



J.N.L. College

Khagaul, Patna-801105

(A Constituent Unit of Patliputra University, Patna)

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Principal Office

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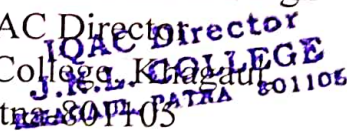
Declaration

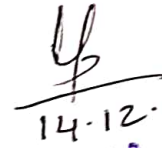
This is to certify that the data includes in this self-study Report (SSR) are true to the best of my knowledge. This SSR is prepared by the institution after discussion and no part thereof has been outsourced.

I/We am/are aware that the peer team will validate the information provided in this SSR during the peer team visit.

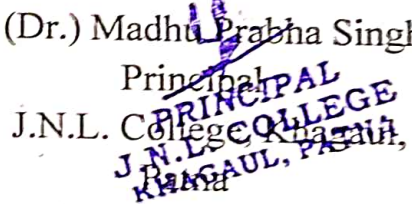

14.12.23

Prof. (Dr.) Nikhil Kumar Singh
IQAC Director
J. N. L. College, Khagaul
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14.12.2023

Prof. (Dr.) Madhu Prabha Singh
Principal
J.N.L. College, Khagaul,
Patna



PROGRAMME OUTCOMES (PO) OF M.A IN SOCIAL SCIENCES

- PO1.** Individual and Society-Conceptualize the relationships between individuals and society.
- PO2.** Evolutionary approach - Investigate the evolution of civilized society
- PO3.** Societal dynamics- Interpret the dynamic interrelationships between various facets of the society- social, cultural, economic, historical, environmental and political
- PO4.** Interdisciplinary Approach -Highlight importance of interdisciplinary approach in Social Sciences.
- PO5.** Critical Analysis- Integrate qualitative and quantitative methods of social analysis
- PO6.** Decision making and Policy planning- Perceive principles of social sciences as tools for decision making and policy planning
- PO7.** Innovative research- Apply principles of social sciences in research for attaining holistic results in all scientific and technological initiatives.

PROGRAMME OUTCOMES (PO) OF M.Sc IN SCIENCES

Upon completion of postgraduate programme, the students will be able to:

- PO1.** Critical Thinking: Ability to engage in reflective and independent thinking. To understand the logical connections between ideas. Identify, construct and evaluate arguments, detect inconsistencies and common mistakes in reasoning, solve problems systematically and identify the relevance and importance of ideas that reflect on the justification of one's own beliefs and values.
- PO2.** Effective Communication Skills: Enhanced ability to become concise and confident communicator, read, write and listen with utmost clarity in person and through electronic media and make meaning of the world by connecting/corroborating people, ideas, books, media and technology.
- PO3.** Healthy Social Interaction: Socialize and encourage a sense of community and provide a way for the spread and strengthening of social and cultural mores and norms. Through social interactions, individuals reaffirm their commitment to community values.
- PO4.** Duty bound Citizenship: Inculcation of good citizenship values, democratic values, and responsible behavior. Knowledge of a society's major social, political and legal institutions, the capacity and disposition to participate within those institutions, and an awareness of the rights and obligations that citizenship entails.
- PO5.** Ethics: Foster ethical learning environments and training in ethics as the common ground for educating individuals on making ethical decisions in the workplace.
- PO6.** Environment and Sustainability: Understanding of the role of environmental awareness and environmental contexts in achieving sustainable development.
- PO7.** Self-regulated Life-long Learning: Developing life long, self-directed and independent learning skills by setting up major goals.

POs for Vocational Courses

- PO1.** Problem analysis: Identify, formulate, research literature, and analyze complex physical, technological problems reaching substantiated conclusions using first principles of mathematics, natural sciences and applied sciences (IT, Biotech, Env SC, EWM etc).
- PO2.** Global Environment on Business: Demonstrate comprehension of cultural commonalities and differences in international business activities and customs. Develop effective management techniques for cross-cultural business.
- PO3.** Team Participation and Leadership: MBA Program summarizes and apply theories of effective leadership, theories of team composition, process, and motivation (including inclusivity and diversity) to effectively manage work teams
- PO4.** Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO5.** Conduct investigations of complex problems: Use research-based knowledge and research methods in the fields of applied science, business, society and its welfare, including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO6.** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO7.** Society Responsibility: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO8.** Environment and sustainability: Understand the impact of the professional technological solutions in societal and environmental contexts, and demonstrate

the knowledge of, and need for sustainable development.

PO9. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the technological practice.

B. A. IN English Honours

Programme Specific Outcome (PSO)

The specific outcome of the programme is to help students analyse, interpret, and evaluate major forms of literature. Students will be able to chart the growth and development of language and literature in the background of socio-political and cultural changes that have taken place from the Middle Ages to the Post-Modern Age and also be made aware of the emerging genres, movements and literary theories. The aim is to make students more observant towards issues of caste, class, gender etc. in academia and literature. It will help students identify their areas of interest and also develop a work-ethic among the undergraduates.

The programme encourages undergraduates to explore reading strategies, appreciate cultural sensibilities of different literatures and gain a wider perspective of the world. An understanding of classical ideals and contemporary issues is cultivated as an outcome of this course of study. Students will be introduced to multiple themes, styles and ideologies. At the completion of the programme they will have learnt how to form a comparative understanding of literatures, critically analyse and appreciate them with a realization that critical writing is different from creative writing. The intent is to prepare students for further in-depth studies, enhance their reading, writing and communicative skills, and broaden their horizons with opportunities in allied fields.

Honours Part I

Paper I History of English Literature from Elizabethan Age to the
Victorian Age

History of English Language:

- a. Dialects of Middle English
- b. Word Formation
- c. Borrowings

Program Specific Outcome (PSOs)

Program : B.A. (Hons.) Psychology

Upon completion of the programme the student will be able to :

- POS1
- (i) Students will be equipped with theoretical knowledge, approaches and issues of fundamental Psychology.
 - (ii) Students will be able to identify and diagnose mental disorders, causal pattern and appropriate treatment of different disorders.
 - (iii) Identify the importance of experimentation in the field of learning, memory and attention.
- PSO2-
- (i) Appreciate and apply various theories of Psychology in educational field.
 - (ii) Extensive knowledge about the contribution of different schools of Psychology in historical perspective.
 - (iii) Ability to administer, analyse and interpret results from various Psychological Tests.
- PSO3-
- (i) Illustrate and analyse the theoretical knowledge of social Psychology and develop understanding about social problems.
 - (ii) Students will know the principles of Research Methodology and apply research methods in Psychology, understand the various statistical tools.
 - (iii) Understand how psychological principles improve efficiency and quality of employ life. Identify the various categories of Psychological disorders with an emphasis on diagnosis and progress.
 - iv) Ability to administer, analyze and interpret results from various psychological experiments and develop a critical awareness about the socially and psychologically relevant issues.

Economics B.A- Economics
PSO, PO & CO

PROGRAMME SPECIFIC OUTCOMES (PSOs)

On successful completion of the B.A. Economics program, the students are able to

PSO1- have the ability to establish comprehensive knowledge and understanding on the basic concepts and theories that form a part of this programme.

PSO2- have the ability to analyse and assess the current events from an economic viewpoint.

PSO3- develop skills in applied application of economic theory.

PSO4- have an ability to suggest alternative solution on policy issues.

PSO5- demonstrate the capability to analyse, understand and draw valid inferences from quantitative and qualitative data.

PSO6- communicate efficiently on specific economic matters and present complex information in a clear and concise manner.

PSO7- nurture the spirit of leadership qualities and readiness to work and learn. PSO8- boost the spirit of self-confidence and inculcate the spirit of moral values. PSO9- build robust foundation for pursuing continuous learning.

PROGRAMME OUTCOMES (POs)

PO01- Graduates in economics will be able to interpret data from an economic viewpoint.

PO02- Graduates in economics will be able to analyse the situation and identify the major economic issues, as well as demonstrate the ability to provide alternative solutions to difficulties. This will help to improve critical thinking abilities.

PO03- Economics graduate will be able to exhibit the knowledge and abilities required to attract future employers in the banking, insurance, marketing, and teaching fields.

DEPARTMENT OF POLITICAL SCIENCE
PROGRAMME SPECIFIC OUTCOME (UG)

- PSO1-To study the political world in a comparative sense, including the behavior, organizations, institutions and philosophical foundations of political life from the level of individuals to the international setting in both contemporary and historical contexts.
- PSO2- To establish the connection between theory and practice at the ground level by preparing students for active lifelong participation and leadership in democratic society.
- PSO3- To make the students able to understand the basic concepts and theories pertaining to Political Science and the interrelationship among the historical, political, economical, cultural and geographical dimensions in Political Science.
- PSO4- To develop an understanding of the relationship between Political Science and Society through comprehensive teaching of the practice of Public Administration in India.
- PSO5- To Inculcate among students a basic understanding of the rights and duties of the citizens and encouraging them to act as responsible citizens through the celebration of important days like Independence Day, Republic Day and Human Rights Day .
- PSO6-To equip the students with the ability to analyze the Indian constitutional provisions, major legislations and reforms.
- PSO7-To enable the students to critically evaluate socio, economic and political variables for a proper understanding of the plurality of Indian society.
- PSO8- To critically evaluate the ideas of Indian and Western political thinkers.
- PSO9- To examine the dynamics of International Relations and India's relation with her neighbours and major powers.

PSO10- To evaluate the various dimensions of Public Administration and its relevance in modern society.

B. A. History Hons.

COURSE OUTCOMES (CO)

After successfully completing this course, students will be able to

B.A. Part-I (Hons.)

Paper-I : History of India from the Earliest time to 1206 A.D.

- CO-1 Perceive various sources to study of Ancient India.
- CO-2 Analyze the development and the achievements of man in stone age and Harappan civilization.
- CO-3 Comprehend the history of vedic period.
- CO-4 Understand the philosophy of Jainism and Buddhism.
- CO-5 Perceive socio-economic, religious situation under the Maurya Empire. CO-6 Understand emergence of Fendal System in Indian Society.
- CO-7 Understand and critically analyze the history of satrahanas, Shungas, kushans, Hunda, Sangam age, the cholas, pallavas and Chalukyias.

Paper-II : History of Great Britain (1603-1939)

- CO-1 Understand the circumstances reagarding the constitutional conflict between King andparliament.
- CO-2 Acquainted with the agrarian and Industrial revolution in England and theirparticipation in the First World War.
- CO-3 Critically Evaluate the major concepts of British history and social life.

B.A. Part-II (Hons.)

Paper-III : History of India From 1206-1757

- CO-1 Grasp territorial Expansion of Sultanate period and Mughal period. CO-2 Understand the Emergence and Maratha power.
- CO-3 Analyze the nature of village community and the relationship between the different sections of society.
- CO-4 Perceive Socio-economic, cultural, religious situation during this chromological Span.

Paper-IV : History of Modern Europe (1788-1945)

CO-1 Know about the political changes of Europe after French revolution.

CO-2 Understand and Analyze the process of colonialism in the different part of world and the circumstances related to world wars and world Economic Depression.

B.A. Part-III (Hons.)

Paper-V : History of India (1757-1857)

- CO-1 Acquaint with significant events leading to establishment of the rule of East India Company.
- CO-2 Know the Colonial policy adopted by the company to consolidate its rule in India.
- CO-3 Understand the structural changes initiated by colonial rule in Indian Economy.
- CO-4 Explain the various revolts against rule of the East India Company.

Paper-VI : History of India (1858-1947)

- CO-1 Understand the events which lead to the growth of nationalism in India.
- CO-2 Acquaint with major events of the Freedom Struggle under the leadership of Mahatama Gandhi.
- CO-3 Explain the contribution of Revolutionaries, left Movement and Indian National Army. CO-4 Know the concept of communalism and the causes and effects of the partition of India.

Paper-VII : History of China and Japan mid-19th Century to mid-20th Century

- CO-1 Understand imperialism and China with reference to traditional Chinese Society, economy and culture, transformation of China into informal Colony, agrarian movements and the revolution of 1911.
- CO-2 Acquainted with the history of China between 1919 and 1949 with reference to the Chinese communist movement.
- CO-3 Understand and analyze the nature of transition from Feudalism to Capitalism in Japan with reference to Meiji restoration.

Paper-VIII : United States of America (1860-1990)

- CO-1 Understand the political changes and agrarian transformation in the USA CO-2 Acquainted with the history of growth of Capitalism, business cycles and Depression.
- CO-3 Acquainted with religious, cultural and intellectual trends of the USA during this period.

CO-4 Analyze the character of US imperialism with reference to US involvement in the First and Second World War.

Programme Specific Outcomes (PSOs)

Mathematics, UG

- PSO 1.** Acquire problem solving skills pertaining to different branches of Mathematics like differential calculus , integral calculus, conic sections, linear programming, analytical geometry, trigonometry, theory of equations etc and their applications in real world problems.
- PSO 2.** Attain Conceptual understanding of real analysis, infinite series, algebra and three dimensional solid geometry.
- PSO 3.** Invoke analytical skill to understand essential scruples of group theory, Riemann integrals, hydrostatics, mechanics, gravitation, astronomy.
- PSO 4.** Understand the fundamentals of ring theory, linear algebra, metric spaces, topological spaces etc
- PSO 5.** Develop capabilities and requisite skills to evaluate volume and surface area of solids of revolution, matrices, differential equations of second order etc

Department of Zoology
(UG)
Program Specific Outcomes (P.S.O.) of Zoology

- PSO-1 This program helps to develop scientific tempers and attitudes, which in turn can prove to be beneficial for the society.
- PSO-2 Students will be equipped to use their in-depth knowledge about different biological systems, their coordination and control as well as evolution, behavior, and biological roles of the animals in the ecosystem.
- PSO-3 Student will be able to qualitatively and quantitatively analyze evolutionary parameters using various biostatistics and computational tools used in modern sciences.
- PSO - 4 Students will acquire complete in-depth knowledge in the specific areas of Functional Biology of Invertebrates and Chordates, Molecular Cell Biology, Genetics, Environmental Science, Biostatistics, Biochemistry, Biosystematics and Evolution.
- PSO -5 Students will also acquire hands on experience of working in the field on these areas and experimentation in these areas. In the elective course, they will gain knowledge on the biological functioning insect such as honey bee, silk worm, lac worm, fishes etc

Department of Botany
Undergraduate Programme Specific Outcome

- PSO1:** To Develop a conceptual understanding of principles and importance of Botany. They will be able to demonstrate knowledge on selected topic of microbiology, cytology, and genetics, plant Biotechnology, angiosperm and be able to apply this knowledge to analyze a broad range of different phenomenon.
- PSO2:** To Understand the nature and basic concept of Diversity of lower and higher plants, taxonomy, Anatomy, Physiology and Ecology Applied Botany, Cytogenetic and identify & classify the plant that occurs locally.
- PSO3:** to develop laboratory skill and be able to test soil, water, different physiological experiment. Applied course of Botany have tremendous scope in Vermicomposting, Apiculture, Floriculture.
- PSO4:** to demonstrate written and oral communication skills in communicating Botany – related topics and will provide and work independently.
- PSO5:** to develop an understanding of the impact of botany and science on society and develop respect for conservation of environment.

**Department of Computer
Applications (BCA)**

Program Specific Outcomes (POs):

- ✓ After successful completion of the course, the career path may be chosen by students are:
 - Develop core competencies to design, implement and evaluate a computational system to meet desired needs within realistic constraints.
 - Apply the computing and mathematical knowledge as well as standard software engineering practices and strategies to develop applications to support societal needs.
 - Adapt to technological advances through active participation in life-long learning.
 - Acquire strong communication skills, acquaint with the contemporary trends in industry / research, collaborate with a team and create innovative solutions to existing problems.
 - Adapt to technological advances through active participation in life-long learning.
 - Use research methods including design of experiments, analysis, interpretation of data, synthesis of information, developing GUI applications to provide authentic solutions to problems.

DEPARTMENT OF B.Sc. IT

PROGRAMME OUTCOMES

In the fast changing world and cut throat competition student find difficult time in getting job. It is a technology driven world where learning the skill is the most needed. We must have industry ready syllabus to cope with the organizing challenges in ever changing world market in IT has great potential and in near future job will be aplenty.

The Department of Information Technology (IT) is dedicated to promote learning the various subjects and technologies in the field of information technology. At present, the Department offer one programme i.e., B.Sc.-I.T.

Bachelor of Science (B.Sc.-IT) is a Bachelor's degree awarded for an undergraduate course or programme in the Information technology field of duration three years. The aim of B.Sc.-IT curriculum is to provide basic inputs in various aspects of IT and broad understanding of other interdisciplinary interfaces for providing the needs of effective business management by bridging the gaps between managerial practices and Information Technology.

In this programme student learn the art of Coding, Programming of different languages, Computer Hardware and Software, Networking, Database Management, Information Technology, Mathematics, Statistics and Electronics along with effective soft communication skill to interact with people in corporate fast evolving world. The student also build themselves to express and suggest at global platform.

This programme equips such that students with the skills needed to contribute to this exciting diversified and rapidly changing world. It is combination of skills that enables our graduates to keep pace with the fast-moving world and secure rewarding carrier that can be pursued almost anywhere in the world. The students acquire technical knowledge, skill and background for designing and organizing computer systems.

Our main objectives is to nurture the student for effectively managing the business by bridging the gap between Managerial Practices in Information Technology.

Programme Specific Outcomes (PSOs):

After successful completion of the course, the career path may be chosen by students are:

- Software Developer.
- Back- End or Front- End Programmer.
- Systems Analyst.
- Data Analyst
- Computer Support.
- Engineer.
- Database Administrator.
- Systems Administrator.
- Web Designer & Developer.
- Network Administrator.
- Data Analyst.
- Data Scientist(Data Mining)
- Cyber Security and forensic expert.
- User Interface Designer.
- Quality Analyst
- IT Specialist
- Graphics Designer
- Technical Consultant
- Market Digital Expertise

The Major overall learning outcomes of the programme in our department are as follows:

PSO 1: Technical Aptitude: Learning information Technology emphasizing the knowledge of programming, hardware organization, operating systems, theory of computation and principles of programming language.

POS 2: Analytical Assessment: The ability to solve problems quickly and effectively, which may involve a methodical approach that allows

breaking down complex problems into single and manageable components.

PSO 3: Effective Communication: Employees in the digital age must be able effectively convey and receive messages. Good communication skills will help get hired and be successful throughout the career.

PSO 4: Moral Philosophy: Incorporating human values and morality by responsibly accepting the roles to work for the sustainable development of self and society.

PSO 5: Being self and Adaptability: Acquire the ability to survive in the environment of rapid technological changes through dynamic learning.

Specific Programme Outcomes (SPOs):

SPO 1: Under Graduates will have skills and knowledge to excel in their professional career in IT applications and related disciplines

SPO 2: Under Graduates will contribute and communicate effectively within the team to grow into leaders

SPO 3: Under Graduates will practice lifelong learning for continuing professional development into leaders

SPO 4: Under Graduates will have the capability to continue their formal education and successfully complete an advanced degree

SPO 5: Under Graduates will contribute to the growth of the nation and society by applying acquired knowledge in technical, computing and managerial skills.

Department of Biotechnology

U.G.(Biotechnology Honours)

Programme Outcomes

Upon completion of the B.Sc. Degree Programme, the graduate will

- PO-1** acquire basic and specific skills to full fill the manpower need of biotechnological industries
- PO-2** obtain hands-on experience in state of art laboratory techniques.
- PO-3** gain updated knowledge in the scientific development
- PO-4** be able to join research institutions for higher education leading to a career in teaching and research.
- PO-5** Acquire self-confidence and determination to become entrepreneur and startup

Programme Specific Outcomes

- PSO -1** Upon completion of the courses the student would learn the fundamental concepts of Life sciences & allied branches and their applications to improve our life and health of the planet
- PSO-2** gain ability on how to apply the basic knowledge and basic tools and techniques for performing experiments and design new experiments.
- PSO-3** decide and apply suitable tools and techniques in biotechnological manipulation
- PSO-4** gain the ability to generate data on certain research project and / or compile available information from literature on a

given topic of biotechnological relevance

PSO-5. get the knowledge of Biotechnological entrepreneurship

DEPARTMENT OF URDU
Programme Specific Outcome
(U.G.)

