PROGRAMME OUTCOME

ROGRAMME SPECIFIC OUTCOME &

COURSE OUTCOME

FOR

UNDER GRADUATE & POST GRADUATE COURSES

Internal Quality Assurance Cell

BANKI COLLEGE (AUTONOMOUS),BANKI

Dist.Cuttack, Odisha

CONTENTS

Arts Faculty

SCIENCE FACULTY

COMMERCE FACULTY

BANKI AUTONOMOUS COLLEGE,
BANKI ,UTTACK, Odisha-754008

PROGRAM OUTCOMES(POs), PROGRAM SPECIFIC OUTCOMES(PSO) AND COURSE OUTCOMES(COs)

Arts Faculty

1. ECONOMICS:

A) PROGRAM OUTCOMES

PO1.	Economics subject enables the learners to build up a professional carrier as economists, financial advisors, economics planners and policy makers.
PO2.	It prepares them to cope up with the stress and strain involved in the process of economic development.
PO3.	Department supports the education and training of students, teachers and research in economics

B) PROGRAM SPECIFIC OUTCOMES

PSO1.	The behavioural patterns of different economic agents, advance theoretical issues and their applications.
PSO2.	Macroeconomics
PSO3.	Understand the basic concept of microeconomics.
PSO4.	Acquaint with some basic statistical methods to be applied in economics.
PSO5.	Acquaint with some basic mathematical methods to be applied in economics.
PSO6.	Acquaint with some basic theoretical concept of public finance.
PSO7.	Acquaint with the measurement of development with the help of theories along with the conceptual issues of poverty and inequalities with Indian perspectives.
PSO8.	Delineate the fiscal policies designed for developed and developing economics.
PSO9.	Facilitate the historical developments in the economic thoughts propounded by different schools.
PSO10.	Learn the basic concept of monetary analysis and financial marketing in Indian financial markets.
PSO11.	Learn the development issues of Indian economy.
PSO12.	Acquaint with some basic concept of environmental economics along with the solution of the environmental problems.
PSO13.	Learn the real and monetary sides of International economics.
PSO14.	Acquaint with the characteristics of the economy of Odisha.

B) COURSE OUTCOMES

SEMESTER –I

Core – I (INTRODUCTORY MICROECONOMICS)

CO1	After completion of the course, the students shall be able to explore the subject matter of Economics
CO2	To know supply and demand: How market works, markets and welfare
CO3	This course will enable the households- The budget constraint
CO4	The firm and market structures
CO5	The input markets- The demand for labour.

Core – II (MATHEMATICAL METHODS FOR ECONOMICS – I)

CO1	This course will enable students to know more about Set and set operations.
CO2	Elements of matrix algebra and input output analysis.
CO3	Differential calculus and its economic applications.
CO4	Integral calculus and its economic applications.
CO5	Use of differential and difference equations in economics.

SEMESTER – II

Core – III (INTRODUCTORY MACRO ECONOMICS)

CO1	After completion of this paper, the students will be able to know basic concepts of macro economics.
CO2	Measurement of macroeconomic values
CO3	To know about Money – Evolution and function, cash transaction, cash balances, etc.
CO4	Knowledge about Inflation, Deflation, Depression and Stagflation
CO5	Determination of National income

Core – IV (MATHEMATICAL METHODS FOR ECONOMICS – II)

CO1	To know about Linear Models.
CO2	Second and higher order derivatives.
CO3	Differentials and total derivatives.
CO4	Single and multivariable optimisation.
CO5	Optimisation with Equality constraints.

SEMESTER – III

Core – V (MICROECONOMICS – I)

CO1	After completion of the course, the students shall be able to know the Basic concepts of microeconomics such as laws of demand and supply and elasticity etc.
CO2	Concepts of consumer behaviour like cardinal utility and ordinal utility analysis.
CO3	Application of Indifference curve analysis in deriving demand curves, price effect, income effect and substitution effect.
CO4	Theory of production- iso-quants, laws of returns to scale, law of variable proportion.
CO5	Traditional and modern theory of cost.

