harmless animals, slide preparation of cell division stages, and Barr body.</p>
5 th sem gen	Parasitology and medical	Students get knowledge about

	<p>entomology...life cycle, pathogenicity,clinical features, control measures of P vivax, E. histolytica, A.lumbricoides, T.solium, Anopheles, Culex, Aedes. Housefly, bed bug. Head louse etc. Microbiology and immunology includes microbes, disease causing microbes, human gut flora, different types of immune system and immune response, antibodies.</p> <p>Practical..identification of pathogens, disease causing animals, gut flora preparation and collection of life cycle stages of mosquito in glass bottle and preparation of charts.</p>	<p>parasites and pathogens.</p> <p>Help to develop knowledge on metamorphosis of mosquitoes from egg to adult.</p>
6 th sem gen	Project on field based.	Students come to know how to prepare project and how to make power point presentation

DEPARTMENT OF COMMERCE
COURSE OUTCOME: COMMERCE (HONS.)

Program Outcomes

Department of Commerce was instituted to offer an educational platform for students' aspiring to pursue undergraduate courses in Commerce General (B.Com Pass) or Honours (B. Com Hons) as deem fit. The course curriculum encapsulates broad range of subjects under single platform which literally provides inputs for a number of professional courses for students aspiring for; including general courses. The course incorporates a good intermixture of theoretical and practical papers. Practical papers include Financial Accounting, Cost Accounting, Corporate Accounting, Advanced Financial Accounting, Management Accounting, Direct and Indirect Tax, Financial Management, Statistics & Mathematics etc. each of these relates to professional courses like Chartered Accountancy (ICA), Cost Accountancy (ICWA), Chartered Financial Analyst (CFA), Company Secretary (ICS), Master of Business Administration (MBA) and so on. Similarly, theoretical papers like Marketing Management, Human Resource Management, Principles of Management, Business Ethics and Communication, Entrepreneurship Development, Indian Financial System, Law and Practice of Banking, Principles of Insurance, Auditing, Project work, e-marketing, Business Law, Corporate Law, Economics etc relates to respective programs at the masters level in M.Com, MBA, BED as well as LLBs in general courses. Basic learning outcomes from these exercises are:

- Students can develop hands on expertise over commerce subjects leading to professional courses;
- Level of students-teacher interaction enshrined in course curriculum especially during seminar presentation can improve upon presentation skill of learners;
- Objective form of evaluation, either by undertaking sessional exams or group discussion, can instill competitive environment amongst them in one hand while inculcating leadership skill on the other;
- Mentoring of students provides opportunity to them to excel the different fields of studies; and
- Awareness programs of different kinds make them conversant with social issues surrounding them and the ways to address those in real life

situations.

***Program Specific
Outcomes***

Upon completion of B Com (both Pass and Hons), students can:

- Figure out and define themselves about their future course of action depending on respective ability, skill and aptitude;
- Choose the best course of action from among the available alternatives;
- Start business venture of their own depending on choices and preferences; and
- Pursue education at the higher levels in realizing their dreams.

1)

***Cours
e
Outco
mes***

Sl No	Semesters	Course	Course Outcomes
------------------	------------------	---------------	------------------------

1	1 st Semester (Hons)	Financial Accounting	<ul style="list-style-type: none"> i. Make them understand about the nitty-gritty of preparation of financial statements; ii. Conceptualize the subject matter of accounting process; and iii. Customize the usages and applications in consonance with accounting concepts and conventions.
2	1 st Semester (General)	Principles of Management	<ul style="list-style-type: none"> i. Introduces the preliminaries of decision making from among the alternative courses of action; ii. Learn to distinguish between programmed decisions and non-programmed decisions; iii. Make them understand about organization structure, staffing, coordination and controlling mechanism.
3	1 st Semester (General)	Business Law	<ul style="list-style-type: none"> i. Introduces the preliminaries of Laws of Contract and other applicable Laws relating to the field of study; ii. Learn to distinguish between void, voidable and valid contracts as well as the need for written contracts; iii. Make them understand about Sale of Goods Act, Consumer Protection Act, Negotiable Instrument Act, and its practical implications.
4	1 st Semester (Pass)	Principles and Practice of Accounting	<ul style="list-style-type: none"> i. Make them understand about the nitty-gritty of preparation of financial statements; ii. Conceptualize the subject matter of accounting process; and iii. Customize the usages and applications in consonance with accounting concepts and conventions.

5	2 nd Semester Hons	Cost Accounting	<ul style="list-style-type: none"> i. Make them understand about the nitty-gritty of preparation of cost accounting statements; ii. Conceptualize the need for learning estimates and break even analysis; and iii. Customize the reporting techniques and the use of costing in decision making process.
6	2 nd Semester General	Business Economics & Business Mathematics	<ul style="list-style-type: none"> i. This paper converges elementary micro economics and business mathematics on 50:50 basis considered essential for achieving learning outcomes enshrined; ii. Micro economics aspects help students understand the preliminaries of theoretical aspects of commerce education; and iii. Study of mathematics help them understand logical reasoning in resolving practical problems.

(2)

Course Outcomes			
SNo	Semesters	Course	Course Outcomes
7	2 nd Semester General	Corporate Laws	<ul style="list-style-type: none"> i. Make them understand about the company laws prevailing in the country; ii. This paper provides inputs to entire gamut of commerce education and makes them conversant about the relevant explanation associated with corporate laws.

8	2 nd Semester Pass	Elements of Cost Accounting	<p>i. Make them understand about the nitty-gritty of preparation of cost accounting statements;</p> <p>ii. Conceptualize the need for learning estimates and break even analysis; and</p> <p>iii. Customize the reporting techniques and the use of costing in decision making process.</p>
9	3 rd Semester Hons	Corporate Accounting	<p>i. Make them understand the importance attached to learning different facets of corporate accounting ;</p> <p>ii. Study of this kind of subjects provide them much needed confidence to go for professional courses which otherwise difficult, if not impossible;</p> <p>iii. Students get hands on training on practical application of Company Act, 2013.</p>
10	3 rd Semester General	Indian Financial System	<p>i. This paper make students aware about entire gamut of Indian Financial System prevailing in the country since Independence;</p> <p>ii. Provides insight into functioning of both capital and money market; and</p> <p>iii. Students can get conversed with different rating agencies engaged in providing financial services in the country.</p>

11	3 rd Semester General	Entrepreneurship Development	<p>i. This paper introduces students to approaches needed for promoting entrepreneurship ;</p> <p>ii. They come to know the different facets of entrepreneurship and its adjoining features; and</p> <p>iii. It provides much needed inputs for becoming entrepreneur themselves.</p>
12	3 rd Pass Semester	Advanced Accounting	<p>i. Much like Corporate Accounting, this paper introduces advanced aspects of accounting practices for pass students ;</p> <p>ii. It makes them understand entire aspect of maintaining accounts in business concerns; and</p> <p>iii. This paper caters to accounting related jobs prevailing in both organized and unorganized sectors..</p>