After successful completion of this three years programme, the student has had comprehensive knowledge of Urdu Language and Literature. Study of so many prominent literary genres e.g. Ghazal, Nazm, Masnavi, Marsia, Novel, Afsana, Dastan etc. will make a student able to compete in any competitive or academic examination of Urdu. Their interest and appreciation of Urdu literature will be enhanced considerably.

Course: B.A. Part- I

(Hons.)Paper-I

Prose

This paper provides introductory knowledge of Urdu prose. Students will be acquainted with pre-Urdu samples, both prose and poetry, preserved in the form of “Malfuzat”. Some early writings have to be studied in this paper that will help them to understand the development of Urdu language and literature from the very beginning.

Paper

-II

Poetry

In this paper students will get the knowledge of old poetry of Urdu literature especially Ghazals. They will know about the foundation of Ghazal in Bihar, Sufi Ghazal, and romantic flavor of Ghazal along with classical samples of Marsia (elegy).

Course: B.A. Part-II

(Hons.)Paper- III

Prose

This paper is the developed form of paper-I, studied in Part-I. During the study students can know about the improved writings of Novel, Short Stories and Literary history.

Paper-

IV

Poetry

After completing of this course students will be acquainted with some classic samples of Delhi school and Lucknow school of poetry as well as advent of modern poetic genre “Nazm” and classic piece of a Masnavi composed in Bihar school.

Course: B.A. Part-III

(Hons.)Paper-V

Tareekh-e-Adab-e-Urdu and Tareekh-e-Islam

This paper is divided into two parts: (1) History of Urdu Literature & (2) History of Islam. Students will get a fair knowledge of overall development of Urdu literature and Islamic history included therein while studying this course.

Paper-VI

Adabi Tanqeed and Lesanyat

The first part of this paper deals with literary criticism & the second one with linguistics. The objective of this paper is to provide basic knowledge of literary criticism to students. Apart from literature, development of Urdu language through ages can also be had by the students in this paper.

Paper-VII

Asnaf-e-Adab-o-Farsi

Literary genres particularly Novel, Afsana, Ghazal, Masnavi and Sahafat are the focus area of this paper. Students will have a glimpse of these genres. After learning this, students will get an introductory knowledge of Persian language. Persian had played a key role in the development of Urdu language and literature. This introductory study of Persian language will improve the understanding and vocabulary of Urdu students.

Paper-VIII

Project-o-Zobani Imtehan

Basically this paper is related to prosody. Students will be aware of the formation of poetry using different types of literary skills. This will enhance their critical appreciation of poetic genres too.

DEPARTMENT OF POLITICAL SCIENCE
PROGRAMME SPECIFIC OUTCOME (PG)

The Department is running a Master programme which has been designed in a manner so as to provide a holistic approach to the study of Political Science.

PSO1- To maintain the core of the Discipline with courses on political philosophy both western and Indian and key concepts of politics.

PSO2- To provide a solid grounding to the learners on the history of ideas and the larger issues of epistemology in social sciences.

PSO3- To try to integrate the concepts with the practices of politics and government and to understand their relevance in totality.

PSO4- To make a detailed study and analysis of morphology and anatomy of politics in India through the study of constitution, institutions, processes and political economy.

PSO5- To engage the students with the undercurrents of political practice and developmental processes by familiarizing them with the legal framework of government institutions.

PSO6- To provide an overview of political developments at the global level through the Courses on comparative politics and international relations.

PSO7- To assess the patterns of institutionalism, democratization and development in various political systems and also understand a framework for explaining variations with the help of comparative analysis.

PSO8- To introduce the students to certain new dimensions of politics through specialized courses on humanrights, peace and conflict studies, state politics etc.

PSO9- To encourage them to undertake future research in these unconventional areas of Political Science.

PSO10- To develop an interdisciplinary focus through these courses without deviating from the core of the discipline.

PSO11- To familiarize the students with specialized techniques of qualitative and quantitative research in social sciences.

PSO12- To train the students to undertake field research and write research reports.

M. A. History
Programme Specific Outcome (PSO)

On completion of the B.A. with History Honours, students will be able to ...

- PSO-01** Students will learn basic narrative of historical events, personalities and turning points of the history of the India, World and Bihar.
- PSO-02** Build critical ability through completion of a combination of courses, students become familiar with the political processes and structures, society and culture, political thoughts, historical thoughts and historiography, economy and society in India, Bihar and World.
- PSO-03** To Understand background of the religious, customs, institutions and administration and so on.
- PSO-04** Evaluation of historical ideas, arguments and point of view, presentation of a summary of a topic in an organized, coherent and compelling fashion orally or written.
- PSO-05** Students will acquire basic historical research skills including effective use of libraries, archives and databases.
- PSO-06** To understand the depth of subject of history from Macro to micro level.

DEPARTMENT OF ZOOLOGY

P G PROGRAMME

Programme specific outcome(PG)

- PSO1-** To demonstrate and apply the fundamental knowledge of the basic principles of major fields of Zoology;
- PSO2-** To apply knowledge to solve the issues related to animal sciences
- PSO3-**To take appropriate steps towards conservation of endemic and endangered animal species
- PSO4-** To help to develop scientific tempers and attitudes, which in turn can prove to be beneficial for the society.
- PSO5-** To use their in-depth knowledge about different biological systems, their coordination and control as well as evolution, behavior, and biological roles of the animals in the ecosystem.
- PSO6-** To acquire complete in-depth knowledge in the specific areas of Functional Biology of Invertebrates and Chordates, Molecular Cell Biology, Genetics, Environmental Science, Bio-instrumentation & Biostatistics, Biochemistry, Biosystematics and Evolution and Vertebrate Immunology.
- PSO7-** To able to qualitatively and quantitatively analyze evolutionary parameters using various biostatistics and computational tools used in modern sciences.
- PSO8-** To acquire hands on experience of working in the field on these areas and experimentation inthese areas.
- PSO9-** To gain mastery on the biological functioning of fish and inland fisheries orin the field of Entomology.
- PSO10-** To understand about complex interactions among the various animals of different phyla, their distribution and their relationship with the environment
- PSO11-** To understand the nature and basic concepts of cell biology, genetics, taxonomy,physiology, ecology and applied Zoology

PSO12- To understand the importance and knowledge of agro – based industries like sericulture, pisciculture etc.

PSO 13- To learn about animal behaviour and will develop empathy towards animals.

PSO 14- Understand about various concepts of genetics and its importance in human health

PSO 15- To apply the scientific knowledge acquired in zoology and become skilled professionals adhering to the values of sustainable living.

PSO 16- To develop and popularize scientific temper to make conceptual contributions in zoology and promote environmental consciousness.

PSO 17- To understand and contextualize environmental and ethical issues and contribute towards the betterment of the environment, protection of endangered species and sustainable growth.

PSO 18- To demonstrate analytical reasoning, problem-solving, scientific reasoning, and reflective thinking as professionals in all frontiers of zoology.

Course Outcome:

Jagat Narain Lal College, Khagaul, Patna

DEPARTMENT OF ENGLISH
PROGRAMME OUTCOMES UG DEGREE

Honours Part I

Paper I History of English Literature from Elizabethan Age to the Victorian Age
History of English Language:

- a. Dialects of Middle English
- b. Word Formation
- c. Borrowings

Course Outcome:

The aim of this paper is to make students aware of the development of English Literature from the 16th century to the 19th century in England and also to create an awareness of the structural development of the History of the English language down the ages. Apart from introducing the major writers of all ages, the course content lays emphasis on literary movements and different emerging genres. The course is focused on helping students develop a literary sensibility and a mature response to literary texts.

Paper II

1. Chaucer Nun's Priest's Tale
2. Donne Death Be Not Proud
 Go and Catch A Falling
 StarThe Sun Rising
3. Milton Lycidas
4. Pope The Rape of the Lock
5. Coleridge The Ancient Mariner
6. Arnold The Scholar Gypsy

Prosody

- a. Scanning a passage

Course Outcome:

Jagat Narain Lal College, Khagaul, Patna

b. Figures of Speech

Paper II complements Paper I by providing a comprehensive understanding of literary and linguistic evolution from the Medieval Age to the Victorian Age through a study of select representative texts. The selected literary works provide an extensive overview of how individual texts have been influenced by socio-historical factors. The paper will acquaint students with literary terms, genres and poetic elements.

Honours Part II

Paper III

1. Marlowe Dr. Faustus
2. Shakespeare Macbeth
3. Ben Jonson Volpone
4. Congreve The Way of the World
5. Sheridan The Rivals

Course Outcome:

This course is designed to show students how changes in English drama coincided with periods of tumultuous change in Europe. The course will provide students with a literary perspective, clarity of concepts and an understanding of various movements prevalent in the 16th and 17th century. The course will help learners identify literary features of each genre and also understand how they contributed to the ideas in the texts. From the development of drama to its decline, the course emphasizes upon the changing aspects of theatre and changes in dramatic works.

Paper IV

Course Outcome:

Jagat Narain Lal College, Khagaul, Patna

Ecclesiastes (the Bible) Jonathan Swift Jane Austen Charles Dickens

The aim of the paper is to provide an understanding of the social and intellectual background of 18th century English Literature which led to the rise of the novel and its popularity. The paper intends to create an awareness of the historical and cultural contexts of literary works of religious literature and also enable the class to identify symbolic meanings as well as central themes in the emergence of the novel. Students will be encouraged to ponder over issues regarding the importance of social and political satire, expression of women writers and the prevailing social conventions.

Honours Part III

Paper V

Group A: Literary Criticism

Aristotle	Poetics
Longinus	On the
Horace	Sublime Ars
Johnson	Poetica Life
Dryden	of Cowley
Matthew	Essay of Dramatic
Arnold	Poesie The Study of
T.S Eliot	Poetry
	Tradition and the Individual Talent

Group B: Practical Criticism

Course Outcome:

The paper provides an overview of literary criticism down the ages. On completion of the course the students will have been educated with the different schools of critical thought and would have acquired the knowledge that critical writing is different from creative writing. The

paper includes studying a number of influential critical thinkers involved in intellectual activity and their observations about literary forms. The course will help in developing the critical and analytical skills of students.

Paper VI

W. B Yeats	The Fox The Old Man and the Sea
T.S. Eliot	Things Fall Apart To the Light House

Course outcome:

By providing an overview of English Literature at the advent of Modernism, students will awaken to the effects of cultural movements between the world wars and their influence on English literature through a study of select literary works in terms of poetry, drama, short story and novels of the age.

Paper VII

Group A: Indian Poetry in English

H.L.V	Poetry
Derozio	The Heaven of
R.N. Tagore	Freedom The Tiger
S.	and the Deer The
Aurobindo	Casuarina Tree
T.Dutt	The Soul's Prayers
S. Naidu	The Night of the Scorpion
N. Ezekiel	The Old Play
K. Das	House The Striders
A.K.	Death of A Bird
Ramanujan	Indian Women
K.N	Dawn at Puri
Daruwalla	
S.K.Kumar	
J.Mahapatra	

Group B: The Literary Heritage- A New Anthology of Indian English Prose

S.	Vivekananda Jawaharlal Nehru Mahatma Gandhi R.K. Narayan Raja Rao K.A. Abbas
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The Secret Work
The Variety and Unity Of India
Truth and
Ahimsa An
Astrologer's
Day
The Cow of The
Barricades The Sparrow

Group C: Indian Fiction

M.R Anand	Untouchable
R.K. Narayan	Waiting for the Mahatma The
K. Desai	Inheritance of Loss
K. Markanday a	Nectar in A Sieves The God of Small Things
Arundhati Roy	

Course Outcome:

The paper provides an understanding of Indian English Literature—its history, and the impact of socio-cultural and political factors on literature. Students are made aware of the problems of interpreting Indian culture via the English language with the help of significant Indian English writing of poetry, prose, fiction and drama. The paper reinforces the philosophical attributes of thinkers amongst students and furthers a better understanding of the nation in the past two centuries -- the effects of colonial experiences, followed by issues of culture and identity.

Paper VIII**American Literature:**

Walt Whitman	A Song of Joys A Glimpse
Robert Frost	A Passage to India Prayer of Columbus Stopping By Woods On A Snowy Evening
Emily Dickenson	The Road Not Taken Nothing Gold Can Stay Fire and Ice I Never Lost as Much as Twice These are the Days
Arthur Miller	A Bird Came Walking Down the
Mark Twain	Walk The Grass So Little Has to
Melville	Do
Tennessee	All My Sons
Williams	Huckleberry
Henry James	Finn Billy Budd The Glass Menagerie The Portrait of the Artist as A Young Man

Course Outcome:

The paper attempts to provide an in-depth study of American literature through a study of select works of eminent American poets and novelists. Students are made aware of the historical background of American Literature which includes Multiculturalism, the great American Dream, followed by the idea of democracy. The course helps students evaluate other literatures and, therefore, broadens their perspectives.

DEPARTMENT OF HINDI

UG COURSES OUTCOMES

स्नातक प्रतिष्ठा

हिंदी पाठ्यक्रम

PROGRAM OUTCOME (PO)

- इस पाठ्यक्रम के माध्यम से विद्यार्थियों में हिंदी भाषा और साहित्य के प्रति प्रेम और सम्मान की भावना जागृत होगी।
- विद्यार्थियों में नैतिक मूल्य विकसित होगा।
- हिंदी साहित्य के विविध विधाओं-- कविता, कहानी, उपन्यास, नाटक, निबंध, आलोचना, एकांकी आदि के जरिए विद्यार्थियों में साहित्य सृजन की भावना विकसित होगी।
- विद्यार्थी भारतीय एवं पाश्चात्य काव्यशास्त्र के विभिन्न संप्रदायों और प्रमुख से अवगत होंगे
- हिंदी साहित्य के इतिहास की विकासोन्मुख प्रवृत्ति को समझने में यह पाठ्यक्रम मदद करता है।

(

स्नातक प्रथम वर्ष

- हिंदी रचना (सामान्य हिंदी) हिंदी भाषियों के लिए अनिवार्य

पूर्णांक – 100

- इस पाठ्यक्रम के माध्यम से विद्यार्थी हिंदी साहित्य के इतिहास के विभिन्न चरणों उनके उद्भव और विकास से परिचित होंगे।
- हिंदी साहित्य के महत्वपूर्ण साहित्यकारों के साहित्यिक अवदान से परिचित हो सकेंगे।
- विद्यार्थी पाठ आधारित कहानियां और निबंधों के अध्ययन के द्वारा उसकी समीक्षा कर सकेंगे।
- विद्यार्थी हिंदी व्याकरण एवं रचना से परिचित होंगे।

स्नातक प्रथम वर्ष

सामान्य हिंदी (हिंदी रचना) आहिंदी भाषियों के लिए
(कला, विज्ञान एवं वाणिज्य के विद्यार्थियों के लिए अनिवार्य)

पूर्णांक-50

- इस पाठ्यक्रम के माध्यम से विद्यार्थी हिंदी साहित्य के इतिहास के विभिन्न चरणों उनके उद्भव और विकास से परिचित होंगे।
- भक्ति काल की पूर्व पीठिका, प्रेरक तत्व, लोक जागरण, प्रमुख काव्य धारा एवं भक्ति काल के प्रमुख कवियों से विद्यार्थी परिचित होंगे।
- पाठ्यक्रम में उल्लिखित विभिन्न कहानियां संस्मरण एवं रेखाचित्र के मूल पाठ के अध्ययन से विद्यार्थियों में मानवीय संवेदना का विस्तार होगा साथ-ही इन रचनाओं के मूल्यांकन करने की क्षमता विकसित होगी।
- विद्यार्थी हिंदी व्याकरण एवं रचना से परिचित होंगे।

स्नातक प्रथम वर्ष

(कला, विज्ञान एवं वाणिज्य)

हिंदी उत्तीर्ण (पास कोर्स) तथा आनुषंगिक (सब्सिडियरी) वर्ग

पूर्णांक- 100

- इस पाठ्यक्रम के माध्यम से विद्यार्थी हिंदी साहित्य के विविधों के उद्भव और विकास से परिचित होंगे।
- पाठ्यक्रम में उल्लिखित विभिन्न कहानियां संस्मरण एवं रेखाचित्र के मूल पाठ के अध्ययन से विद्यार्थियों में मानवीय संवेदना का विस्तार होगा साथ-ही इन रचनाओं के मूल्यांकन करने की क्षमता विकसित होगी।

स्नातक हिंदी प्रतिष्ठा-प्रथम वर्ष

पत्र 1

मध्यकालीन काव्य (भक्ति व रीति काव्य)

- इसके अंतर्गत विद्यार्थी भक्ति आंदोलन की पूर्ण प्रतिक्रिया, भक्ति आंदोलन के प्रमुख काल, भक्ति काव्य का विकास, उसके दार्शनिक अन्वय और विविध धाराओं से परिचित हो सकेंगे।
- कबीर की दार्शनिकता, सहाजिकता और उनकी कविताओं की विशेषताओं से परिचित हो सकेंगे।
- जयसी का ब्रज्य परिचय, पदावली में सृष्टि काल एवं सांसायनिक संदर्भ के काव्य सौंदर्य से परिचित हो सकेंगे।
- तुलसीदास का कवि परिचय, रामचरितमानस की महत्ता और रामचरितमानस की इच्छा काली के रूप में अयोध्या कांड के काव्य सौंदर्य से विद्यार्थी परिचित हो सकेंगे।
- मीराबाई का जीवन चरित्र, कृष्ण के प्रति अकल्प्य प्रेम एवं उनकी काव्यगत विशेषताओं से विद्यार्थी परिचित हो सकेंगे।
- रीतिमिद कवि के रूप में बिहारी या बाल्य परिचय, उनका कृष्ण चरित्र एवं उनकी बाल्य कला से विद्यार्थी अवगत हो सकेंगे।
- विद्यार्थियों में पाठ आभासीत अध्ययन के द्वारा पंक्ति की व्याख्या अथवा विश्लेषण और मूलकथन कथनों की क्षमता विकसित होगी।

स्नातक हिन्दी प्रतिष्ठा प्रथम वर्ष
पत्र - 2
(गद्य विधाएँ)
(कथा साहित्य, नाटक एवं निबंध)

- यह पाठ्यक्रम साहित्य की गद्य विधाओं के अंतर्गत उपन्यास, नाटक, कहानी और निबंध को समझने में सहायक है।
- गद्य विधाओं के अंतर्गत उपन्यास, कहानी, नाटक और निबंध का विकास समझ सकेंगे।
- 'चित्रलेखा' उपन्यास के माध्यम से उसकी कथावस्तु, चरित्र चित्रण, उद्देश्य और भाषा शिल्प को समझ सकेंगे।
- 'चंद्रगुप्त' नाटक के माध्यम से उसकी कथावस्तु, अभिनेयता और रस से परिचित हो सकेंगे।
- पठित कहानियों और निबंधों के माध्यम से उसका कलात्मक वैशिष्ट्य को समझ सकेंगे।

स्नातक द्वितीय वर्ष

सामान्य हिंदी (हिंदी रचना)

कला, विज्ञान, वाणिज्य के उत्तीर्ण (पास) एवं प्रतिष्ठा दोनों वर्गों की विद्यार्थियों के लिए अनिवार्य

पूर्णांक - 100

- राष्ट्रकवि दिनकर के जीवन और उनके साहित्यिक अवदान से विद्यार्थी परिचित होंगे। साथ ही कुरुक्षेत्र काव्य और अंतर्वस्तु से परिचित होंगे।
- मैथिलीशरण गुप्त के जीवन और उनके साहित्यिक अवदान से विद्यार्थी परिचित होंगे। साथ ही यशोधरा काव्य और अंतर्वस्तु से परिचित होंगे।
- विभिन्न निबंधों के माध्यम से विद्यार्थियों में मानवीय संवेदना का विस्तार होगा।

स्नातक द्वितीय वर्ष

कला, विज्ञान और वाणिज्य परीक्षा के लिए अनिवार्य
उत्तीर्ण (पास) एवं आनुषंगिक (सब्सिडियरी) कथा साहित्य एवं नाट्य विधाएं
पूर्णांक -100