Core – VI (MACROECONOMICS – I)

CO1	The students will be able to know the Theories of Consumption Function.
CO2	Theories of Investment Function.
CO3	Demand for and supply of money.
CO4	Aggregate Demand and Aggregate Supply.
CO5	Inflation, unemployment, expectations and trade cycles.

Core – VII (STATISTICAL METHODS FOR ECONOMICS)

CO1	Basic concepts of statistics such as measures of central tendency, dispersion, skewness and kurtosis.
CO2	Elementary probability theory including probability distributions.
CO3	Methods of sampling and census.
CO4	Correlation and simple regression
CO5	Index numbers.

SEMESTER – IV

Core – VIII (MICROECNOMICS – II)

CO1	To analyse the behavioural patterns of different economic agents regarding profit, price, cost etc.
CO2	The decision making process in different market situations such as perfect competition, monopolistic competition, monopoly and oligopoly markets.
CO3	To deal with the advance theoretical issues and their practical applications of distribution theories.
CO4	General equilibrium, economic efficiency and market failure.

Core – IX (MACROECONOMICS – II)

CO1	This course will help students understand financial markets and reforms.
CO2	Open economy macroeconomics.
CO3	Modelling economic growth.
CO4	Macroeconomic policy.
CO5	Schools of macroeconomic thought and the fundamentals of macroeconomic theory and policy.

Core – X (PUBLIC ECONOMICS)

CO1	This course will enable students to understand introduction to public finance.
CO2	Public expenditure.
CO3	Public revenue.
CO4	Public budget.
CO5	Public debt.

SEMESTER – V

Core – XI (INDIAN ECONOMY – I)

CO1	After completion of this course, the students shall be able to have knowledge of basic characteristics of Indian economy as a developing economy.
CO2	Population and economic development.
CO3	National Income in India - The growth story and Regional disparities.
CO4	Economic planning in India
CO5	Current challenges.

Core – XII (DEVELOPMENT ECONOMICS – I)

CO1	The students shall be able to have knowledge of economic development.
CO2	Theories of economic growth and development.
CO3	Poverty, inequality and development.
CO4	Institutions and economic development.
CO5	Agriculture, industry and economic development.

DSE – I (ECONOMIC HISTORY OF INDIA)

CO1	This course will enable the students to know about Colonial India: Background and introduction.
CO2	Macro trends- National income, population and occupational structure.
CO3	Agriculture - Agrarian structure and land relations.
CO4	Railways and industry - De-industrialisation debate, evolution of entrepreneurial and industrial structure.
CO5	Economy and state in the imperial context.

DSE – II (INTRODUCTORY ECONOMETRICS)

CO1	After completion of this course, the students will know about Introduction of Econometrics - Nature and scope, probability distributions and their uses.
CO2	Sampling - Basic concepts, probability and non-probability sampling, types and estimation
CO3	Hypothesis testing - defining statistical , simple, composite, null and alternative hypothesis and errors.
CO4	Linear regression analysis.
CO5	Violation of classical assumptions.

SEMESTER VI

Core – XIII (INDIAN ECONOMY – II)

CO1	Once the course is completed, the students shall have an idea about Agricultural development in India.
CO2	Industrial development in India.
CO3	Tertiary sector and HRD.
CO4	Externa sector- Foreign trade, export and import, balance of payment, trade policies,and foreign capital.
CO5	Indian economy and environment -Environmental Policies, rules, National Forest policy, Policy statement for abatement of pollution, National conservation strategy, etc.

Core – XIV (DEVELOPMENT ECONOMICS – II)

CO1	This course will enable students to know about Population and development - Demographic concepts, costs and benefits of population growth etc.
CO2	Dualism and economic development - Geographic, social and technological, regional inequalities, international inequality, dependency, exploitation and unequal exchange.
CO3	Environment and development.
CO4	Financing economic development.
CO5	Globalisation, international trade and economic development.