- पठित रचनाओं के माध्यम से उपन्यास, नाटक एवं एकांकी को समझ सकेंगे।
- हिन्दी साहित्य की विभिन्न विधाओं से परिचित होंगे।
- पाठ आधारित उपन्यास, एकांकी और नाटक के अध्ययन से विद्यार्थियों में मानवीय संवेदना का विकास होगा।

स्नातक द्वितीय वर्ष

सामान्य हिंदी (हिंदी रचना)

उत्तीर्ण (पास) एवं प्रतिष्ठा दोनों वर्गों के लिए

(कला, विज्ञान और वाणिज्य के अहिंदी भाषियों के लिए अनिवार्य)

पूर्णांक-50

- पाठ्य पुस्तक 'हिंदी गद्य पद्य संग्रह' के माध्यम से उल्लिखित कहानी और कविताओं को समझ सकेंगे।
- व्यावहारिक हिंदी के अंतर्गत संक्षेपण, पल्लवन, पत्र-लेखन, आशय-लेखन, वाक्य संशोधन को जान पाएंगे।

स्नातक हिन्दी प्रतिष्ठा द्वितीय वर्ष
पत्र - 3
आधुनिक काव्य

खण्ड - क

- यह पाठ्यक्रम छायावाद के चार स्तंभ प्रसाद, निराला, पंत एवं महादेवी वर्मा से संबन्धित हैं।
- इसमें छायावाद की विशेषताओं को समझ सकेंगे।
- पठित कविताओं के माध्यम से इन रचनाकारों की कविताओं का कला-पक्ष एवं भाव-पक्ष को समझ सकेंगे।

खण्ड - ख

- पठित कविताओं के माध्यम से दिनकर, बच्चन, अज्ञेय, धर्मवीर भारती, भवानी प्रसाद मिश्र और धूमिल की कविताओं के कला-पक्ष एवं भाव-पक्ष को समझ सकेंगे।

स्नातक हिंदी प्रतिष्ठा-द्वितीय वर्ष

पत्र 4

हिंदी साहित्य का इतिहास

- हिंदी साहित्य के विभिन्न काल-खण्डों की समय-सीमा और उन काल-खण्डों के नामकरण से जुड़े प्रमुख विद्वानों के कथन और प्रमुख कारकों के विस्तृत अध्ययन में यह पाठ सहायक है।
- हिंदी साहित्य के विकास क्रम को समझने में यह सहायक है।
- हिंदी साहित्य के विभिन्न कालों की प्रवृत्तियाँ और उसके प्रमुख रचनाकारों के अन्दान को यह पाठ्यक्रम विस्तार से निरूपित करता है।
- आधुनिक काल की पृष्ठभूमि के क्रम में युगों के विभाजन के कारण तत्त्व, विभिन्न कालों के स्वरूप एवं उसकी प्रमुख प्रवृत्तियाँ को समझने में यह पाठ सहायक है।
- हिंदी गद्य की विविध विधाओं जैसे कहानी उपन्यास नाटक निबंध एवं आलोचना के स्वरूप एवं उसके विकास क्रम को विद्यार्थी इस पाठ से समझ सकते हैं।
- हिंदी गद्य विधाओं के नवीन स्वरूप जैसे- रिपोर्ताज, सम्प्रेषण, रेखाचित्र, डाबरी लेखन एवं यात्रा साहित्य आदि के स्वरूप एवं विकास के क्रम को विद्यार्थी इस पाठ से समझ सकते हैं।

स्नातक हिंदी प्रतिष्ठा तृतीय वर्ष

पत्र - 5

भाषा विज्ञान

खंड- क

- भाषा की परिभाषा, उसकी विशेषताएं एवं भाषा-बोली को समझ पाएंगे।
- भाषा विज्ञान की परिभाषा उसकी उपयोगिता एवं उसका अन्य शाखाओं से संबंध समझ सकेंगे।
- भाषा विज्ञान के विभिन्न अंगों का परिचयात्मक अध्ययन (ध्वनि, शब्द, वाक्य और अर्थ विज्ञान) से अवगत हो सकेंगे।
- हिंदी की शब्द संपदा शब्द कोटियाँ-- संज्ञा, सर्वनाम, विशेषण और क्रियाविशेषण की व्याकरणिक कोटियों को समझ सकेंगे।

खंड- ख

- हिंदी भाषा का उद्भव और विकास एवं आर्य भाषाओं से परिचित हो सकेंगे।
- राष्ट्रभाषा राजभाषा एवं संपर्क भाषा को समझ सकेंगे।

स्नातक हिंदी प्रतिष्ठा तृतीय वर्ष

पत्र - 6

भारतीय काव्यशास्त्र और पाश्चात्य साहित्य सिद्धांत

- काव्य लक्षण, काव्य हेतु, काव्य प्रयोजन, काव्य के प्रकार एवं शब्द शक्ति को समझ सकेंगे।
- रस, अलंकार, रीति, ध्वनि, वक्रोक्ति सिद्धांतों का सामान्य परिचय से अवगत हो सकेंगे।
- अलंकार और छंद को समझ सकेंगे।
- पठित अलंकार और छंद के भेद से परिचित हो सकेंगे।
- पाश्चात्य आलोचक-- प्लेटो, अरस्तू, मैथ्यू अर्नाल्ड, आई.ए.रिचर्ड्स के साहित्य सिद्धांतों से अवगत हो सकेंगे।
- पठित भारतीय समीक्षक--आचार्य रामचंद्र शुक्ल आचार्य हजारी प्रसाद द्विवेदी नंददुलारे वाजपेयी, लक्ष्मीनारायण सुधांशु, रामविलास शर्मा, नामवर सिंह, नलिन विलोचन शर्मा को समझ सकेंगे।

स्नातक हिन्दी प्रतिष्ठा तृतीय वर्ष

पत्र - 7

प्रयोजनमूलक हिन्दी

- यह पाठ्यक्रम प्रयोजनमूलक हिन्दी, अनुवाद और पत्रकारिता से संबन्धित है।
- इससे प्रयोजनमूलक हिन्दी, कार्यालयी हिन्दी और व्यावहारिक हिन्दी को विस्तृत रूप से समझ सकेंगे।
- पारिभाषिक शब्दावली से अवगत हो सकेंगे।
- हिन्दी भाषा की व्यापकता और उसकी विविध शैलियों को समझ सकेंगे।
- अनुवाद और उसके विविध प्रकार एवं उसके प्रयोग से अवगत हो सकेंगे।
- पत्रकारिता की परिभाषा, भेद, प्रयोग एवं उसके तकनीकी शब्द को जान सकेंगे।

स्नातक हिंदी प्रतिष्ठा-तृतीय वर्ष

पत्र 8

विशेष अध्ययन (सगुण भक्ति काव्य)

- यह पाठ्यक्रम भक्ति काल और उसकी प्रमुख काव्य धारा- सगुण भक्ति को जानने और समझने में सहायक है।
- भक्ति आंदोलन में कृष्ण काल्य धारा एवं राम काल्य धारा के प्रमुख कवियों के वैचारिक आधार, दार्शनिक आधार और उनके साहित्य की सामाजिक भूमिका को समझने में बेहद उपयोगी है।
- प्रमुख सगुण भक्त कवियों के जीवन-संघर्ष, काव्य संसार, उनकी भक्ति और सामाजिक चेतना को इस पाठ के माध्यम से विद्यार्थी असानी से समझ सकते हैं।
- भ्रमरगीत के आधार स्रोत, भ्रमरगीत का साहित्यिक एवं दार्शनिक पक्ष, मूर की काल्य भाषा एवं भ्रमरगीत की अन्य विशेषताओं को समझने में यह पाठ सहायक है।
- तुलसीदास के लोक नगल एवं भक्ति के स्वरूप एवं उनकी रचना 'कवितारवली' की प्रमुख विशेषताओं को समझने में यह पाठ सहायक है।
- मीराबाई के पदों के माध्यम से उनका जीवन संघर्ष, उनके पदों में वर्णित प्रेम के स्वरूप एवं महत्व एवं उनकी भाषा-शैली को समझने में यह पाठ सहायक है।
- कृष्ण भक्ति परंपरा में रसखान का स्थान, उनकी कविताओं में वर्णित प्रेम के स्वरूप एवं महत्व एवं उनकी काल्य भाषा को समझने में यह पाठ सहायक है।
- रासो की काव्यगत विशेषताएँ, नायक-नायिका भेद एवं उनके नीतिपरक दोहों की विशेषताओं को समझने में या पाठ सहायक है।
- विद्यार्थियों में पाठ आधारित अध्ययन के द्वारा कविता की न्याख्या, उसका विश्लेषण और मूल्यांकन करने की क्षमता विकसित होगी।

DEPARTMENT OF PSYCHOLOGY

Course outcome:

Course Title: General Psychology (Paper -I)

- CO1 : Understand the observation method and experimental method of Psychology.
- CO2 : Students will be able to identify central and Peripheral Nervous system. Brain-structure and function and its theories.
- CO 3: Explain the process and nature of perception evaluate various theories of perception.CO4: Students will evaluate the various theories of Learning.
- CO5: Appreciate and apply various theories of Remembering and forgetting in practical world.CO6: Enables students to understand procedure of problem solving and creative thinking.
- CO7: Students will be able to explain the nature of emotion and their theories.
- CO8: Students will be able to identify the concept of assessing intelligence and their uses.
- CO9: Understand the various factors of personality, theoretical approaches and assessment of personality.

Course Title: Psychopathology (Paper II)

Course outcome:

- CO1: Students will be able to compare different views of abnormality and history of Psychopathology.CO2: Students will be able to explain Topographical and dynamic aspect of mind.
- CO3: Develop a critical awareness about Psychopathology of everyday life and defense mechanism.CO4: Evaluate the various theories of Dream and Dream

work.

CO5: Develop a comprehensive understanding of Neurotic and Psychoses and various Neurotic disorders.

CO6: Students will be able to explain various Psychotic Disorders.

CO7: Evaluate the types, clinical pictures and dynamics of

Psychopathic disorders. CO8: Familiarizes with various types of

psychosomatic disorders.

CO9: Critically analyze the various therapies Psychoanalytic, group behaviour etc.

CO10: Enable the students to understand the classification, causes and rehabilitation of Mental Retardation.

B.A. Part-I-(Hons)

Course title: Practical

Course outcome:

- CO1: Train the students to understand the basic process involved in memorizing non-sense syllables.
- CO2: Students will be able to demonstrate the phenomenon of bilateral transfer of Training and Habitinterference.
- CO3: Enable the students to understand the Psychology of colour and color preference.
- CO4: Perform the experiment, tabulate the observation and draw the graph of Muller Lyre illusion by various psychophysical methods.
- CO5: Students will be able to measure the span of Attention and Distraction of Attention.
- CO6: By conducting experiment students will develop a critical awareness about the process of recalland recognition.

B.A. (Part-II)

Course Title: Educational Psychology (Paper -III)

Course Outcome:

CO1: Assess the Nature of Education and Educational Psychology.

CO2: Students will be able to compare various methods Rating, Rankling, case study and Interview.

CO3: Students will develop a working knowledge about management of Intelligence Aptitude and achievement.

CO4: Develop a Comprehensive understanding of Programmed Learning Formal and Distant

Education. .CO5: Students will be able to evaluate the Examination System Essay type and objective types.

CO6: Enable the Students to understand the Education of special types of children physically and mentally handicap and Problem children

CO7: Familiarizes with the messing uses and methods of Guidance and counseling.

Course Title: Systems of Psychology (Paper -IV)

Course Outcome:

CO1: Develops a comprehensive understanding of structuralism

wound and Teachers.CO2: Enable the students to understand the

Functionalism.

CO3: Students will be able to explain the contribution of Early and Late Behaviorism.

CO4: Provide the students a sound understanding of the Psychoanalytic School

Freud, Jung, and Adler.CO5: Critically analyses the contributions of Neo

Freudians.

CO6: Students will be able to identify the contribution, criticisms and present status of Gestalt psychology.

CO7: Develop a critical awareness about the contribution of Humanistic Psychology Roger's self-theory and Maslow's self-actualization theory.

B.A. (Part-II)

Course Title:

Practical Course

Outcome:

CO1: By Conducting of this test students will be able to understand the measurement of Intelligences and its importance.

CO2: Understand the various factors of Emotional Intelligence and assessment of

Emotional Intelligence. CO3: Students will evaluate the Stress level and measure the stress level.

CO4: Student will develop a comprehensive understanding about the various

factors of personality. CO5: Students will illustrate and interpret adjustment problems in different areas.

B.A. (Part-III Hons)

Course title: Social Psychology (Paper V)

Course Outcome:

CO1: Students will be able to understand subject matter and scope of Social Psychology and its relation with Sociology and Anthropology.

CO2: Critically analyses the merits and demerits of various methods-observation, experiment and survey. CO3: Develop a comprehensive understanding of socialization process, culture and personality.

CO4: Enables the students to understand the Formation of Attitude, change of attitude and Measurement of Attitude.

CO5: Students will be able to demonstrate and understanding of prejudice and stereotype. CO6: Familiarize with the structure, function and types of Group.

CO7: Students will be able to comprehend the nature, emergence of Leadership and Types, Traits and function of leaders.

CO8: Students will be able to explain the meaning, principles and Techniques of Propaganda. CO9: Critically assess the meaning, formation and Role of Public Opinion in Democracy.

CO10: Provide the students a sound understanding of the causes and reduction of social change in India.

B.A. (Paper VI)

Course Title: Research Methodology

(Group-A) Course

Outcome:

CO1: Students will be able to describe the Nature and Stages of Psychological Research and writing a research report.

CO2: Develop a Comprehensive understanding of Nature and sources of Hypothesis and criteria of Good Hypothesis.

CO3: Enables the students to understand the meaning Interview and Interview Schedule and also Interview as a tool of Psychological Research.

CO4: Develop a critical awareness about the Advantages and limitations of

observation and experiment. CO5: Familiarize with the meaning and various type of sampling.

Course Title: Statistics (Group B)

Course outcome:

CO1: Students will be able to understand frequency distribution and Graphic Representation of data.

CO2: Students will be able to implement statistical analyzes-measurement of central tendency and variability.

CO3: Develop a comprehensive understanding of Normal probability curve

and its application. CO4: Enable the students to understand the various methods of correlation.

Paper VII

Course title: Industrial Psychology

(Group A) Course outcome.

CO1: Students will be able to describe problem, scope and Foundation of Industrial Psychology.

CO2: Students will be able to discuss about the physical environment at work- Illumination, Temperature, Humidity, ventilation, Noise etc.

CO3: Develop a critical awareness about the Nature and causes of Fatigue and Monotony and method of reducing Fatigue and Monotony.

CO4: Students will be able to outline the contributions of Taylor and Gilbreths

Scientific Management. CO5: Critically evaluate the causes and prevention of Accidents.

CO6: Enable the students to understand the difference between Vocational

Guidance and Selection. CO7: Provide the students a sound understanding of the method of worker analysis.

Course Title: Clinical Psychology (Group B)

Course outcome:

CO1: Students will be able to explain the Nature and Historical Review of clinical Psychology.

CO2: Develop a comprehensive understanding of clinical problem- Psychosomatic, Psychopathic and criminal Behavior.

CO3: Enable the students to understand the functions of Diagnosis, Diagnostic Interview and the uses of Psychological test.

- CO4: Critically assess the Intelligence and Personality test and their Diagnostic value.
- CO5: Students will be able to demonstrate an understanding of the Psychotherapeutic Techniques-Behaviortherapy, Group Therapy, Non-directive Therapy.
- CO6: Provide the students a sound understanding of the Role of clinical Psychologists in different field.

Paper-VIII

Course title-Experiment

(Group A) Course outcome:

- CO1: Train the students to understand the basic process involved in measurement of Aesthesiometer Index.
- CO2: Students will be able to perform the experiment, tabulate the observation and verify the Weber's law.
- CO3: Students will be able to measure simple and complex Reaction time.
- CO4: Students will illustrate and interpret the effect of fatigue on mental work.
- CO5: By conducting experiment students will develop a critical awareness about the Fluctuation of attention.

Course title-Project/Survey Report (Group B)

Course outcome: A project or survey report will be prepared and submitted by the students on any socially relevant topic. By conducting this project work students will develop a critical awareness about the socially relevant problems.

**DEPARTMENT
OF
ECONOMICS**

**Course Name-
Microeconomics**

B.A-1st Year

S.No.	Course Outcome	PSOs Addressed	Action Verb
CO01	Explain the nature and scope of economics, understand the static and dynamic concept and able to differentiate between microeconomics and macroeconomics.	1,2,3,7,8,9	Remember
CO02	Analyse the concept of consumption, demand, elasticity of demand, measurement of elasticity of demand, consumer surplus and also understand its uses.	2,3,4,6,8,9	Understand
CO03	Differentiate between short run and long run cost, interpret the relationship between short run and the long run costs and analyse the concept of production, revenue, production function and market.	2,3,4,6,7,9,10	Apply
CO04	Analyse the characteristics and pricing methods under perfect competition, monopoly and monopolistic competition.	2,3,4,6,7,8,9	Understand
CO05	Analyse the marginal productivity theory of distribution and demonstrate the theory of wages, rent, interest and profits.	1,2,6,7,8,9,10	Apply

Course Name-Macroeconomics

S.No.	Course Outcome	PSOs Addressed	Action Verb
CO01	Learn the various functions and classification of money and gain knowledge on the inflation, deflation, and its effects.	1,2,3,4,5,6,7,8,9	Remember
CO02	Understand the concept of national income and determination of multiplier and	2,3,4,6,7,8,9	Apply

	investment.		
COO 3	Understand the concepts of the Indian Banking System.	1,2,6,7,8,9	Apply
COO 4	Acquire knowledge on various theory of international trade and its effects.	2,3,4,6,7,8,9	Understand

B.A-2nd Year

Course Name-Indian Economy

S.N o.	Course Outcome	PSOs Addressed	Action Verb
COO 1	Understand the basic structure of Indian Economy.	1,2,3,4,6,7	Remember
COO 2	Analyse the reasons behind population growth.	2,3,4,6,7,8,9	Understand
COO 3	Comprehensively interpret the reasons for low productivity in agriculture and reasons for low credit.	2,4,6,7,8,9	Apply
COO 4	Explain various industrial policies, sources of industrial finance and development of transport and its role in economic development.	1,2,4,6,7,8	Apply

CO05	Explain unemployment and government initiatives to reduce it.	1,2,4,6,7,8	Apply
CO06	Evaluate the types, objective and various plans since independence.	1,2,3,4,6,9	Apply

Course Name-Agriculture Economics

S.N o.	Course Outcome	PSOs Addressed	Action Verb
CO0 1	Understand the nature of public finance.	1,2,3,6,7,8,9	Remember
CO0 2	Describe the various types taxes among various classes of people.	2,3,6,7,8,9	Apply
CO0 3	Understand the causes of growing public expenditure for various programs	2,5,6,7,8,9	Apply
CO0 4	Understand the principle of federal finance, concept of public policy and public enterprises.	1,2,3,6,7,8,9	Remember

B.A-3rd Year

Course Name-Economic Growth & Planning

S.N o.	Course Outcome	PSOs Addressed	Action Verb
CO0 1	Understanding the basic requirement of economic development and growth.	1,2,3,6,8,9	Remember
CO0 2	Explain the theories of Harrod-Domar Growth Model, Schumpeter growth model, balanced and unbalanced development.	2,3,4,6,7,8,9	Understand
CO0 4	Explain the concept of capital formation, foreign capital, human resource, technology and its	2,4,6,7,8,9	Apply

CO03	Find out the correlation coefficient and understand the nature and degree of relationship which can be used for future planning and forecasting.	2,4,6,7,8,9	Apply
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Course Name-Agriculture Economics

	linkages to economic growth and Rostow's stages of economic growth.		
CO05	Evaluate the history of economic planning in India and Role of NITI Aayog	2,3,4,6,7,8,9	Understand

Course Name-Economic Development of UK, USA, Russia and Japan

S.No.	Course Outcome	PSOs Addressed	Action Verb
CO01	Understanding the intricacies of UK, USA, Russia and Japan economic, political and social developments.	2,3,4,6,7,8,9	Understand

Course Name-Statistics

S.No.	Course Outcome	PSOs Addressed	Action Verb
CO01	Understand the concept, scope and limitation of statistics.	2,3,4,6,7,8,9	Understand
CO02	Find out Mean, Median, Mode, Harmonic Progression, Geometric Progression, Dispersion, Range, standard deviation.	2,4,6,7,8,9	Apply

S.No.	Course Outcome	PSOs Addressed	Action Verb
CO01	Gain knowledge of basic concepts of agriculture.	1,2,3,6,8,9	Remember
CO02	Apply economic reasoning to issues of Agriculture and Impact of Green Revolution, Land reforms, Programmes in Indian Economy.	2,4,6,7,8,9	Apply
CO03	Narrate effectively the trends of agriculture marketing in India.	2,4,6,7,8,9	Apply

Course Name-Agriculture Economics

Course Name-Mathematical Economics

S.No.	Course Outcome	PSOs Addressed	Action Verb
COO 1	Understanding the operation of Function & Equations.	1,2,3,6,7,8	Remember
COO 2	Application of Limit & Differentiation, Maximisation & Minimisation	2,4,6,7,8,9	Apply
COO 3	Apply the operation of matrix through Cramer's rule.	1,2,3,6,7,8	Apply
COO 4	Calculate the mean, median, mode and apply in research areas. Find out the correlation coefficient and understand the nature and degree of relationship which can be used for economics	1,2,3,4,5,6,7,8,9	Apply

DEPARTMENT OF POLITICAL SCIENCE

DEPARTMENT OF POLITICAL SCIENCE

COURSE OUTCOME (UG)

COURSE TITLE: POLITICAL THEORY (PAPER-I)

Course Outcome:

- CO1- Provide students a sound understanding of Political Science, including various approaches, ideological perspectives and relationship with other Social Sciences.
- CO2- Understand the function of the state in society and how it rules and regulates the power structure by learning various theories of origin and functioning of the state.
- CO3- Explain what power is and how it functions in society and politics. CO4- Evaluate liberal and Marxist approaches to understand politics.
- CO5- Assess the basic concepts of Liberty, Equality, Rights and Justice.

COURSE TITLE: COMPARATIVE GOVERNMENT AND POLITICS(Paper-II)

Course Outcome:

- CO1- Familiarize students with the main elements of the Constitutions of UK, USA, Switzerland and Russia, the representatives of four major types of government so that they may critically evaluate the functioning of government institutions within the context of constitutionality.
- CO2- Critically evaluate the power, functions and position of different branches of the government and rights of the citizens of UK, USA, Switzerland and Russia in a comparative perspective.

CO3-Trace the evolution of Comparative Politics as a discipline and drawing the distinction between Comparative Politics and Comparative Government

CO4-Conduct an intensive comparative study of the functioning of different political systems.

B. A. Part-II

COURSE TITLE: INDIAN POLITICAL SYSTEM(Paper-III)

Course Outcome:

CO1-Understand the political system of India through the study of Constitution and government at different levels.

CO2-Assess the nature of Indian Federalism with focus on Union-state relations.

CO3-Critically analyze the power, functions and position of all the branches of government at union and state levels.

CO3-Examine the Fundamental Rights and Duties of Indian citizens and significance and status of Directive Principles.

CO4- Critically evaluate the Amendment process of the Indian constitution

CO5- Evaluate the role of various forces like caste, religion and language in the Indian political system.

COURSE TITLE: INTERNATIONAL RELATIONS(Paper-IV)

Course Outcome:

CO 1- Explain scope and subject matter of International Relations as an academic discipline
CO 2- Study the discipline through Political realism, Pluralism and system model.

CO 3- Examine the issues of Underdevelopment, Terrorism, Regionalism and Integration that in the Post second world war order.

CO 4- Study the role of Diplomacy, Propaganda and Military capabilities in the making of foreign policy.CO 5- Explain certain basic concepts like Globalisation in contemporary world order.

CO 6- Describe the Cold War phases and understanding the post Cold War era.

CO 7- Discuss the developments in European Ethno-nationalism since 1990's.
Tracing the growth of European Union

CO 8- Examine Indian Foreign Policy: Basic Principles, Evolution and Relations with major powers.CO 9- Evaluate the working of UN and its organs; Peace keeping Function and Human Rights.

B. A. Part-III

COURSE TITLE:PUBLIC ADMINISTRATION(Paper-V)

Course Outcome:

CO1- Familiarize the students with meaning, key concepts, and schools of thoughts in publicadministration.

CO- Understand what Public Administration is and how it is different from Private Administration.

CO3- Explain how New Public Management and the concept of New Public Service have changed the focusand ways of ensuring the public good.

CO4- Understand the concept and principles of organization and how the formal ones differ from theinformal ones.

CO5-Comprehend and analyze the administration in India, how different institutions work within thepurview of Constitution and how the administration is being made accountable.

CO6-Analyze issues of personnel and financial administration and understand issues and challenges ofgovernance in India.

COURSE TITLE: POLITICAL THOUGHT(Paper-VI)

Course Outcome:

- CO1- Examine the ideas of some of the most prominent political philosophers like Plato, Aristotle, Kautilya, Machiavelli, Hobbes, Rousseau, Bentham, J. S Mill and Mao.
- CO2-Evaluate their responses to political issues which have profoundly affected the subsequent political thought.
- CO3- Explain what was the ideal state according to Plato and how Aristotle differed from his master Plato on the conception of justice and society
- CO4-Describe the views of Hobbes, Locke, and Rousseau regarding state of nature, the law of nature, form of contract and the emergence of state from the contract.
- CO5-Explain how and why Machiavelli gave an overriding priority to pragmatism above ethics and values in operation of statecraft.
- CO6-Understand the meaning of utilitarianism and how Bentham and Mill differed from each other.

COURSE TITLE: POLITICAL SOCIOLOGY(Paper-VII)

Course Outcome:

- CO1-Understand the concepts of Power, Authority and Legitimacy in the context of society. CO2- Explain social stratification through the index of class, caste and elite.
- CO3- Assess the impact of Religion and Caste on society. CO4- Understand the relation between Gender and Politics.
- CO5-Creat awareness among students about Political Culture, Political Socialization, Political Modernization, Voting Behaviour etc.

CO6- Develop a detailed understanding of relation between society and politics. CO7- Evaluate the concept of Political Development and Social Change.

COURSE TITLE: NATIONAL AWAKENING AND CONSTITUTIONAL DEVELOPMENT IN INDIA (Paper-VIII)

Course Outcome:

CO1- Equip the students with the basic understanding of causes of national awakening, various stages of national movement, origin and role of Indian National Congress.

CO2- Understand the impact of two World Wars on Indian politics.

CO3- Evaluate the contribution of various movements like Non-Cooperation Movement, Civil Disobedience Movement, Quit India Movement.

CO4- Assess the performance of Acts like Montague Chelmsford Reform Act 1919, Government of India Act 1935 etc.

B. A. History Hons.

Programme Specific Outcome (PSO)

On completion of the BA with History Honours, students will be able to

PSO-1 Understand the basic themes, concepts, chronology and the scope of Indian History. PSO-2 Acquaint with range of issues related to Indian History that span

distinct eras.

PSO-3 Understand the history of countries other than India with comparative approach.

PSO-4 Think and argue historically and critically in writing and

discussion. PSO-5 Prepare for various types of competitive

Examinations.

PSO-6 Critically recognize the social, political, Economic and cultural aspects of History.

Mathematics Course outcome (Under-graduate)

Course outcome: B.Sc. Part-I

Core Course (paper-I)

- CO 1. Apply theory of equation to analyse problems related to traffic control, space program etc
- CO 2. Apply Set theory to real world from bars to train schedules.
- CO 3. Understand comprehensively the rules of Trigonometry and learn to apply to real situations like to determine the height of the roof in building ,cartography etc
- CO 4. Understand the rules of Matrices and apply to solve linear equations and multivariate statistical analysis.
- CO 5. Learn Linear programming and its applications in to solve real world problems. Core Course (paper-II)
- CO 1. Learn the basics of differential calculus and its different applications.
- CO 2. Grasp the concepts of Integral calculus and learn its applications to solve problems of Physics.
- CO 3. Understand and apply second order equations to different curves like parabola, ellipse, hyperbola and learn the rudiments of conic sections.
- CO 4. Understand the analytical geometry of three dimensions and concepts of representation in different coordinate systems rectangular, spherical , polar and cylindrical.

Course outcome: B.Sc Part-II

Core Course (paper-III)

- CO 1. Get well conversant with the theory of Real numbers , Cauchy's sequence, convergence, continuity and differentiability of real variables, Taylor's expansion etc .
- CO 2. Develop concept of Infinite series and their convergence, Cauchy's root test, condensation test, integral test ,other tests and their applications.
- CO 3. Conceptualize binary notion of group, Abelian ,Non- Abelian group, identity and inverse elements, cyclic group, ring, integral domain ,field etc.

Core Course (paper-IV)

- CO 1. Understand product of three and four vectors, differentiation of vector function, differentiation of product of vectors, gradient, divergence and curl of vector function and their applications.
- CO 2. Get requisite skills for formation of Differential equation of first and second order, separation of variables, geometrical applications of first order differential equation, and orthogonal trajectories.
- CO 3. Acquire the concept of reduction of a force system into a force and a couple, resultant equation, concept of virtual work in two dimensions, stable equilibrium, energy test for stability with applications.
- CO 4. Understand the concept of the components of velocity and acceleration in Cartesian radial and transverse, tangential and normal forms, projectile motion, central force, gravitational force etc

Course outcome: B.Sc Part-III

Core Course (paper-V)

- CO 1. Understand function of two variables, limit, repeated limits, Moore, Osgood Theorem, Continuity and differentiability of function of two

variable, Young's and Schwarz condition of equality of implicit function theorem, Taylor's theorem, Maxima, Minima of Functions of two variables, Lagrange's method of undermined multipliers.

CO 2. Conceptualize Riemann integral of bounded function, Riemann Integrability of continuous functions and monotonic function, the fundamental theorem of integral calculus, Mean Value theorem.

CO 3. Get well versed with Improper integral, convergence of an improper integral, comparison tests, Dirichlet's test, Beta and Gamma functions, their properties and relationship, differentiation under integral Double and triple integrals, changes of order of integration, Line, surface and volume integrals Green's Gauss's and Stokes theorem.

CO 4. Acquire skills to deal with Weierstrass Sequence and series of functions and their pointwise convergence, Uniform convergence of sequence and series of functions, Weierstrass M-test, uniform convergence and continuity, Dini's test, Abel's test, Dirichlet's Test, Uniform convergence Infinite product and its convergence and their mutual relations, Double series, Elementary notions of metric spaces and topological spaces.

Core Course (paper-VI)

CO 1. Ruminant and understand essentials of group theory like Centre, Normalizer, Conjugacy, class equation, auto morphisms, inner auto morphisms, Commutator and commutator sub group, Direct Product of two groups, Division ring, Polynomial ring, etc. Imbedding of a ring without unity in a ring with unity, Characteristics of a field, Field of quotients etc.

CO 2. Learn in depth, Vector spaces, Subspaces, Bases and dimension, Linear Transformation, Algebra of linear transformation, Matrix and linear transformation, Rank and nullity of a linear transformation, Direct sum of sub-spaces, characteristic value, characteristic vector etc.

Core Course (paper-VII)

CO 1. Analyse and apply Motion in a resisting medium, motion of a body about a fixed point, Angular velocity relation between angular velocity and linear velocity of a point of the body general motion of a body, Moment of inertia, Definitions and standards results, Moment ellipsoid and perpendicular axis theorem, Principal axis of inertia (existence of principal axis of inertia at

point) Angular momentum and Kinetic energy of a rigid body rotating about a fixed point etc

CO 2. Get Acquaintance with various terms like Attraction and potential, Attraction and potential of rod, Rectangular and circular dies, Spherical shells, sphere (Laplace's and Poisson equations), Theorem of equipotential surface, Pressure at a point, Thrust on a Plane surface, Centre of pressure, Equilibrium

CO 3. Grasp the skills of dealing with Second order equations with variable coefficients, Solution of second order differential equations with variable coefficients etc.

Core Course (paper-VIII)

CO1. Contemplate over fundamentals of Astronomy and understand Spherical triangle, Fundamental Formula (Cosine, Sine, Sine-Cosine, Cotangent), Napier's rule.

CO 2. Understand D'Alemberts analogies, right angle triangle, Celestial sphere: Definition: Different System of Co-ordinates.

CO 3. Gain knowledge of Phenomenon of rising and setting of stars, Twilight Solar system, Area integral, Kepler's law, Anomalies, Kepler's Equations, Annual Aberration, Effect of the aberration on celestial latitude and longitude etc.

PHYSICS**Course Outcome(CO)****B.Sc. (Honours) : Part - 1 Paper - I**

CO 1/I : Students learn fundamental concepts and applications of the special theory of relativity. They learn and visualize a transition from Newtonian mechanics to Einsteinian mechanics. They learn to apply and appreciate the application and consequences of Lorentz transformation equations. They understand relativistic mass, length, time and energy.

CO 2/I : Students learn to associate an observer with a frame of reference and get to know centrifugal force, coriolis force, generalized co-ordinates, D'Alembert's principle, formulation and simple applications of Lagrangian and Hamiltonian equations of motion.

CO 3/I : Students learn about gravitational potential and field, motion of bodies under the influence of the central force field, and Kepler's laws of planetary motion.

CO 4/I : Students understand and learn elasticity and surface tension.

CO 5/I : Students acquire a comprehensive knowledge of wave equations, damped and forced oscillations, vibration, properties of sound, and the acoustics of buildings.

Paper - II

CO 1/II : Students learn about the Maxwell-Boltzman distribution law, equipartition of energy, mean free path, viscosity, thermal conductivity, diffusion, and Brownian motion.

CO 2/II : Students understand the rectilinear flow of heat, real gas equations, and the Van der Waal equation of state.

CO 3/II : Students develop concepts related to laws of thermodynamics and their application.

CO 4/II : Students develop a clear understanding of the efficiency of Carnot's engine and refrigerator. They learn reversible & irreversible processes and entropy

changes in various processes.

CO 5/II : Students become familiar with the thermodynamic potentials and their physical interpretations, low temperature physics, black body radiation and the laws associated with it.

Practical : B.Sc. (Honours) Part - 1

CO 1/1/P : Students gain demonstration skills and competencies to conduct experiments related to the properties of matter, heat and thermodynamics, waves and vibration.

CO 2/1/P : Students develop expertise in handling equipments essential for conducting experiments involving the properties of matter, heat, thermodynamics, waves, and vibration.

CO 3/1/P : Students learn how to analyze the experimental data and present the results graphically.

CO 4/1/P : Students learn to determine and analyze various properties of matter using different models and methods. They become aware of the constraints of measurements as well as model limitations.

B.Sc. (Honours) : Part - 2

Paper - III

CO 1/III : Students develop understanding of the phenomenon of interference and their applications.

CO 2/III : Students are able to explain diffraction and polarisation phenomena and learn applications related to it.

CO 3/III : Students gain knowledge about different optical instruments like biprism, interferometer, diffraction grating, telescope, and microscope.

CO 4/III : Students comprehend Maxwell's equations, poynting vector, electro-magnetic momentum, etc.

CO 5/III : Students learn propagation of electromagnetic waves, dispersion theory, and scattering by free and bound charges.

Paper - IV

CO 1/IV : Students develop basic knowledge of electricity and magnetism. They are able to understand magnetic properties of matter, magnetic circuits and their applications, and solve potential problems in electrostatics.

CO 2/IV : Students learn Peltier effect, Seebeck effect, Thompson effect. They learn the fundamentals of alternating current circuits, alternating current bridges, and transformers.

CO 3/IV : Students acquire elementary knowledge of nucleus and its structures.

They become acquainted with nuclear fission reactors, astrophysics, mass spectrographs, cyclotrons, and betatrons.

CO 4/IV : Students learn natural and artificial radioactivity. They are able to calculate the decay rates and half life of radioactive decays.

CO 5/IV : Students learn to explain photoelectric emission, Compton effect, Bragg's law, cosmic rays. They learn about cathode ray oscilloscope and its uses.

Practical : B.Sc. (Honours) Part - 2

CO 1/2/P : Students gain hands-on experience of using optical instruments like spectrometer, biprism, and grating.

CO 2/2/P : Students are able to determine the magnifying and resolving power of optical instruments.

CO 3/2/P : Students are able to get finer measurements of the wavelength of light using Newton's ring, plane transmission grating, and Fresnel's Biprism.

CO 4/2/P : Students are able to realise the temperature variation of electrical resistance, experimentally verify the characteristics of semiconductor diodes and determine the angle of dip by dip circle.

B.Sc. (Honours) : Part - 3

Paper - V

CO 1/V : Students learn to solve differential equations, Laplace equation, wave equation, and Poisson's equation. They learn to apply the acquired concepts in different co-ordinate systems. They learn complex variables and vector calculus and their applications in diverse branches of physics.

CO 2/V : Students become familiar with Hamilton's principal, Euler-Lagrange equation of motion, and conservation theorems. They understand the role of Hamiltonian dynamics, the laws of motion, and concept of moment of inertia.

CO 3/V : Students learn Euler's equation of motion and solve them for simple systems. They learn basic concepts of canonical transformation and Hamilton-Jacobi equation.

CO 4/V : Students acquaint themselves with quantum formulation and appreciate it comparing with classical formulation of an event. They acquire thorough

knowledge of the postulates of quantum mechanics, operators, the importance of uncertainty relations and angular momentum.

CO 5/V : Students are able to learn and solve the Schrödinger wave equation for different forms of potential in one and three dimensions

Paper - VI

CO 1/VI : Students gain fundamental knowledge of statistical mechanics. They learn probability distributions, partition functions, ensembles, and other related theories.

CO 2/VI : Students learn and analyse Boltzmann, Bose-Einstein, Fermi-Dirac distributions and know their applications. They acquire a clear idea of phase transitions and fluctuations.

CO 3/VI : Students are able to analyze the characteristics of coupled LCR circuits. They familiarize, learn and apply network theorems, two port network, filters and attenuators.

CO 4/VI : Students gather a comprehensive knowledge of semiconductor devices, BJT and FET circuits. They develop deep understanding of various rectifiers, amplifiers, oscillators, and multivibrators. They learn amplitude modulation and its detection.

CO 5/VI : Students get familiar with basic components and terminologies of computer. They learn to write algorithms and flow charts for computer programming. They are able to solve mathematical problems using Basic and Fortran languages.

Paper - VII

CO 1/VII : Students acquire fundamental knowledge related to plasma physics. They are able to describe Plasma oscillations, Debye's potential, Ionospheric reflection, Pinch effect, etc. Students understand and learn different aspects of electrodynamics like field and potential due to oscillating current element, uniformly moving charge, oscillating dipole, covariance of Maxwell's equation, and electromagnetic fields.

CO 2/VII : Students learn about atomic spectra and the application of selection rules. They are able to explain the underlying theory of the Zeeman effect and Paschen back effect. They are able to explain rotational and vibrational spectra, the difference between NMR and ESR.

CO 3/VII : Students gather knowledge related to nuclear mass, size, charge, binding energy, etc. They learn Liquid drop model and Shell model.

CO 4/VII : Students develop an in-depth knowledge of different types of crystal structure and x-ray diffraction. They become familiar with reciprocal lattice, types of crystal binding, cohesive energy, and Madelung energy.

CO 5/VII : Students know the importance and limitations of different theories related to solid state physics like free electron theory of metals, Sommerfeld theory of electrical conductivity, Band theory of solid, etc. They understand the classifications of matter on the basis of conductivity, properties of semiconductors, and their applications.

Practical : B.Sc. (Honours) Part - 3 : Paper - VIII A & B

CO 1/VIII : Students comprehend and know to conduct experiments related to electronics, polarisation, current electricity, and solid state physics.

CO 2/VIII : Students identify different circuit components, demonstrate their uses and limitations.

CO 3/VIII : Students verify experimentally Child-Langmuir, Brewster's laws. They conduct experiment and measure e/m , hall co-efficient, and Plank's constant.

CO 4/VIII : Students are able to study the characteristics of the junction diode, zener diode, BJT, and FET using simple electric circuits.