DSE – III (INTERNATIONAL ECONOMICS)

CO1	Having completed this course, the students should know the Importance of trade and trade theories.
CO2	Trade and economic growth.

CO3	Exchange rate.
CO4	Balance of trade and payments
CO5	International economic institutions.

2. EDUCATION

A) PROGRAM OUTCOMES

PO1	After graduation Education helps in realization of human values and sense of social service .
PO2	Graduates in Education will be responsible and dutiful citizen having critical temper and creative ability.
PO3	Promotes teaching ability to young and adults alike.
PO4	The course generates employability in primary and secondary levels.
PO5	Provides scope for higher studies and research in Education.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	Understand basic concepts and ideas of educational theory.
PSO2	Build understanding and perspective on the nature of the learner, diversity and learning.
PSO3	Comprehend the role of the systems of governance and structural – functional provisions that support school education.
PSO4	Develop understanding about teaching, pedagogy, school management and community involvement.
PSO5	Build skills and abilities of communication, reflection, art, aesthetics, theatre, self expression and ICT.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (BASICS IN EDUCATION)

CO1	After completion of the paper, students shall be able to explain the concept of education and its relationship with philosophy.
CO2	Bases of Education - Meaning, nature and purpose of Education. Aims and functions.
CO3	Reflections of Indian schools of Philosophy on Education.
CO4	Western schools of Philosophy and their Educational implications.
CO5	Doctrines of Great Educators of East and West and their influence on the practices of school Education with special reference to aims and ideals of

	Education, curriculum, method of teaching and the role of teacher.

Core – II (EDUCATION AND SOCIETY)

CO1	After completion of this paper, students shall be able to justify Education as a process and explain its function.
CO2	They shall be able to describe the aims of education from sociological perspective.
CO3	The students will be competent to list various agencies of Education and their functions.
CO4	They can justify Education as a sub-system of society and how other sub-systems affect Education.
CO5	After this paper the students will be able to appreciate the importance of Education for social change.

SEMESTER – II

Core – III (THE LEARNER AND LEARNING PROCESS)

CO1	After completion of this paper, the students shall be able to establish relationship between Education and Psychology.
CO2	They shall understand various methods used to study individual behaviour.
CO3	The students will be able to explain the application of Education Psychology in teaching learning process.
CO4	Understanding individual difference from intelligence, creativity and personality point of view and explain the concept of learning and factors affecting learning.
CO5	They shall be able to reflect the contribution of various learning theories in teaching learning process and explain different category of people from different personality type and the type of adjustment.

Core – IV (PEDAGOGICAL SKILLS)

CO1	After completion of this course, the students shall be able to explain the concept of pedagogy.
CO2	They shall be able to differentiate pedagogy from other allied concepts.
CO3	They will be able to define type of task of teaching.
CO4	Establish relationship between teaching and learning.
CO5	In addition, they shall be able to list out different approaches and methods of teaching.

SEMESTER – III

Core – V (TECHNOLOGY AND INNOVATIONS IN EDUCATION)

CO1	On completion of this course, the students will be able to understand the meaning, nature and scope of Educational Technology.
CO2	The will be able to explain with examples various approaches to Educational Technology.
CO3	They shall describe systems approach and its application in Educational context.

CO4	The students will be capable of explaining the concepts, principles, modes, process and barriers of communication and ther implications in Educational context.
CO5	They shall be able to explain the instructional design and its underlying principles and describe different models of teaching and their use in effective classroom teaching.

CORE – VI (PEDAGOGY OF SCHOOL SUBJECTS)

CO1	On completion of this paper, the students shall be able to explain the meaning and scope of History and relate History with other school subjects.
CO2	They will be able to explain the different approaches to organization of contents in History.
CO3	Achieve mastery over different methods and approaches for curriculum transaction.
CO4	List out the different types of teaching learning materials in history and explain their importance.
CO5	This paper will enable them to prepare lesson plan in History.