CO 5/VIII : Students verify experimentally the properties of amplifiers, oscillators, and rectifiers.

Course Outcome: U.G. (Chemistry)
(CO)

Class	Name of the paper	Course outcome
B.Sc.I(Honours)	Physical Chemistry-IA Group-A: The States of matter	CO1 Describe the properties of gaseous state and how it links to thermodynamics system. CO2 Relate the concepts of thermodynamics with statistical thermodynamics. CO3 Explain Qualitative treatment of the structure of the liquid state physical properties of liquids. CO4 Apply Seven crystal systems, law of rational indices, Miller indices, point and space groups, elementary idea of symmetry and symmetry elements. CO5 Describe preparation of colloidal solution and their purification, properties of colloids.
	Group-B: Equilibrium	CO6 Relate reversible and irreversible reaction CO7 Compare equilibrium constant for homogeneous and heterogeneous reaction. CO8 Explain Le Chatelier's Principle and relate between enthalpy H and internal energy U. CO9 Explain thermodynamic isothermal and

	<p>adiabatic processes for ideal gas.</p> <p>CO10 Relate ionic Equilibrium, buffer solution, solubility product, HSAB concept</p>
<p>Group-C: Changes</p>	<p>CO11 Apply the concept of kinetics for first order reaction and half life, understand the importance of colligative property.</p> <p>CO12 Explain elementary idea of crystal growths and catalytic activity at surfaces.</p>
<p>Inorganic Chemistry-IB Group-A: Foundation</p>	<p>CO1 Describe H-spectra and limitation, refinement of Bohr theory, Bohr-Sommerfeld theory.</p> <p>CO-2 Understand the mechanism in transition metal complexes, Born Haber cycle to calculate lattices energy.</p> <p>CO-3. Study the structure of atom, Hunds rule, term symbol, calculation of microstate and selection rule.</p>

		<p>CO-4 Understand orbital overlap and hybridization, Van der Waal's forces, H-bonding.</p> <p>Know Nomenclature of inorganic Compounds</p> <p>CO-5 Explain aqua acids, periodic trends in aqua acid strength, HSAB concept.</p> <p>CO-6 Define periodicity and influence on their reactivity , periodic anomalies.</p>
	<p>Group-B</p> <p>Systematic chemistry of the elements</p>	<p>CO-7 Understand hydrogen and hydrides, bonding, preparation, properties, structure and uses.</p> <p>CO-8 Analyse general methods of extraction of metals, their position in electrochemical series and</p> <p>CO-9 Calculate Gibbs free energy principles of various concentration methods.</p>
	<p>GROUP-C:</p> <p>Miscellaneous topics</p>	<p>CO-10 Apply molecular Symmetry and relate magnetic behaviours, paramagnetism, diamagnetism and ferromagnetism.</p> <p>CO-11 Describe the principle of volumetric analysis and gravimetric estimation.</p> <p>CO-12 Explain Tracer technique and applications, radiocarbon dating.</p>
	<p>Organic Chemistry</p> <p>- IC</p> <p>Group-A:</p> <p>Foundation</p>	<p>CO-1 Describe shapes and structure of organic molecules.</p> <p>CO-2 Naming the organic compounds by IUPAC nomenclature.</p> <p>CO-3 Explain geometrical and optical isomerism.</p> <p>CO-4 Apply principles of Organic</p>

		Chemistry for understanding the scientific phenomenon in Reaction mechanism.
	Group-B Detailed study of the different classes of compounds	CO-5 Explain preparation and properties of different classes of alcohol Differentiate between alcohols and phenols. CO-6 Application of organometallic compounds in the preparation of different functional groups. CO-7 Use of different reagents for the inter conversions of aldehydes, carboxylic acids and acid derivatives. Separation, distinction identification and estimation. CO-8 Describe Aromaticity and Structure of Benzene.
	Group-C: Application techniques	CO-8 Estimation of C, H, N, S, P and halogens Qualitatively and quantitatively in inorganic compounds. CO-9 Determine molecular weight of organic acids and organic bases. CO-9 Describe criteria of purity and purification techniques to purify organic compounds. CO-10 know chemistry and application of polymers like synthetic fibres and plastics. CO-11 Understand manufacture of soaps and detergents including chemistry of their cleansing actions.
	Practical Paper-II	CO-1 Detect functional groups and identify simple organic functional groups. CO-2 Analyse volumetrically unknown solutions.
B.Sc.II(Honours)	Paper-III (Physical chemistry) Group-A States of matter	CO-1 Relate critical phenomena and Andrew's experiment, critical state, Law of corresponding states. CO-2 Analyse viscosity, refractive index, idea of liquid crystals. CO-3 Explain Bragg's Law, crystal structures, radius ratio rule. CO-4 Describe lyophilic and lyophobic colloids, coagulation, dialysis,

	Hard y Schulze Law, Tyndall effect, Brownian movement, electrophoresis, origin of charge, gold number, size determination, electrokinetic potential, gel, emulsion.
Group-B (Equilibrium)	CO-5 Know Gibbs Helmholtz Equation, Clausius-Clayperon equation and its applications. Ideal gases entropy of mixing of ideal gases. CO-6 Explains alth hydrolysis, theory of acid-base indicators. CO-7 one component water and sulphur systems, two components solid and liquid systems Eutectic mixture, azeotropic mixture, congruent and incongruent compounds. CO-8 Understand Nernst distribution law, association dissociation and chemical change.
Group-C (Changes)	CO-9 Describe second order reaction, acid catalysed hydrolysis of methyl acetate, saponification of ester and inversion of cane sugar, first order gas phase reaction.

		<p>CO-10 Understand acid base catalysis, auto catalysis, enzyme catalysis, promoter, inhibitor, catalytic poison.</p> <p>CO-11 Calculate conductance of electrolytes and Principles of Kohlrausch's law and conductometric titration.</p> <p>CO-12 Understand principles and application of electrochemical Cells, Nernst equation, potentiometric titrations.</p>
PAPER-III B (Inorganic Chemistry) Group-A: Foundation		<p>CO-1 Determine electronic change and e/m ratio particles or waves, uncertainty principle.</p> <p>CO-2 Idea of group of group state term symbols.</p> <p>CO-3 Know the meaning of various terms involved in coordination chemistry</p> <p>CO-4 Understand Werner's formulation of complexes and identify the types of valences</p> <p>CO-5 Know the limitations of VBT</p> <p>CO-6 Describe shapes of d-orbitals and degeneracy of d-orbitals</p> <p>CO-5 Draw the geometrical and optical isomerism of complexes</p>
GROUP-B Systematic chemistry of the elements		<p>CO-7 Explain Noble gas compounds, Pseudohalogen and polyhalides.</p> <p>CO-8 Know transition metal-chemistry. General chemistry of d & f block element.</p> <p>CO-9 know carbides, silicates and tetrahalides, idea of fullerenes and zeolites.</p>
Group-C: Miscellaneous topics		<p>CO-10 Understand principles and simple applications of UV-vis spectroscopy.</p> <p>CO-11 Analyse inorganic mixture qualitatively, group separation in inorganic qualitative cationic analysis.</p> <p>CO-12 Know concepts of oxidation and reduction: redox half reactions, redox stability in water, oxidation by atmospheric oxygen.</p> <p>CO-13 Understand role of metal complexes in biological system.</p>
Paper-III C: Organic chemistry Group-A: Foundation		<p>CO-1 Understand Stereochemistry, diastereoisomerism, asymmetry and dissymmetry.</p> <p>CO-2 Know tautomerism, keto and enol tautomerism, estimation of ketonic and enolic content.</p>

		CO-3 Understand reactivity and mechanism of named reactions.
	Group-B Detailed study of the different classes of compounds	CO-4 Explain structure and configuration of glucose and fructose. Mechanism of Ruff degradation, Kiliani Fischer Synthesis, Osazone formation. CO-5 Know aromaticity, preparation and properties of aromatic compounds. CO-6 Discuss properties of hydroxy carboxylic acids. Preparation and properties of Lactic acid, citric acid. CO-7 Understand Baeyer's Strain Theory. Preparation and properties of Polymethylenes.
	Group-C: Applied organic chemistry	CO-8 Understand principle and working of TLC, paper and gas chromatography. CO-9 Know synthetic applications of reagents aluminium isopropoxide & aluminium chloride. CO-10 Describe structure of proteins.
	Practical Paper-IV	CO-1 Determine Molecular weight of volatile liquids using Duma's bulb & Victor Meyer method. CO-2 Know principles and experimental determination of surface tension, viscosity & partition coefficient. CO-3 Determine experimentally rate constant & refractive index and calculate heat of neutralisation.
B.Sc.III(Honours)	V-A (Physical chemistry) Group-A States and structure	CO-1 Know collision theory of gases & determination of characteristic parameters, temperature and pressure dependence of viscosity. CO-2 Describe Co-ordination number of ions, stoichiometric and non-stoichiometric defects. Elementary idea of X-ray diffraction. CO-3 Know the principle and application of IR, UV-vis spectroscopy. CO-4 Explain Photochemistry and its principles Lambert-Beer Law, Stark Einstein Law, calculate quantum yield and define various Photochemical reactions.
	Group-B (Equilibrium)	CO-5 Apply Maxwell thermodynamic relations, chemical potential in an ideal gas mixture, Absolute entropy. CO-6 Understand phase equilibrium : Three component systems of partially miscible liquids and role of added salts.

		<p>CO-7 Understand De-Broglie hypothesis and Uncertainty principle</p> <p>CO-7. Derive Schrodinger's time dependent and independent equation</p> <p>Wave Mechanics: de-Broglie equation. Schrodinger equation, Idea of operators.</p>
	Group-C (Changes)	<p>CO-8 Explain kinetics of third order reactions, opposing reactions and consecutive reactions.</p> <p>CO-9 Know the principles of Concentration cells, E.M.F. measurements, Reference Electrodes.</p> <p>CO-10 Discuss Dynamic Electrochemistry: Transport number, Gouy-Chapman, fuel cells & corrosion.</p> <p>CO-11 Explain isotherm, Freundlich, Langmuir and Gibbs adsorption isotherms.</p>
	<p>VI (Inorganic chemistry) Group-A Theoretical inorganic chemistry</p>	<p>CO-1 Study wave function, normal and orthogonal wave functions. Probability density pattern for H-atom.</p> <p>CO-2 Explain LCAO combinations, MO diagrams.</p> <p>CO-3 Determine Structure of ionic compounds, idea of delocalization of electrons.</p> <p>CO-4 Understand C.F.T, C.F.S.E, chelates.</p> <p>CO-5 Explain structure of interstitial alloys, superconductivity.</p>
	Group - B Systematic chemistry of the elements	CO-6 Explain nuclear properties, radioactive decay law, radioactive series, stellar energy.
	Group - C Introduction to advanced topics	<p>CO-7 Study Organometallic Chemistry. Explain nomenclature, electron deficient compounds, metal alkyls of groups 1, 2 and 13 elements, carbonyls, nitrosyls and ferrocenes.</p> <p>CO-8 Role of Na, K, Mg, Ca, Fe and Co in biological system.</p> <p>CO-9 Describe Principles and applications of Raman spectroscopy & Mossbauer spectroscopy.</p> <p>CO-10 Explain Inorganic Chains, Rings, Cages and Clusters, heteropolyanions, borazines, boranes and metal-metal bonding.</p>
	<p>VII (Organic chemistry) Group-A</p>	CO-1 Know basic of organic electronic transitions. Characterise carbocations, carbanion carbenes, nitrenes and benzyne.

	<p>Reactions and mechanism</p>	<p>CO-2 Discuss kinetics, mechanism and stereochemistry of SN1 and SN2 reactions. CO-3 Compare between E1 and E2 reactions. Know Saytzeff rule. CO-5. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions. CO-6 know Addition reactions Electrophilic & Nucleophilic substitution at saturated and unsaturated carbon. electrophilic and benzene. CO-7 Understand mechanisms Name reactions and rearrangements.</p>
	<p>Group - B Detailed study of different classes of organic compounds</p>	<p>CO-8 Know Polynuclear hydrocarbons and Amino acids. CO-9 Preparation, properties and application of Heterocyclic Compounds Furan, thiophene, Pyrrole, pyridine, quinoline and isoquinoline. CO-10 Know types, methods of preparation and uses in daily life of synthetic dyes: Azo, TPM dyes, Phthalein dyes, Zanthenedyes, Vat dyes, CO-11 Study Natural colouring pigment, their source, structure and use. CO-12 Learn types, extraction methods of Alkaloids and Terpenes</p>
	<p>Group - C Analytical and applied organic chemistry</p>	<p>CO-13 Types, synthesis and uses of Sulfa drugs, antimalarials antibiotics, analgesics, pyrogenic sedatives, antiseptics. CO-14 Use and application of Reagents HI04, lead tetra-acetate, N.B.S., Br2, SeO2. CO-15 Know uses and types of Explosives, insecticides, adhesives.</p>
	<p>Practical Paper- VIII</p>	<p>CO-1 Analyse qualitatively six radicals in organic mixture. CO-2 Know oxidation, nitration, esterification and hydrolysis methods of preparation of organic compounds.</p>

B. Sc. Part - I:- ZOOLOGY (HONOURS)

PAPER-IA

(Non-Chordate)

CO 1- Explain and able to distinguish the characteristic features of each phylum like Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes Aschelminthes Annelida, Arthoropoda, Mollusca, Echinodermata and Hemichordate

CO 2 - Understand and describe the classification concepts of nonchordates.

CO 3- Classify, Identify and recall the name and distinct features of nonchordates.

CO 4 - Explain, and relate the origin, structural organization and evolutionary aspects of invertebrates. Analyze, compare and distinguish the developmental stages and describe the important biological process.

CO 5 - Understand and critique the economic importance of nonchordates.

CO 6 - Illustrate and examine and compare the systemic and functional morphology of various group of non chordates

CO 7- Compare and distinguish the general and specific characteristics of reproduction in lower animals

CO 8- Infer and integrate the parasitic and economic importance of non

chordate animals CO 9- Understand the interaction of nonchordates with the environment

PAPER-IIA

(Ecology, Animal Behaviors and Biometry)

CO1- Recall the procedure for the estimation of abiotic factors and list out the identification characters of organisms.

CO2- Estimate various parameters of water and collection and of organisms belonging to different habitats.

CO 3- Illustrate abiotic/biotic interactions and symbiotic

relationships CO 4- Analyse and interpret the impact of lifestyle on the environment.

CO 5- Understand global environmental issues as climate change carbon footprint watersecurity and population biology.

CO 6- Summarize the abundance and distribution of organisms.

CO 7- Bring awareness about the impact of socio-economic development on the environment and the solutions put forward by the government to reduce environmental damage.

CO 8-Discuss the environmental hazards and social and economic ramifications.

CO 9- Recall the basics of animal behaviour, ethology patterns of behaviour and approaches and methods in the study of behaviour.

CO 10- Describe and compare social behaviour reproductive behaviour

CO 11- Learn the origin and development of animal behaviour and to understand the influence of genetics, environment on animal behaviours.

CO 12- Understand the biological properties of animal behavior, with an evolutionary and ecological emphasis.

CO 13-Compare innate and learned behavior and differentiate between various mating systems.

CO 14- Impart the knowledge about visual and auditory communication; courtship, mate choice, and mating systems; social behavior and social systems; and animal personality.

CO 15- Discuss how movement and migration behaviors are a result of natural selection

CO 16- Illustrate ecological aspects of behaviour which includes habitat selection, optimal foraging theory and aggressive behaviour.

CO 17-Understand and explain courtship and parental behaviour evolution of sex and reproductive strategies.

CO 18- Calculate numerical of mode, median and arithmetic mean, standard error, standard deviation, Simple test and Chi-square test using formula

CO 19- Understand and recall the basic concepts of biometry. CO 20- Apply suitable statistical methods

to solve problems.

CO 21-Identify and relate the statistical principles for the application of biological experiments

CO 22-Integrate the statistical methods to validate research investigations

PRACTICAL PAPER

IB and IIB

CO1- Gain Basic knowledge on handling animals like Pheretima, Leech, Palaemon, Unio, Pila and Sepia and dissection

CO2- Identify the different groups of nonchordates animals by observing their external characteristics.

CO 3- Understand the organs, organ system and their functions in lower animals.

CO 4- Get knowledge about the different modes of life and their adaptation based on the environment.

CO 5- Able to dissect and display the internal organs and mount the mouthparts and scales of lower animals.

CO 6- Understand the basic structure on invertebrate animals through dissection

CO 7- Acquire knowledge of the reproductive system, nervous system, excretory system and respiratory system of animals like Pheretima, Leech, Palaemon, Unio, Pila and Sepia.

CO 8- Prepare and develop the mounting procedure of Paramoecium gemmules, Spicules, obelia colony, Nephridia and Ovary of Pheretima Jaw of Leech, statocyst of prawn, osphradium, radulla and gill of pila of unio, Glochidium larva, of crustace and Echinoderma, Pediceralia

B. Sc. Part - II:- ZOOLOGY (HONOURS)

PAPER-III

(Chordata)

CO1- Understand and describe general features of phylum chordata

CO2- Classify, Identify and recall the name and distinct features of chordates such as Protochordata, Cyclostomata, Pisces, Amphibia, Reptilia, Aves &

Mammalia.

CO3- Understand and able to distinguish the characteristic features of each subphylum and class

CO4- Analyze, compare and distinguish the developmental stages of chordates and describe the important biological process

CO 4- Understand the economic importance of vertebrates.

CO 5- Understand and critique the economic importance of chordates.

CO 6- Illustrate and examine and compare the systemic and functional morphology of various groups of chordates

CO 7- Compare and distinguish the general and specific characteristics of reproduction in chordates

PAPER-IV

(Comparative Anatomy, Embryology)

CO1- Understand and correlate the significance of cellular processes in embryonic development and specifically in organogenesis.

CO2- Describe and elaborate on the involvement of specific cell types in the formation of specific organs and explain the importance of morphogens.

CO3- Help students to distinguish between the different types of developmental mechanisms in various organisms.

CO 4- Help students to understand the role of environment and genetics in influencing embryonic development

CO 5-Understand artificial reproductive technologies and uncovers the causes and consequences of multiple births, conjoined babies and congenital disorders to help the students to correlate the significance of cellular processes in organogenesis.

CO 6- Understand the organ systems such as Integument,its derivatives and function, Evolution and fate of kidney, urinogential ducts, gonads,Evolution of chondro-Splanchno & osteocranium in the vertebrate groups

CO 7- Will get knowledge about Gastrointestinal tract, Respiratory systems,Heart, Aortic arches,Brain

CO 8- Will differentiate and compare the different type of excretion and kidney

B. Sc. Part – III - ZOOLOGY (HONOURS)

PAPER-V

(Biochemistry, Physiology & Endocrinology)

CO1-Students will understand the structure and classification of Amino Acids, Protein,Carbohydrate & fats

CO 2-Will get the knowledge about the different types of Vitamins and their role in themetabolism as coenzymes

CO 3-Will able to describing structure, functions and the mechanism of action of enzymes.

CO 4-Will develop the knowledge about the mechanism or working of body, its systems, its tissues, the cells and the biomolecules.

CO 5-Will get deeper insight about the structures and function of endocrine glands and get an understanding of the common endocrine.

PAPER-VI

(Cell Biology, Genetics and Economic Zoology)

CO1- Students will get the understanding of fundamental principles cellular biology

CO2-Will learn the structure and functions of a living cell and importance of genetics plays in organic evolution, adaptation and genetic disorders.

CO3-Will able to develop relationship between cell structure cell functions CO4-Will learn how cells grow, divide, and die and their regulation process

CO 5-Will get the knowledge about cell signaling and regulation of cellular functions. Students will also learn about the cancer and other diseases.

PRACTICAL ZOOLOGY

(Practical) PAPER VIIIA

(Biochemistry, Physiology & Endocrinology)

CO1-Dissection and display of gonad, thyroid, adrenal, Pancreas

in mammal CO 2-Determine the bleeding and clotting time

CO 3-Estimation of haemoglobine (gm/ 100 ml)

in blood.CO 4-Enumeration of total RBC.

CO 5-Student will experiment Benedicts test for reducing sugar, Molisch's test, Iodine test for starch and glycogen

PAPER –VIIIB

(Cell Biology, Genetics, Paleozoology and Evolution)

CO 1-Able to do vital staining of secretory granules in Salivary glands of Cockroach and Mitochondria in the buccal epithelium.

CO 2- Homology and Analogy as exhibited by the wings of birds, bat and insect.

CO 3-Explain the adaptive radiation as exhibited by beaks of birds and

dentition of mammals.

CO 4-Demonstrate stages of mitotic and meiotic divisions respectively.

CO 5-Able to do preparation of the giant chromosomes of the chironomus/drosophila larvae.

CO 6-Explain Serial homology in the appendages of prawn.

PAPER –VIII B

(Ecology, Animal Behaviour, Palaeozoology, Zoogeography & Economic Zoology)

CO 1-Student will be able to understand the concept of biosphere

CO 2-Will get the knowledge about the functioning and energy flow

of ecosystem CO 3-Will be able to analyze the behavior of fishes,

insects and migratory birds CO 4-Will get the knowledge about the

economic importance of sericulture

CO 5-Will understand the importance of pests and vector control

CO 6-Student will be able to determine the DO concentration and pH of

water sample CO 7-Will be able to evaluate the moisture content of

soil

CO 8-Will be able to identify the organisms present in water soil samples

CO 9-Will understand the Economic importance of silk worm, lac worm and honey

bee

CO 10-Will get the knowledge about development stages of Lac

sticks, Lac insect, fishing gears and sand fly, honey, propolis

CO 11-Compare homology and analogy

CO 12-Will be able to make permanent slide of insect mouth parts

DEPARTMENT OF BOTANY

U.G. I

Contents: Plant Diversity-I Paper 1

After completion of this course students will gain knowledge of -

CO1: Characterize Viruses and their economic importance, Bacteria, Mycoplasma, Cyanobacteria. and describe the Algae such as-Oedogonium, Chara, Vaucheria, Ectocarpus **CO2:** Describe the Algae such as- Albugo, Mucor, Penicillium, Puccinia, etc.

CO3: Explain the Lichens and Plant pathology-Viral, Fungal, Bacterial diseases.

Contents: Plant Diversity-II Paper II

After completion of this course students will gain knowledge of -

CO1: Classify, General characteristic and economic importance of Bryophyta such as - Riccia, Anthoceros and Funaria and Classification, General characteristic and economic importance of Pteridophyta such as -Rhynia, Selaginella, Equisetum, Marsilea.

CO3: Evaluate Geological time scale, Fossils, types of Fossils.

(Practical Work)

Contents: Plant Diversity-I & Plant

Diversity-II After completion of this

course-

CO1: Identify different types of cyanobacteria.

CO2: Classify and identify the Algal and fungal genus and specimen included.

CO3: Make micro preparation of the material of Pteridophyta and bryophytes and identify them anatomically.

CO4: Make student can make micro preparation of the material of Gymnosperm and identify them anatomically.

Contents: Plant Morphology & Anatomy

After completion of this course students will gain knowledge of -

CO1: Understand vegetative morphology of Angiosperm such as Root, Stem, Leaves and reproductive morphology of Angiosperm such as inflorescent flower and fruit types.

CO2 : Explain Apical meristem of Root & Shoot, types of tissues, Vascular Bundles, Xylem, Phloem, Cambium, Periderm.

CO3: Compare the primary structure of -Dicot root, stem, leaf. Monocot root, stem, leaf.

Contents: Taxonomy & Diversity of Angiosperms

After completion of this course students will gain

knowledge of - CO1: The Fossil Angiosperm, Botanical nomenclature.

CO2: Classify Angiosperms, botanical nomenclature.

CO3: Comparison of flowering plants Dicot families such as- Malvaceae, Solanaceae, Brassicaceae,

Fabaceae and Diversity of flowering plants Dicot families such as- Lamiaceae, Apocynaceae, Asteraceae.

CO4: Explain the flowering plants Monocot families such as- Liliaceae, Poaceae, Orchidaceae.

(Laboratory Work)

Contents: Plant Morphology & Anatomy & Taxonomy & Diversity of Angiosperms
After completion of this course-

CO1: Develop the skill and be able to prepare double stained micro preparation of the given material and identify on the basis of observation.

CO2: Develop the skill to identify the fossil specimen.

PART II

Contents: Reproductive Biology and development in Angiosperm
After completion of this course students

will gain knowledge of -

CO1: Study the structure of Stamen, Pistil, Ovule, Embryo Sac, Pollination types.

CO2: Comparison of double fertilization, formation of seed, seed dormancy and strategies of seed disease cell.

CO3: Understand the growth of development growth regulators movements in the plants.

CO4: Physiology of flowering, Phytochromes, Photoperiodism, and Senescence and abscission.

Contents: Plant Biochemistry & Plant Physiology

After completion of this course students will gain knowledge of -

CO1: Comparison of structure, properties and uses of Carbohydrates, Lipids and Proteins. **CO2:** Understand the structure, properties, mechanism of Enzymes and Metabolism of Nitrogen. **CO3:** Plants, Water related function of Ascent of Sap, Transpiration, Absorption and phloem transport.

CO4: Mechanism of Photosynthesis and Respiration.

CO5: Classification, General characteristic and economic importance of Gymnosperm such as –Cycas, Pinus.

(Laboratory Work)

Contents: Reproductive Biology and development in Angiosperm & Plant Biochemistry and Physiology

CO1: Analyze experiment in practical demonstrate/Study- Physiological and Biochemistry.

CO2: Understand the photographs, permanent slides, herbarium sheets and other submission of the assignment given to them.

Contents: Cell Biology, Biotechnology & Genetics

After completion of this course students will gain knowledge of -

CO1: Compare the structure & function of cell inclusion, cell division, DNA-RNA types and their structure.

CO2: Explain Mendelism laws and interaction of gene and extra nuclear

genome and the linkage, crossing over, variation, mutation and structural changes in chromosome numbers. **CO3:** Understand plant tissue culture, genetic engineering regulation of genes.

Contents: Plant Ecology

After completion of this course students will gain

knowledge of - CO1: Study the ecological and climatic, abiotic and biotic factors

CO2: Compare ecosystem, biogeochemical cycle and environmental Pollution and autecology and synecology their characters and importance and the plant succession and phytography. **(Laboratory Work)**

Contents: Cell Biology, Biotechnology & Genetics &

Plant Ecology CO1: Conduct the laboratory exercise based on paper.

CO2: Conduct laboratory experiments based on paper.

PART III

Contents: Plant Physiology & Biochemistry

Paper III After completion of this course -

CO1: Understand the idea about plant water relation, function and mechanism of Ascent of sap, Transpiration, Phloem transport.

CO2: Understand the Lipid, Nitrogen metabolism, water theories of mineral absorption. **CO3:** Compare the structure, properties and use of Lipids and Carbohydrates and know the chemical structure of Amino acid, protein and basic enzymology.

Contents: Plant Ecology

After completion of this course -

CO1: Study the ecological and climatic, abiotic and biotic factors

CO2: Explain the expected to understand ecosystem, biogeochemical cycle and environmental Pollution.

CO3: Define the autecology and synecology their characters and importance

CO4: The knowledge of plants succession and phytography.

(Laboratory Work)

Contents: Plant Physiology & Biochemistry & Plant

Ecology After completion of this course-

CO1: Understand the phenomenon of Dispersion, Adsorption, and Imbibition. Student to perform the Ascent of Sap.

Student will also understand the Plant Biochemistry experiments.

CO2: Understand the Hydrophytes, Xerophytes, Halophyte, Epiphyte, and Parasite.

Student will have developed knowledge about distribution of various plant species by quadrat Method.

Contents: Plant Physiology, Growth & development After completion of this course

students will be able to -

CO1: Define the process photosynthesis and types of Dark reactions.

CO2: Define the process aerobic and anaerobic respiration, glycolysis, TCA, ETS and ATP Synthesis.

CO3: Explain growth and development, plant growth regulators, plant movement.

CO4: Understand the concept of Photoperiodism, physiology of flowering, seed dormancy, Senescence and Abscission.

Contents: Ethno Botany & applied

Botany After completion of this

course -

CO1: Compare the methodology and importance of Ethnobotany and contribution of ethnic-Societies in India.

CO2: Understand importance of ethno medicinal plants and narcotics, Ethno vegetable fruit and seed for various diseases and the knowledge of applied botany such as Agroforestry, Biofertilizer, Vermiculture and composting.

CO3: Student will be able to understand the process of floriculture, mushroom culture, apiculture and its application in rural area.

(Lab Work)

Contents: Plant Physiology, Growth & development & Ethno Botany &

applied Botany CO1: Student will perform the experiment on suggested laboratory plant growth and development

CO2: Visit to see the projects working of nearby.

Course Outcomes (COs):

1 st Year (Part – I)		
Hon 's Paper – I	Group – A	<ul style="list-style-type: none"> • To understand the applications of computers in present era. • To understand the concept of evaluation and history of computers. • To learn the functional units and classify types of computers and their use. • To understand the concepts of various types of input and output devices working process of computer. • To understand the software classifications. • To understand the types of system software and their uses. • To understand how the operating system works and their types. • To classify various types applications software and their classifications. • To understand communication systems
	Group – B	<ul style="list-style-type: none"> • To understand communication among various units of CPU take place • To understand various types of registers used CPU and its role. • To understand Fetch, Decode, and Execute Cycles (instruction cycle) • To understand Direct Memory Access (DMA) controller. • To understand CISC and RISC architecture and the difference between them. • To learn architecture of 8085 and 8088 microprocessor. • To learn various internal and external commands of MS – DOS operating system.

Group – C	<ul style="list-style-type: none"> • To develop a basic understanding of many areas of information technology and how they are used • To understand logic development • To understand the basic structure of a program including sequence, decisions and looping • To understand how to design a program to solve a simple program • To introduce the basics of several programming language and understand the commonality and differences in languages • To understand what a programmer does and what writing a program means • To learn creation of flow chart, writing algorithms, and pseudo codes • To learn programming with QBasic Programming Language user for beginners.
Group – D	<ul style="list-style-type: none"> • Computer lab work for executing various types of MS – DOS commands with their options / switches / parameters. • Computer lab work for creating and executing various programs of QBasic taught in class.
Group – A	<ul style="list-style-type: none"> • Identify and describe the Services Provided by Operating Systems. • Understand and Solve Problems Involving Process Control, Mutual Exclusion, Synchronization and Deadlock. • Implement Processor Scheduling, Synchronization and Disk Allocation Algorithms for a Given Scenario. • Apply Various Approaches of Memory Management Techniques.

Hon 's Paper – II		<ul style="list-style-type: none"> • Analysis Various Operating System Approaches in Unix / Linux and Windows.
	Group – B	<ul style="list-style-type: none"> • Operational knowledge of Windows operating system and various types of administration settings • Working knowledge of word processing software using MS Word • Working knowledge of electronic data processing software using MS Excel • Working knowledge of presentation software using MS Power Point • Conceptual knowledge of Database management system.
	Group – C	<ul style="list-style-type: none"> • Database creating, add, updating, editing, appending, sorting, deleting, filtering and other various operations with records handling in FoxPro. • Handling multiple database files together in FoxPro. • Reports & labels designing In FoxPro. • Programming with FoxPro. • Data Input Screen Layout Designing.
	Group – D	<ul style="list-style-type: none"> • Implementation of Linux / Unix command in computer lab. • MS – Windows operations and settings. • Ms – Word implementations with various menu commands • Ms – Excel implementations with various menu commands • Ms – Power Point implementations with various menu commands

		<ul style="list-style-type: none">• FoxPro Database Handling, Programming, etc.
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Subsidiary	Paper – I	<ul style="list-style-type: none"> • The maximum portion of the Syllabus is useful for higher studies in Computer Science. • Set Theory, Algebra, Real Analysis, Matrix Theory, etc are taught and used in the field. • It's helpful for Research works in Computer Science and Engineering. • Trigonometry and Analytical Geometry are useful in Computer Graphics.
	Paper – II	<ul style="list-style-type: none"> • To be able to read and comprehend English. • To acquire an interest in reading English. • To develop an aesthetic sense of appreciation • To develop a strong sense of moral values. • To develop an appreciation of Nature.
	Paper – III	

Hon' s Paper – III	Group – A	<ul style="list-style-type: none"> • Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing, and Working of Networking Devices. • Demonstrate the Significance, Purpose, and application of Networking Protocols and Standards. • Describe, compare, and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM, and Various Switching Techniques. • Explain the working of Layers and apply the various protocols of the OSI & TCP/IP model. • Analyze the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies. • Design the Network Diagram and Solve the Networking Problems of the Organizations with Consideration of Human and Environment. • Install and Configure Networking Devices.
	Group – B	<ul style="list-style-type: none"> • Apply the principles of number system, binary codes and Boolean algebra to minimize logic expressions • Develop K-maps to minimize and optimize logic functions up to 5 variables • Acquire knowledge about various logic gates and logic families and analyze basic circuits of these families. • Design various combinational and sequential circuits such as encoders, decoders and counters using multiplexers, and flip - flops • Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits

Group – C	<ul style="list-style-type: none">• Illustrate basic concepts of Computer and C programming.• Design the solution for the given problems and develop the same using C programming language.• Apply the concepts of looping, branching, and decision-making statements for a given problem.• Demonstrate the ability to write C programs using pointers, structures, unions and arrays.• Develop modular applications using C programming language.
Group – D	<ul style="list-style-type: none">• Writing and executing various programs of C language in computer lab.

Hon' s Paper – IV	Group – A	<ul style="list-style-type: none"> • Understand and Explain Basic Data Structures Such as, Linked Lists, Stacks and Queues, Tree and Graph. • Select and Apply Appropriate Data Structures to define the particular Problemstatement. • Implement Operations Like Searching / Sorting, Insertion, and Deletion, Traversing on Various Data Structures. • Determine and Analyze the Complexity of Given Algorithms.
	Group – B	<ul style="list-style-type: none"> • Illustrate the basic concepts of internet and its evolution • To understand various terms used in the world of internet • To know about various types of internet connections and ISP • To understand various types of software used by internet • To know various types of applications of internet • To know about data over internet • To know about various computer languages used by internet
	Group – C	<ul style="list-style-type: none"> • To understand basic concepts of Engineering design. • Demonstrate basic concepts of the AutoCAD software • Apply basic concepts to develop construction (drawing) techniques • Ability to manipulate drawings through editing and plotting techniques • Understand geometric construction • Produce template drawings • Produce 2D Orthographic Projections • Understand and demonstrate dimensioning concepts and techniques • Understand Section and Auxiliary Views • Become familiar with the use of Blocks, Design Center, and Tool Palettes • Become familiar with Solid Modelling concepts and techniques.
	Group – D	<ul style="list-style-type: none"> • Practical implementation of algorithms used in data structure study • Accessing internet, creating email, video chat, internet telephony, newsgroup, writing blogs, etc. • Creating various types engineering design in 2-D & 3-D form and generating raster image using AutoCAD.
Paper – IV	Paper – IV	<ul style="list-style-type: none"> • Calculus and Differential Equations must be known to everyone who is related with Science and Applied fields. • Vector Analysis and Vector Calculus is useful in Computer Graphics. • Statics and Dynamics are the applications and are very interesting to study and are useful for technical students.
	Paper – V	<ul style="list-style-type: none"> • Ability to comprehend English and use it efficiently • Critical ability to appreciate culture and thoughts down the ages • To develop student's character and emotional maturity • To develop a confidence in students to stand at par with others • To acquire linguistic communicative skills

Subsidiary	Paper – VI	.
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3rd Year (Part - III)		
Hon 's Paper - V	Group - A	<ul style="list-style-type: none"> • Students list the visual programming concepts. • Explain basic concepts and definitions. • Express constants and arithmetic operations. • Distinguish variable and data types. • Students code visual programs by using Visual Basic work environment. • Distinguish and compose events and methods. • Recognize and arrange control structures. • Design a complete program using visual programming concepts. • Students prepare various projects by helping visual programming. • Different types of Connectivity with database software applications. • Prepare project in visual programming. • Manage and analyse prepared project with programs. • Interpret and report obtaining results.
	Group - B	<ul style="list-style-type: none"> • Describe the fundamental elements of relational database management systems • Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. • Design ER-models to represent simple database application scenarios • Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. • Improve the database design by normalization. • Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods.
	Group - C	<ul style="list-style-type: none"> • Database Design will be able to apply normalization rules to database design. • Database Design will be able to create E-R (Entity Relationship) and UML (Unified Modeling Language) diagrams for a given database scenario. • Database Management - Oracle Lecture will be able to create queries to retrieve data from multiple tables using Oracle functions, views, and scripts. • Database Management - Oracle Lecture will be able to use decision making statements, loops, and cursors in order to create a business application. • Students will understand exception handling and know how to take the actions when exceptions are raised. • Students will be able to understand subqueries. • In ACTs introduction to Oracle PL/SQL programming

		training, attendees write stored procedures, functions, packages, and triggers, and implement complex business rules with oracle.
	Group – D	<ul style="list-style-type: none"> • Computer Practical Laboratory works of Group – A & Group – B.
Hon' s Paper – VI	Group – A	<ul style="list-style-type: none"> • Explain Concepts and Advantages of Object-Oriented Programming. • Apply and implement the concepts of the Object-Oriented paradigms to analyze, design and develop the solutions of real-world problems using the principles of information Hiding Localization and Modularity. • Design, Development and maintain the small applications, system utility for societal and academic problems using reusability concepts in team spirit. • Demonstrate the Advanced Features of C++ Specifically Stream I/O, Templates and Operator Overloading and overriding.
	Group – B	<ul style="list-style-type: none"> • Explain and Apply the Object-Oriented Concepts for Solving Real Problem. • Use the Java SDK Environment to Create, Debug and Run Simple Java Programs.

		<ul style="list-style-type: none"> • Apply Java Technology to Develop the Small Applications, Utilities, and Web Applications. • Apply Events Management and Layout Managers Using AWT, Swing, JDBC and Servlet for Developing the Software for Various Problems.
	Group – C	<ul style="list-style-type: none"> • Demonstrate Artificial Intelligence Techniques, Various Types of Production Systems, and Characteristics of Production Systems. • Design and implement Neural Networks using layers, various activation functions and Various Algorithms to solve real life problems. • Analyze fuzzy nature problem and Design, implement and test the Fuzzy Inference Systems for vague nature real life problem. • Explain Genetic Algorithms theory, Design and validate the Genetic Algorithms based systems for search space driven problems.
	Group – D	<ul style="list-style-type: none"> • Computer Practical Laboratory works of Group – A, Group – B, and Group – C.
Practical	Paper – VII	<ul style="list-style-type: none"> • Computer Practical Examination Hon’s Paper – V & Hon’s Paper – VI.
Project	Paper – VIII	<ul style="list-style-type: none"> • Students will be required to pursue a project work for an organization of their choice with the permission of the HOD. This work generally involves collecting data, solving and implementing a problem for the organization, developing computer programs using the knowledge acquired in the theory and laboratory courses. They will have to submit a report of the work done by them. Finally, a demonstration of the work with the help of a presentation has to be done.
Subsidiary	Paper – VII	<ul style="list-style-type: none"> • Current events of national and international importance • History of India and Indian National Movement • Indian and World Geography • Indian Polity and Governance • Evaluation and History of Bihar, polity and governance • Economic and Social Development • General issues on Environmental ecology, Bio-diversity and Climate Change (<i>Covers only general awareness of the issues, no subject specialization required</i>) • General Science • Comprehension • Interpersonal skills including communication skills • Logical reasoning and analytical ability • Decision making and problem-solving • General mental ability such as Basic numeracy, Numbers and their relations, Orders of magnitude, etc. and Data interpretation

Course outcome**B.Sc.-IT****UG-I(1st Year)****Paper-1**

Section Name	Introduction to Information Technology
Section	A
Unit	I
Unit Name	Hardware
CO-1	<ul style="list-style-type: none"> • To understand the basics of computer and its evolution. • To explore the names and distinguishing features of different kinds of input and output devices. • Illustrate how the CPU processes data and understand instructions and controls the operation of all other devices. • Provide knowledge of different units of computers such as processing unit, IO unit, and storage unit. • Learn Operating System such as Windows OS and its features. • To sketch about DOS, batch scripting, OS and its internal and external commands. • Knowledge of number system, number arithmetic, ASCII & EBCDIC character set. • Knowledge of Software, its types and application package.
Unit	II
Unit Name	Introduction to Software
CO-2	<ul style="list-style-type: none"> • To contrasting the difference between Operating Systems software and Application Systems software. • To illustrate about commonly use of operating systems. • Identify the primary functions of Operating System. • Contrasting about the “Boot” process. • Detecting and identifying Desktop and Windows features. • To know about Utility programs. • Discussion about pros and cons of the three major operating systems. • To understand and gather the information about MS Word, MS Powerpoint, MS Excel, MS Access

Note:- CO stand for Course Outcome

Section Name	Structured Programming Using ‘C’ Language
Section	B

Unit	I
Unit Name	Basics Programming Concept
CO-3	<ul style="list-style-type: none"> • Programs and Program Development • To tag and major role play of Flow Charts, Pseudo Codes and art to write Algorithm • Programming Technique- Procedural, Structural, OOPs based Programming and their co-relation.
Unit	II
Unit Name	‘C’ Programming Language
CO-4	<ul style="list-style-type: none"> • Read, understand and trace the execution of program written in C. • Overview - History and features • Wiki-building programming skill for interact with software to write block of code for solve specific task by know various type method, syntax, symantics. • To compose about common type of errors how to troubleshoot the various among them. • To develop the logic which will help them to create programs, applications in C • To develop the solving technique. • To develop the interest to know about working of operating system and compiler development.
Section	C
Section Name	Computer Architecture
Unit	I
Unit Name	Introduction to IBM Architecture
CO-4	<ul style="list-style-type: none"> <input type="checkbox"/> Able to know and rating on Boolean algebra and map simplification to digital circuit design. <input type="checkbox"/> Able to sketch and podcasting the flip-flop operation to design the timing and control circuit. <input type="checkbox"/> By implementing memory addressing techniques solve memory address problem. <input type="checkbox"/> Able to mashing with assembly code for some basic problem. <input type="checkbox"/> Identifying the various types of memory and their functions.