Core – VII (STATISTICS IN EDUCATION)

CO1	This paper will enable students to describe the importance of statistics in field of Education.
CO2	After completion of this course the students will be able to convey the essential characteristics of a set of data by representing in tabular and graphical forms.
CO3	Compute relevant measures of average and measures of variation.
CO4	The can spell out the characteristics of normal probability of distribution.
CO5	Examine relationship between and among different types of variables of a research study.

SEMESTER – IV

Core – VIII (CURRICULUM DEVELOPMENT & EDUCATIONAL GUIDANCE)

CO1	On completion of this paper, the students shall be able to define and explain the concept of curriculum.
CO2	They can list different types of curriculum with examples and suggest bases of curriculum such as, Philosophical, Psychological and Sociological.
CO3	Describe different considerations for curriculum planning and elucidate different process of curriculum development.
CO4	They shall be able to explain the role of teacher in curriculum development and identify major issues and trends in curriculum.
CO5	Explain National Curriculum Framework (2005), explain different types of guidance & counselling along with listing out different type of counselling services and the role of teacher in organising those services.

Core – IX (EDUCATIONAL ASSESSMENT & EVALUATION)

CO1	After studying the course the students shall be able to describe the role of assessment in Education and differentiate measurement, assessment and evaluation.
CO2	Establish the relationship among measurement, assessment and

	evaluation and to explain different forms of asessment that aid student learning.
CO3	Use wide range of assessment tools and techniques and construct these appropriately.
CO4	Classify educational objectives in terms of specific behavioural form and prepare a good achievement test on any school subject.
CO5	Explain the characteristics of good measuring instruments and list out different type of assessment techniques.

Core – X (INTRODUCTION TO EDUCATIONA RESEARCH)

CO1	On completion of this course the students shall be able to describe the nature, purpose, scope of research in Education.
CO2	Identify types of research in Education and explain the characteristic of qualitative, quantitative and mixed research.
CO3	Select and explain an appropriate method for a research study.
CO4	Select appropriate tools and techniques for the collection of data.
CO5	Describe the procedure of preparation of Research Report.

SEMESTER – V

Core – XI (HISTORY OF EDUCATION IN INDIA)

CO1	This course will enable students to narrate the concept of Education in the context of Indian heritage.
CO2	Describe Education in ancient India, particularly, Vedic Education, panishadic Education and the Buddhist Education.
CO3	Critically examine the Education system in Medieval India .
CO4	Elaborate the role of teacher, school and community in preservation of Indian heritage and achievement of National goals.
CO5	Evaluate the Education system during British period with spewcial emphasis on the commissions and committees. Elaborate the status of Education during post-independence period with special emphasis on the Commissions and committees.

Core – XII (COMPARATIVE EDUCATION)

CO1	Students shall be able to explain the scope of comparative Education.
CO2	List out the factors of comparative Education.
CO3	Compare the structure, curriculum and evaluation system of India with that of China, Japan, U.K and U.S.A.

DSE – I (ICT IN EDUCATION)

CO1	Once the course is completed, the students shall be able to explain the concept, nature and scope of ICT in Education.
CO2	Differentiate Web 1.0 and Web 2.0 and describe the importance of open source software in Education.
CO3	List and explain various approaches in adoption and use of ICT in Education and various stages of ICT usages in general and pedagogical usages in particular .
CO4	Describe the needed teacher competencies for ICT usage in the classroom.

CO5	Demonstrate the use of various computer software such as Word-processing, Spreadsheets and Presentation.

DSE – II (SPECIAL EDUCATION)

CO1	On completion of the course, the students shall be able to know about the concept, nature, objectives, types and historical perspective of special Education.
CO2	Explain the innovations and issues of special Education.
CO3	Elaborate the policies and programmes of special Education.
CO4	Able to identify different type of special category children and understand various Educational interventions meant for special children.
CO5	Explain the role of resource teacher and special teacher.