Paper- II

Section Name	Database Managements System
Section	A
Unit	I

Unit Name	DBMS basics
CO-1	<ul style="list-style-type: none"> • Paraphrase and mashing with the basic concepts and terminology of Database Management System. • Apply query language commands using MySQL. • Inferring internal storage mechanism, File Organization and Indexing in Database. • To know how to take lead for write the queries in Relational Algebra. • Collectively associate with Concurrency, Transaction and recovery management concepts. • Know Basic Concepts in parallel, distributed, object relational and XML database.
Unit	II
Unit Name	RDBMS
CO-2	<ul style="list-style-type: none"> • To present a theoretical foundation and interaction of database with real world problems. • Develop the basic concepts and the applications of database systems and utilize the knowledge of basics of SQL and construct queries using SQL. • Compose the concept to apply relational database theory, and be able to write relational algebra expressions for queries. write relational algebra expressions for queries. • Bookmarking the design principles for logical design of databases, including the E-R method and normalization approach. • To know about Oracle Database • To learn about how to extract the information by writing structure queries.
Section	B
Section Name	Operating System
Unit	I to V
Unit Name	Basics Concepts of Operating System

CO-3	<ul style="list-style-type: none"> • To simulate how software perform and complete their task of real world. • To memorise about various type of management technique- ProcessManagement, Memory Management, Device Management, File Management, File Management, Disk Operating System. • To identify and describe the services provided by OperatingSystems. • Mesmerise and Solve Problems based on Process Control, MutualExclusion, Synchronization and Deadlock. • Implement Processor Scheduling, Synchronization and DiskAllocation Algorithms for a given scenario. • Interviewing various approaches of Memory ManagementTechniques. • Distinguishing Various Operating System Approaches in Linux andWindows.
Section	C
Unit	I to V
Unit Name	Basic Electronics
CO-4	<ul style="list-style-type: none"> • To contrast about type of resistance, resistance symbol, Color Code,Capacitor’s symbol, Code types, Mica & paper capacitor. Inductance, Conductor, Insulator, Band Theory, Intrinsic & extrinsic semiconductors, Theory of p-n Junction, Capacitance & Diffusion capacitance. • To mapping about diode and their type, various type ofconfiguration, characteristics of various components • To retrieving about circuits and amplifier.

UG-II(2nd Year)

Paper- III

Section Name	Data Structure in ‘C’ Programming
Section	A
Unit	I

CO-1	<ul style="list-style-type: none"> • To charting the knowledge of basic data structure and their implementing. • To exemplifying the importance of data structure in context of writing efficient programs. • To filming skills to apply appropriate data structures in problem solving. • Contrast the strength and weakness of different data structure to articulate use of appropriate DS in context of solution of given problem. • To encourage for adapt the optimal programming skills with requires to solve given problem along with fun with maths & logic skill development. • Express and articulate basic Data Structures such as, Linked Lists, Stacks and Queues, Tree and Graph • Select and presenting appropriate Data Structures to define the particular Problem statement. • Implement Operations Like Searching / Sorting, Insertion, and Deletion, Traversing on Various Data Structures. • Outline and explaining of the Complexity of Given Algorithms.
Section	B
Section Name	Discrete Mathematics
Unit	I
Unit Name	(Boolean Algebra)
CO-2	<ul style="list-style-type: none"> • Introduction about Digital Logic, gates and diagrams • Wiki- building the logical design of digital systems. • Structuring and simplifying digital circuits or digital gates. • Various type of gates and basic circuits
Unit	II
Unit Name	(Circuit Design)
CO-3	<ul style="list-style-type: none"> • To provide an environment for simulate hands on experience in designing electric circuit. • To express about simulation of software used in circuit design.

	<ul style="list-style-type: none"> • To journalizing the fundamental principles of amplifiers, Oscillator, multivibrator circuit and constructs waveform generation circuits.
Section	C
Unit	I
Unit Name	Basics Linux
CO-4	<ul style="list-style-type: none"> • Define what is Linux? • Extending the basics philosophy behind linux operating system and where to research and find the right distribution for their needs. • Be able to download a linux OS.iso file, burn it to a DVD and run alive boot disc.
Unit	II
Unit Name	Linux
CO-5	<ul style="list-style-type: none"> • Explain and express the fundamental concepts of Linux Server Administration. • Perform to install, configure and manage basic Linux services. • Manage Users and their permissions, applications and services in Linux server. • Manage the resources and security of a Linux server. • Configure and manage basic networking services in Linux server. • Install and configure E-Mail, FTP, and Web Servers and shell programming.

Paper- IV

Section	A
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Section Name	OBJECT ORIENTED PROGRAMMING USING C++
Unit	I
Unit Name	Basics of C++
CO-1	<ul style="list-style-type: none"> • To gather the concepts and advantages of Object-Oriented Programming. • To sketch and implement the concepts of the Object-Oriented paradigms to correlate, design and develop the solutions of realworld problems using the principles of Information Hiding, Localization and Modularity. • To contrast with design, development and maintain the small applications, system utility for societal and academic problems using reusability concepts in team spirit.
Unit	II
Unit Name	Programming in C++ elaborate
CO-2	<ul style="list-style-type: none"> <input type="checkbox"/> Demonstrate the Advanced Features of C++ specifically Stream I/O, Templates and Operator Overloading and Overriding by help of examples. <input type="checkbox"/> Creating simple programs using classes and objects in C++. <input type="checkbox"/> Implement Object Oriented Programming Concepts in C++. <input type="checkbox"/> Develop applications using stream I/O and file I/O. <input type="checkbox"/> Animate the simple graphical user interfaces. <input type="checkbox"/> Implement Object Oriented Programs using templates.
Section	B
Section Name	Computer Network & Internet
Unit	I to III
Unit Name	Computer Network
CO-3	<ul style="list-style-type: none"> • Demonstrate the Basic Concepts of Networking, Networking Principles, Routing Algorithms, IP Addressing, and Working of Networking Devices. • Demonstrate the Significance, Purpose, and application of Networking Protocols and Standards. • Describe, compare, and contrast LAN, WAN, MAN, Intranet, Internet, AM, FM, PM, and Various Switching Techniques. • Paraphrasing the working of Layers and apply the various protocols of the OSI & TCP/IP model.

	<ul style="list-style-type: none">• Matching with the Requirements for a Given Organizational Structure and Select the Most Appropriate Networking Architecture and Technologies.• Design the Network Diagram and Solve the Networking Problems of
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	<p>the Organizations with Consideration of Human and Environment.</p> <ul style="list-style-type: none"> • Learn about how to install and Configure Networking Devices
Unit	IV to V
Unit Name	Internet
CO-4	<ul style="list-style-type: none"> • To extend the knowledge of internet work as a system for global datacommunication service develop by DARP. • To googling about various mechanism and technologies involve in the development of the internet. • To ware from basics terminologies and technologies, involved devices and mechanisms and the application of the internet. • To explore and questioning among correlation about the evolution in internet, the uses in maintaining global defence and surveillance.
Section	C
Unit	
Section Name	Digital Computer Organisation
CO-5	<ul style="list-style-type: none"> • To memorise about structure and behaviour of digital computers. • It concern with overall basic of computer hardware structure, including the peripheral devices. • To explain about evolution of computer and arithmetic. • Understanding about various type of Organisations such as CPU Organisation, I/O Organisation, Memory Organisation and their purpose, components & their working.

UG-II(3rd Year)**Paper-V**

Section Name	Programming in Java
Section	A
Unit	I to V
CO-1	<ul style="list-style-type: none"> • To develop and paraphrasing of the basic concepts of Java Programming Language along with its design and implementational concepts • To develop, understanding and knowledge of various Java Programming Language techniques • Explain and apply the Object-Oriented Concepts for Solving Real Problem. • Use the Java SDK Environment to Create, Debug and Run Simple Java Programs. • Apply Java Technology to Develop the Small Applications, Utilities, and Web Applications. • Apply Events Management and Layout Managers Using AWT, Swing, JDBC and Servlet for Developing the Software for Various Problems.
Section	B
Section Name	Internet and Web Designing
Unit	I
Unit Name	Internet
CO-2	<ul style="list-style-type: none"> • To memorise and interviewing mail, WWW, News groups, messaging and sending. • To know about protocols, setting up internet connection, creating e-mail, sending email, attachments and their features.
Unit	II
Unit Name	Web Designing

CO-3	<ul style="list-style-type: none"> • Simple and impressive design techniques and discover how does web works really? To illustrate about the different web browser, their importance, purpose and how it is interacting with our daily life. • To create web elements like buttons, banners & bars and of course complete UI designs. • Describe the Concepts of WWW Including Browser and HTTP Protocol. • Bullet- pointing the Various HTML Tags and use them to develop the users friendly Web Pages, DHTML, MIRC. • Gathering the knowledge of CSS with its Types and use them to provide the Styles to the web pages at Various Levels. • Develop the Modern Web Pages Using the HTML and CSS Features with different layouts as per need of Applications. • Use the JavaScript to develop the Dynamic Web Pages. • Use Server-Side Scripting with PHP to generate the Web Pages
	<p style="text-align: center;">Dynamically Using the Database Connectivity.</p> <ul style="list-style-type: none"> • Develop the Modern Web Applications using the Client and Server-Side Technologies and the Web Design Fundamentals. • To compose about the impending effects in web pages, scripting VB code with HTML, Web Hosting.
Section	C
Section Name	Introduction to Network Security
Unit	I
CO-4	<ul style="list-style-type: none"> • Describe network security services and mechanisms. • Symmetrical and Asymmetrical cryptography. • Data integrity, Authentication, Digital Signatures. • To contrast about firewalls and web issues. • Analyse for deduce & resolve security issues in networks and computer systems to secure an IT infrastructure. • Design, simulate, test & know about secure software.
Unit	II

CO-5	<ul style="list-style-type: none"> • To wiki-building about the developed policies and procedures to manage enterprise security risks. • To googling about interpret and forensically investigate security incidents. • Hypothesizing and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.
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Paper-VI

Section	A
Section Name	Visual Programming with Visual Basic
Unit	I
CO-1	<ul style="list-style-type: none"> • Understanding about the programming algorithm, process, and structure • Understand and identify the fundamental concepts of object-oriented programming • Understand and use the concepts of objects, primitive value, message, method, selection control structure, repetition control structures, object reference, container, and method parameter • Explore for learn how to write and run a complete program • Understand and identify the importance of object-oriented programming for the Internet based electronic commerce • Exemplifying the impact of Java and VB.NET on business
Section	B
Section Name	SQL Server
Unit	I
CO-2	<ul style="list-style-type: none"> <input type="checkbox"/> Build and manage SQL Server databases <input type="checkbox"/> Retrieve and manipulate data with SQL queries <input type="checkbox"/> Integrate SQL Server with .NET, Microsoft Office and XML <input type="checkbox"/> Secure and monitor databases with Management Studio <input type="checkbox"/> Replicate data over multiple servers with merge replication <input type="checkbox"/> Transform data into strategic information using business intelligence processes

Section	C
Section Name	System Analysis & Design
Unit	I
CO-3	<ul style="list-style-type: none"> • To know about the various steps of software devolvement life cycle. • To analyze the structure of a system using structured analysis tools such as DFD, ER diagram, Data dictionary etc. • To learn about the importance of feasibility study in development model and their type. • To know about the system maintenance and its various types. • Inferring the concept of Quality assurance goals in SDLC.

Paper VII & VIII

Section Name	Major Project
CO-1	<ul style="list-style-type: none"> • To develop the ability to apply theoretical and practical tools/technique to solve real life problems realated to industrial,academic and research laboratories. • Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study. • Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study. • Develop a running project and become a master of any programming language, database or and technology • Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards • Practice the skills, diligence, and commitment to excellence needed to engage in lifelong learning • To develop the ability to apply theoretical and practical tools/technique to solve real life problems related to industry academic institutions to and related to industry academic institutions and research laboratory.

DEPARTMENT OF POLITICAL SCIENCE

Course Outcome (PG)

M.A Political Science

First Semester

Course title: Political

Theory Course code:

MPOLCC-1 Course

Outcome:

CO1- Understand the basic concepts in political theory. CO2-Assess the theories of State(Origin, Nature, Functions). CO3- Engage in critical analysis of the subject.

CO4- Understand basic concepts of Liberty, Equality, Law, Rights and Justice.

CO5- Enable the students to apply appropriate theories to analyze social and political happenings.

Course Title: Western Political

Thought Course Code-

MPOLCC-2

Course Outcome:

CO1-Understand the importance of political thought and philosophy in shaping and influencing the state and society at large.

CO2-Analyze the ideas and thoughts which are rich and insightful.

CO3-Have a comparative perspective of western political philosophers like Plato, Aristotle, Hobbes, Locke, Rousseau, Marx, Rowls, Nozick and Hayek.

Course Title: Comparative

**Politics Course Code-
MPOLCC-3**

Course Outcome:

CO1-Understand the nature, scope theory and methods of comparative politics. CO2- Evaluate different models of political system.

CO3-Assess the way political dynamics have changed and shaped societies from time to time.

CO4-Enable the students to make a comparative analysis of the functioning of different branches of government working in different political systems.

CO5-Conduct an intensive comparative study of Executive, Legislature and Judiciary of UK, USA, Switzerland, France and China.

**Course Name: Theories of
International Relations Course Code:**

MPOLCC-4

Course Outcome:

CO1-Trace theoretical insights on international relations and global politics.

CO2-Undertake academic assignments and research projects related with international issues which are becoming very salient in today's globalized world.

CO3-Analyze the major issues in world today and their complexities and develop sense of some important theoretical approaches to understand international relations.

CO4-Explain certain basic concepts like Globalization in the contemporary world.

Course Title: Introduction To Public

Administration Course Code-MPOLC-5

Course Outcome:

CO1-Understand traditional and emerging theories and principles of public administration.

CO2-Acquaint them with changing management practices in the light of expanding public works and the need for greater collaboration with non-state agencies.

CO3-Familiarize the students with contemporary issues affecting Public Administration like E-Governance, impact of Globalization and Information Technology on administration and governance.

CO4-Discuss Public Policy making and their implementation.

CO5-Explain the Decision making approach and Ecological approach to Public Administration.

Course Title: Indian Politics: Foreign Policy Of

Major Powers Course Code- MPOLCC-6

Course Outcome:

CO1-Understand theoretical framework to the policies that major powers follow in world affairs. CO2-Critically analyze the problems of global governance and factors affecting them.

CO3-Understand detailed perspectives of foreign policy pursued by the Permanent Five countries.

CO4-Discuss foreign policies of other nations like Japan and Germany, which due to their unique placement in world influence the global security and strategic affairs.

CO-5-Examine the Evolution and basic principles of India's foreign policy.

Course Title: Contemporary Issues in

International Politics Course Code:

MPOLCC-7

Course Outcome:

CO1-Understand contemporary issues in global politics. CO2-Examine Issues affecting the post second world order.

CO3-Learn the dynamics of larger issues in global politics like state, human rights, nuclear security, humansecurity and environment.

CO4-Analyze the way the global institutions are responding to different social and economic concerns. CO5-Identify new problem areas that need critical consideration in the study of current international relations.

Course Title :Indian Political

Thought Course

Code:MPOLCC-8

Course Outcome:

CO1-Develop a critical awareness about distinctive features of tradition of socio, religious and politicalthought in India.

CO2-Examine the Indian political and philosophical response to western modernity and imperialism.

CO3-Understand the issue of continuity and discontinuity between traditional Indian socio-political ideas andmodern political ideas.

CO4-Develop a clear understanding of the ideas of Indian political thinkers like Kautilya, Ambedkar, JyotibaPhule, Vivekanand, Aurobindo etc.

Course Title: Political Process and

Governance in India Course Code-

MPOLCC-9

Course Outcome:

CO1-Familiarize with socio-cultural and philosophical bases of Indian Politics.

CO2-Develop a comprehensive understanding of electoral behaviour, changing socio-economic profile of legislatures and politics of caste and language.

CO3-Discuss Social Movements including Human Rights Movements, Women Movements. CO4-Evaluate the origin and success of Environmental Movements.

THIRD SEMESTER

Course Title: Political Institutions and Practices in India Course Code: MPOLCC-10

Course Outcome:

CO1-Develop a clear and comprehensive understanding of guiding principles and values of the Indian Constitution.

CO2- Assess the actual functioning of different branches of government.

CO3- Evaluate Indian Federalism with reference to centre-state relations.

CO4- Examine the functioning of some statutory institutions like Election Commission and UPSC.

Course Title: Research

Methodology Course Code:

MPOLCC-11

Course Outcome:

CO1- Train the students to undertake research by familiarizing them with the basic and advanced tools and techniques of field studies.

CO2-Introduce the students to the process and methods of empirical research for achieving scientific knowledge in Political Science.

CO3-Explain the design of research projects and programmes in diverse areas of political science. CO4-Understand the various limitations of Research in Social Science.

**Course Title: State Politics
in India Course Code-
MPOLCC-12 Course**

Outcome:

CO1-Understand the historical and emerging trends in political process in the Indian states. CO2-Examine the federal process in India.

CO3-Evaluate the issues underlying political dynamics of regions and the changing power relations between centre and states over a period of time.

CO4- Assess the nature of party system and electoral politics at the state level. CO5-Discuss the vibrancy and limitations of the democratic practices in India.

**Course Title: India's
Foreign Policy Course Code-
MPOLCC-13**

Course Outcome:

CO1-Enable the students to grasp various aspects and perspectives related to the historical evolution of India's foreign policy.

CO2-Understand the institutions and processes related to formulation of foreign policies.

CO3-Analyze different dimensions of India's international engagements.

CO4-Explain the determinants of foreign policy.

CO5-Evaluate the various challenges faced by government in the formulation of foreign policies.

CO6-Discuss India's relation with Major powers and its neighbours in the changing international scenario.

**Course Title: Politics and Social
Movements Course Code:
MSPOLCC-14**

Course Outcome:

CO1-Enable the students to understand the importance of political and social movements as a driving force in political development and social change.

CO2-Analyze the reasons and causes for the success, failure and impact of political and social movements.

CO3-Understand the rise and growth of movements like Tribal and Dalit Movement, Dravid Movement, Peasant Movement, Feminist Movement, J P Movement, Anna Hazare Movement etc.

CO4-Examine the impact of the above movements on the future course of state and society.

Fourth Semester

**Course Title: Indian
Administrative System Course
Code: MPOLEC-2**

Course Outcome:

CO1-Provide the students a sound understating of the historical dimensions of

Indian Administration.

CO2- Evaluate the importance of Public Administration in developing country like India.

CO3- Critically analyze the functioning and role of various ministries and departments in providing service to the community.

CO4- Know about divergent issues related to Civil Services including Training of Civil Servants, their services and conduct rules and Debates over Bureaucratic Neutrality.

CO5- Critically assess the role of civil servants in the development of the country.

Course Title: Introduction to

International Law Course Code:

MPOLEC-6

Course Outcome:

CO1- Develop a clear understanding of the concept of International Law.

CO- Understand the nature, content and different aspects of International Laws pertaining to principles of recognition, jurisdiction, law of sea, diplomatic immunities and privileges, treaty of obligation and crimes against humanity.

CO3- Enable the students to understand the dynamics of international system and the relationship between nations.

CO4- Discuss the role of various International organizations in the enforcement of International Laws.

Course Outcomes (CO)

After successfully completing this course, students will be able to ...

Sem.-I

MHISCC-I Historiography

CO-1 To demonstrate knowledge of historiography and its perspectives.

CO-2 To identify the difference between primary sources and secondary sources and importance of sources.

CO-3 To understand historical trends in theory and method and explain major trends in historiography.

MHISCC – 2 : History of Early Civilization & Medieval World

CO-1 To understand the cultures and civilizations globally with special emphasis on Egypt, Mesopotamian and Harappan civilization.

CO-2 Assess the contributions of the post-classical societies of Medieval Europe.

CO-3 Explain and analyze the origins, basic beliefs, and diffusions of the world's major religious traditions of Islam.

MHISCC-3 : Early Medieval India

CO-1 To acquire knowledge of the transition from ancient to early medieval India with special references of origin of Rajputs.

CO-2 Critically analyze the tripartite struggle for political ascendancy in South along with the growth of regional style of art and architecture.

MHISCC-4 : Science and Technology in India

CO-1 Critically analyze the process of development of science and technology in different fields in ancient India.

CO-2 To understand and analyze the role of some Indian Scientists in the field of science and technology in India.

Semester - II MHISCC-5 :

History of Idea

CO-1 To Understand the excellent works of many scholars, philosophers, theorists and critics.

CO-2 Analyze the different approaches of Western and B. R. Ambedkar on social justice.

MHISCC-6 : History of Europe and Modern World.

CO-1 To understand and analyze the post Modern War – 1 developments and rise of Totalitarianism in Europe.

CO-2 Comprehend the history of Russia and grasp the consequences of World War-II. CO-3 Critically analyze the process of development of Cold War and NAM.

MHISCC-7 : History of Bihar (From the earliest time)

CO-1 To acquire the basic knowledge of geographical background and sources with approaches to pre and proto history of Bihar.

CO-2 To understand the emergence and growth of earlier kingdom and dynasties like Maurya, Gupta etc.

CO-3 Critically analyze the role of Bihar in the Indian National Movement.

MHISCC-9 : Contemporary India-1947 onwards

CO-1 To assess the different dimensions of integration of princely states and critically analyze the caste and communal Forces in politics.

CO-2 Explore and resolve the major challenges emerged in post-Independent scenario.

MHISCC-10 : Indian Historians

CO-1 To understand the various principles of history writing.

CO-2 Analyze and examine the different approaches of important intellectuals in the field of history writing.

MHISCC-11 : South Asia : 1950 onwards

Co-1 Demonstrate knowledge of political history of Asia and economics transition of Asia.

CO-2 To formulated and understood how to cope up with the challenges of globalization.

MHISCC-12 : United States of America – (1860-1990)

CO-1 To understand and evaluate the civil war and reconstruction process in America.

CO-2 To Explain and analyze the process of making the USA as a world power.

MHISCC-13 : National Movement in India

CO-1 To understand the events which lead to the growth of nationalism in India.

CO-2 To explain the contribution of Revolutionaries, Indian National Congress, Left Movement and Indian National Army.

CO-3 To analyze the nationalist responses against the constitutional Changes.

MHISCC-14 : Revolution and Revolutionary thought

CO-1 To understand and analyze the development of English Revolution, Americanrevolution, Russian revolution and Chinese revolution.

CO-2 To indentify commonalities and differences among these revolutions and understand how they transformed the modern world, individually and collectively.

CO-3 Critically, Examine the Gandhian Ideology.

Semester – 4

MHISEC – 1 :- Tribal Movement

CO-1 To analyze the facts responsible for Tribal uprising in India.

CO-2 To understand the impact of the new political Set-up in Indian politics.

MHISEC – 2 :- Human Rights

CO-1 To identify the issues and problems relating to the realization of human rights. CO-2 Acquire analytical skills of how human rights affect social and political processes.

Programmed: M.Sc. Chemistry

M.Sc. Semester I	
Title of the Course and Course Code	Inorganic Chemistry-I (MSCCHE CC-1)
CO1	Recall basic concepts of VSPER Theory, bent rule and CFT to understand the structures of complexes. Explain and illustrate M.O. diagram for hetero- nuclear di- and triatomic molecules and M.O.T. for σ and π bonding.
CO2	Outline the concept of term symbols, spin orbit coupling, anomalous magnetic moments, magnetic properties of inner transition element.
CO3	Determination of formation constants by pH metry and spectrophotometer. Formulate and drive the expression for stepwise and overall formation constants, chelate effect and its thermodynamic origin.
CO4	Understand and acquire knowledge of reaction mechanism of transition metal complexes. Outline the concepts of evidences of theories of trans-effect and Marcus-Hush theory.
CO5	Discuss the chemistry of Isopoly and Heteropoly acids and salts.
Title of the Course and	Physical Chemistry-I (MSCCHE CC-2)

Course Code	
CO1	Outline and recall basic knowledge of polymer, kinetics and mechanism of polymerization, determination of molecular mass of polymer.
CO2	Explain the electrode potential in term of chemical potential, Debye Huckel theory. Qualitative treatment of Debye Huckel limiting law, Butler Volmer equation and Tafel plot.
CO3	Discuss mechanism and dynamics of consecutive, opposing reactions along with activated complex theory, photolysis and kinetics of enzyme catalysis.
CO4	Define and analyze chemical thermodynamics, chemical potential, Gibbs Duhem equation, fugacity and activity of gas mixture.
CO5	Explain and illustrate statistical thermodynamic properties, Translational, rotational and vibrational, electronic partition function and Sakure Tetrode equation.
Title of the Course and Course	Organic Chemistry-I (MSCCHE CC-3)

Code	
CO1	Recall the concept of aromaticity in benzenoid and non-benzenoid compounds and its application to identify various organic compounds. Predict and cite examples of aromaticity of annulenes, heterocyclic and non- heterocyclic compound.
CO2	Review various terms in stereochemistry and explain aspects of configurations in many chiral compounds and apply their understanding about the organic reactions of a number of compounds with respect to the chemoselectivity, regioselectivity and enantioselectivity.
CO3	Explain the reactions mechanism of different types of reactions and predict the products/intermediates. Study and understand the Hammett equation and linear free energy relationship, Hammond's postulate and Curtin-Hammett principle.
CO4	Discuss kinetics, reactions mechanism and stereochemistry of aliphatic and aromatic nucleophilic substitution reactions at an allylic, aliphatic trigonal and a vinylic carbon. Study the various name reactions such as the Von- Richter, Sommelet-Hauser, and Smiles rearrangements.

CO5	Define and explain aliphatic electrophilic substitution, aromatic electrophilic substitution and elimination reactions with mechanism. Compare between E1 and E2 reactions. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions
Title of the Course and Course Code	Practical (physical Chemistry) (MSCCHE CC-4)
CO1	Perform the experiment, tabulate the observations and draw the graph of colorimetry experiments and determine heat of acid base solution.
CO2	Perform the experiment of chemical kinetics, i.e., hydrolysis of methyl acetate and saponification of ethyl acetate.
CO3	Determine the distribution coefficient acetic acid/benzoic acid between water and benzene.
CO4	Find out the specific and molar rotation of sugar and rate constant by inversion of sugar.
CO5	Illustrate and interpret dissociation constant and solubility product using potentiometrically.
M.Sc. Semester II	
Title of the	Advances in Chemistry (MSCCHE CC-5)

Course and Course Code	
CO1	To get the knowledge of Nuclear Chemistry such as Shell model, Liquid Drop Model, Nuclear Reactions and their types along with the Nuclear Reactions in Cross-section.
CO2	Basic concepts of nanomaterials in chemistry, its sources, examples, Bottom- up Method of synthesis in nano chemistry. Characterizations and applications of nanomaterials was also studied.
CO3	Basics of Solid-State Chemistry along with advanced theory and applications of Conductor, Semiconductor, and superconductor have to be studied.
CO4	Industrial Application of Chemistry with references to the cement, paper and pulp, and petroleum.
CO5	Study of waste management and their classification such as nuclear waste management, e-waste management, recycling of plastic with sorting, washing, shredding and extruding.
Title of the Course and Course Code	Inorganic Chemistry-II (MSCCHE CC-6)

CO1	Learn Orgel and Tanabe Sugano diagrams for transition metal complexes, Review the concept of Jahn Teller effect, spectrochemical and nephelauxetic series.
CO2	Outline the concept of symmetry to imagine molecules in three dimensions and identify the symmetry elements and symmetry operations and be able to pass through the molecule.
CO3	Classify the symmetry elements possessed by a molecule and assign it to a point group and generalize the importance of Orthogonality Theorem and learn the rules for constructing character tables.
CO4	Known the preparation, bonding, structure and important reaction of transition metal carbonyls & nitrosyl
CO5	Describe structure and bonding in higher boranes & carboranes. Understand the Wade's rules, 18 electron rule and its application.
Title of the Course and Course Code	Physical Chemistry-II (MSCCHE CC-7)
CO1	Recall and define basic terminologies of quantum chemistry, particle in three-dimensional box, Hermitian operators and Theorems of operators.
CO2	Solve quantum mechanical problem for Harmonic

	oscillator using Hermit differential equation through recursion relation.
CO3	Formulate and solve quantum mechanical problems based on variation method. Perturbation method for He atom.
CO4	Explain Huckel molecular orbital theory of conjugated system, bond order and charge density calculation.
CO5	Review and relate the concepts involved in chemical bonding, LCAO-MO theory and its application for H ₂ molecule.
Title of the Course and Course Code	Organic Chemistry-II (MSCCHE CC-8)
CO1	Study the various name reaction with examples. Learn the mechanism of rearrangement reaction, use synthetic reagent of oxidation and reduction for solving the problems.
CO2	Define and explain principles of photochemistry of Carbonyl Compounds & Unsaturated system.
CO3	Explain pericyclic reactions and justify their mechanisms by using Woodward-Hoffmann correlation diagrams, FMO and PMO approach.
CO4	Describe, conformation of monosaccharides and important derivatives of monosaccharides, glycosides,

	deoxy sugar, amino sugar and study the structure determination and chemical synthesis of sucrose, and maltose.
CO5	Learn the types of proteins and propose chemical and enzymatic hydrolysis of proteins, amino acid sequencing.
Title of the Course and Course Code	Practical (Organic Chemistry) (MSCCHE CC-9)
CO1	Separation and identification organic compounds from binary mixtures by chemical tests. Detection of special elements and functional groups.
CO2	Determination of melting points of unknown organic compounds and preparation of their derivatives.
CO3	Synthesize organic compounds in two steps reaction i.e., prepare p-bromoaniline and p-nitroaniline from acetanilide.
CO4	Preparation of anthranilic acid from phthalic anhydride in two steps.
CO5	Synthesize organic compounds in two steps reaction i.e., p-bromoacetanilide and p-nitroacetanilide from aniline.
M.Sc. Semester III	

Title of the Course and Course Code	Application of Spectroscopy (MSCCHE CC-10)
CO1	Define and describe basic principles of rotational spectroscopy and explain various types of rotators and demonstrate their applications.
CO2	Study of vibrational spectra, Raman effect and photoelectron spectroscopy and describe basic principles of photoelectric effect ionization process, PES and XPS.
CO3	Learn nuclear magnetic resonance and ESR spectroscopy. Explain chemical shift value, spin lattice relaxation & spin-spin interaction and factors affecting its value.
CO4	Define and describe Mass spectrometry. Determine structures from fragmentation data and discuss factors controlling fragmentation.
CO5	Solve problems based on - UV, IR, NMR, CMR and mass spectral data. Propose structures of compounds using spectroscopic data. Distinguish compounds using spectroscopic methods.

Title of the Course and Course Code	Bio-Inorganic Chemistry (MSCCHE CC-11)
CO1	Recall the role of metals ions in biological processes, Concept of Na ⁺ /K ⁺ pump. Definition and examples of essential and trace metals. Study the Toxic effect of heavy metals and their detoxification.
CO2	Understand the bioenergetics and ATP Cycle, DNA polymerization, Overview of photosystem I and photosystem II in cleavage of water. Details understanding of glucose storage process. Review the role of chlorophylls.
CO3	Basic idea about Heme proteins and oxygen uptake, haemoglobin, myoglobin, hemocyanins and hemerythrin.
CO4	Discussion on electron Transfer in Biological system, cytochromes and ion-sulphur proteins. Interpretation of biological nitrogen fixation with spectroscopic and other evidences.
CO5	Explain role of metal in medicines, biochemical bases of essential metal deficient diseases anticancer activity and various mechanism using metal complexes and polyethylene amines as chelating drugs.

Title of the Course and Course Code	Environmental Chemistry and Green Chemistry (MSCCHE CC-12)
CO1	Learn about composition of atmosphere, vertical temperature, heat budget of the earth atmospheric system, vertical stability atmosphere, biogeochemical cycles of C, N, P, S and O.
CO2	Study the chemicals compositions of water bodies lakes, streams, rivers, and wet lands. Describe analytical methods for measuring BOD, DO, COD, F, Oils, Metals.
CO3	Explain chemical and photochemical reactions in atmosphere, smog formation, oxides of N, C, S, O and their effect. Define various analytical methods for measuring air pollutants.
CO4	Describe twelve principles of Green Chemistry, atom economy in chemical synthesis and important technique employed in practice of Green chemistry.
CO5	Outline the replacement of CFC and hydrocarbon blowing agents with environmental friendly blowing agent CO ₂ in the production of polystyrene.
Title of the Course	Bio-organic Chemistry (MSCCHE CC-13)

and Course Code	
CO1	Introduction to chemical and biological catalysis, hypothesis of Fischer's lock and key and Koshtand's induced fit model. Mechanism of enzyme catalysis Michaelis Menten and Line weave-Burk plots.
CO2	Review on Transition-state theory for acid base and covalent catalysis. Illustration on some typical enzyme mechanisms for chymotrypsin, lysozyme and carboxypeptidase A.
CO3	Demonstration of Enzyme catalyzed reactions and the coupling of ATP cleavage to endergonic processes, Transfer of sulphate, addition and elimination reaction.
CO4	Define and explain Co-Enzyme Chemistry, apoenzymes, Structure and biological functions of coenzyme A, thiamine pyrophosphate, pyridoxal phosphate, NAD, NADI, FMN, FAD, Lipole acid and vitamin B 12.
CO5	Study and understand biotechnological use of enzymes in daily life applications, drug design, Clinical uses, enzyme therapy and DNA technology.
Title of the Course and	Practical (Inorganic Chemistry) (MSCCHE CC-14)

Course Code	
CO1	To analyze ions (Mg^{2+} , Ca^{2+} , and Al^{3+}) quantitatively using EDTA.
CO2	To apply green methods for the preparation of the following complexes and their characterization via IR, electronic spectra and T.G.A. Pot trioxalato ferrate (III) Pot trioxalato chromate (III) Chromus Acetate $Hg [Co (SCN)_4]$ Hexa ammine Ni (II) chloride.
CO3	To quantitatively analyze the inorganic mixture containing six radicals including interfering radical.
M.Sc. Semester IV	
Title of the Course and Course Code	Inorganic Chemistry Special (MSCCHE EC- Ia)
CO1	Study alkyls and aryls transition metals & their types, routes of synthesis, stability and decomposition pathways and organocopper in organic synthesis.
CO2	To get the knowledge of transition metal π -complexes with unsaturated organic molecules alkenes, alkynes, allyl, diene, dienyl, arene, trienyl complexes, their

	structural features and important nucleophilic and electrophilic reactions.
CO3	Study the basics of homogeneous catalysis by taking examples such as Zeigler Natta polymerization of olefins, catalytic reactions involving CO, oxo palladation reactions.
CO4	Basics of supramolecular chemistry (non-covalent interactions, self- assembly in supramolecular chemistry, reactivity, catalysis design, synthesis, transport processes and carrier design) and Photo chemistry of metal complexes were studied.
CO5	Study basics of molecular rearrangement via D and A process, reactions of inversions, isomerization, geometrical and optical isomers, optical racemization of octahedral complexes and Fluxional organometallic compounds.
Title of the Course and Course Code	Physical Chemistry Special (MSCCHE EC- Ib)
CO1	State and describe Hartree Fock theory, Born Oppenheimer approximation. Salter Condon rule, Koopman theory, Semi Empirical Theories and HMO Theory.

CO2	Discuss the kinetics of catalytic reaction, reaction intermediate and oscillatory reactions.
CO3	Outline the basic facts, concepts, kinetics of condensed phase reaction and apply different methods to study fast reaction.
CO4	Explain the kinetics of electrode reaction with theoretical expression and factor affecting on its kinetics.
CO5	Review scope, economic impact on corrosion and electrochemical theories. Illustrate the thermodynamics of solid including heat capacity and specific heat.
Title of the Course and Course Code	Organic Chemistry Special (MSCCHE EC- 1c)
CO1	Explain the types of terpenoids, isoprene rule and special isoprene rule. Study structure, stereochemistry and synthesis of Citral, Terpeneol, Camphor, Santonin and abietic acid.
CO2	Discuss synthesis and structure determination of papaverine, Nicotine, Atropine, Quinine and Morphine.
CO3	Study classification, theories of drug activity, assay of drugs and SAR factors affecting bio activity.
CO4	Acquire knowledge about the various types of drugs such as antineoplastic agents, cardiovascular drugs and

	anti-tubercular drugs.
CO5	Known the preparation and properties of benzofused five membered heterocyclic compounds, Five, Six, Seven and large membered heterocycles with two or more heteroatoms.
Title of the Course and Course Code	Practical Inorganic Chemistry (Special) (MSCCHE EC (P) -2a)
CO1	Perform experiments of metal ions in alloys and minerals, analyze and interpret the experimental results.
CO2	Carry out qualitative analysis of inorganic mixture containing six radicals including various samples using different instrumentation techniques.
CO3	Spectrophotometric determination of Fe, Ni, M ⁿ , C., V, I.i, F, NO ₃ ⁻ and P ₀₄ ⁻⁻⁻⁻
Title of the Course and Course Code	Practical Physical Chemistry (Special) (MSCCHE EC (P) -2b)
CO1	Apply the laboratory skills and concepts to carry out the Conductometric titration using acid base mixture.

CO2	Perform Potentiometric experiments to determine EMF, pH and carry out acid base titration.
CO3	Carry out the experiment to determine partition coefficients of acetic acid and iodine in different medium.
Title of the Course and Course Code	Practical Organic Chemistry (Special) (MSCCHE EC (P) -2c)
CO1	Learn the chemical methods to separate and identify organic compounds from mixtures of up to three unknown compounds.
CO2	Perform the multi-step experiments for the preparation of different organic compounds.
CO3	Estimation of biomolecule e.g., carbohydrates, protein, amino acids, and blood cholesterol by UV-visible Spectrophotometric method
CO4	Quantitative estimation of ascorbic acid and aspirin using Spectroscopic technique.
CO5	Practical skill will be developed on handling various organic reactions and compounds.