SEMESTER – VI

Core – XIII (EDUCATIONAL PLANNING, ADMINISTRATION AND MANAGEMENT)

CO1	After completing the course, the students will be able to explain the concept, nature, scope and principles of Educational management.
CO2	Describe the functions of Educational management and administration along with listing down various types of administration.
CO3	Elaborate the steps in planning.
CO4	Explain different types of administration and elaborate functions of state level Educational bodies.
CO5	Describe the sources of financing in Education.

Core – XIV (CONTEMPORARY CONCERNS IN INDIAN EDUCATION)

CO1	After completion of the course, the students shall be able to explain the concept of universalization of elementary and secondary education along with its implementation strategies.
CO2	To describe present position of secondary education.
CO3	Explaining the challenges of secondary education.
CO4	Explaining the present scenario of higher education and agencies for improvement.
CO5	Explain the concept of value education, environment education and life skills education.

DSE – III (PREPARATION OF SELF INSTRUCTIONAL MATERIALS (SIM) / CASE STUDY OF DISTANCE EDUCATION STUDY CENTRE)

CO1	After completion of this SIM or case study, the students shall be able to prepare SIM and case study independently leading to employment generation.

3. ENGLISH

A) PROGRAM OUTCOMES

Student graduating with a Bachelor of Arts degree in English will have demonstrated an ability to :

PO1	Read, interpret and write about a diverse range of texts in English.
PO2	Understand those texts analytically and critically.
PO3	Understand those texts on the basis of careful close reading.
PO4	Understand those texts through past and current literary theory.
PO5	Understand that those text are culturally constructed in time, place and tradition.
PO6	Understand how those texts inform culture.
PO7	Participate in the critical and cultural discourses of English.
PO8	Participate appropriately through multiple spoken and written forms.
PO9	Analyze instances of the variety of literary forms closely in terms of style, figurative language and convention.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	The students know the nature of the subject in comparison to the secondary level.
PSO2	The students get more knowledge of structure and semantics.
PSO3	The students have the literary sense and comprehension of the subject.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (BRITISH POETRY AND DRAMA 14TH O 17TH CENTURIES)

CO1	After completion of this course, the students shall be able to understand 14th century poetry, spirit of renaissance and period of expansion of horizons.
CO2	Chauser: The wife of Bath's Tale
CO3	Thomas Champion, Sir Philip Sidney, etc.
CO4	William Shakespeare: Twelfth Night.
CO5	Marlowe: The Jewl of Malta.

Core – II (BRITISH POETRY AND DRAMA 17TH TO 18TH CENTURIES)

CO1	The students will be able to know Period of English revolution, the Jacobean period etc.
CO2	John Milton, John Donne, Andrew Marvel, G. Herbert.
CO3	Ben Jonson
CO4	Pope and Robert Burns.
CO5	Dryden: All for Love.

SEMESTER – II

Core – III (BRITISH LITERATURE: 18TH CENTURY)

CO1	This course will enable students to know Restoration, Glorious revolution, Neo-classicism, Enlightenment.
CO2	Joseph Addison
CO3	Daniel Defoe
CO4	Oliver Goldsmith and Samuel Johnson
CO5	Thomas Gray

Core – IV (INDIAN WRITING IN ENGLISH)

CO1	After completion of this course, the students will be able to know Indian writing in English.
CO2	Crystallization: R. K. Narayan
CO3	Nissim Ezekiel, Kamala Das, Jayanta Mahapatra, A. K. Ramajan and Sarojini Naidu.
CO4	Performing: Mahesh Dattani, The final Solution.
CO5	Maturation: Amitav Ghosh, Shadow Lines.

SEMESTER – III

Core – V (BRITISH ROMANTIC LITERATURE)

CO1	The students after completing this course will be familiar with The Romantic Revival.
CO2	William Blake.
CO3	William Wordsworth, Samuel Taylor Coleridge and Lord Byron.
CO4	John Keats and P. B. Shelly.
CO5	William Wordsworth.

Core – VI (19TH CENTURY BRITISH LITERATURE)

CO1	After completion of this course, the students will be familiar with the 19th Century British literature.

CO2	Charles Lamb, Willim Hazlitt, Leigh Hunt and R. L. Stevenson.
CO3	R. L. Stevenson(contd.).
CO4	Jane Austen.
CO5	Criticism: Matthew Arnold.

Core – VII (AMERICAN LITERATURE)

CO1	The students will be able to know Genesis and Evolution and the defining myths of American Literature.
CO2	Harriet Jacobs.
CO3	Billy Budd.
CO4	Walt Whitman, Emily Dickinson, Robert Frost and Rita Dove.
CO5	Desire under the Elms-Eugene O'Nell.

SEMESTER –IV

Core – VIII (BRITISH LITERATURE: EARLY 20TH CENTURY)

CO1	The students will be able to understand highlights which include developments in society and economy in the western society.
CO2	T. S. Elliot, W. B. Yeats, Ezra Pound, T. E. Hulme and Hilda Dolittle.
CO3	War poetry: Wilferd Owen and Siegfred Sassoon.
CO4	Virginia Woolf.
CO5	T. S. Elliot(contd.).

Core – IX (EUROPEAN CLASSICAL LITERATURE)

CO1	The students shall be able to know Classical Antiquity and Geographical space.
CO2	Epic poetry: Homer.
CO3	Tragedy: Sophocies.
CO4	Comedy: Aristophanes
CO5	Criticism: Aristotle.

Core – X (WOMEN'S WRITING)

CO1	In defence of A literature of their own – Mary Wollstonecraft.
CO2	Desiring self: Fiction by Women from the centre.
CO3	Desiring and dissenting self: Fiction by Women fom the periphery.
CO4	Tongues of flame: Poetry by Women from across the world.
CO5	Discoursing at par: Literary criticism by women.

SEMESTER – V

Core – XI (MODERN EUROPEAN DRAMA)

CO1	The students will be familiar with Politics, social change and the stage and European drama.
CO2	Henrik Ibsen.
CO3	Heiner Muler.
CO4	Eygene Ionesco.
CO5	Samul Beckett.

Core – XII (INDIAN CLASSICAL LITERATURE)

CO1	The students will be able to understand Vedic Literature.
CO2	Selections from epic literature.
CO3	Sanskrit drama.
CO4	Aesthetics and maxims.

DSE – I (LITERARY THEORY)

CO1	After completion of the course, the students will be able to understand – Crises in literary criticism and the search for a method.
CO2	New criticism and formalism.
CO3	Structuralism and Poststructuralism.
CO4	Maxims and new Historicism.
CO5	Ramchandra Guha and Judith Butler.

DSE – II (READING WORLD LITERATURE)

CO1	Concept of the idea of world literature and uses of reading world literature.
CO2	European literature.
CO3	Carribean and African literature.
CO4	Canadian short fiction.
CO5	Latin American Poetry.

Semester – VI

Core – XIII (POSTCOLONIAL LITERATURE)

CO1	Definition and characteristics of Post Colonial Literature.
CO2	Indian literature.
CO3	Carribean African literature.
CO4	South African literature.
CO5	Criticism.

Core – XIV (POPULAR LITERATURE)

CO1	Introduction to Popular literature.
CO2	Detective fiction.
CO3	Romance.
CO4	Campus Fiction.
CO5	Rewriting mythology.

DSE – III (RESEARCH METHODOLOGY)

CO1	Research and the initial issues.
CO2	Literature review.
CO3	Hypotheses and formulation of research design.
CO4	Results and documentation.
CO5	Internal assessment.

4.HISTORY

A) PROGRAM OUTCOMES

PO1	After the completion of BA, history scholars will be able to distinguish between primary and secondary sources and identify and evaluate evidence
PO2	Students will demonstrate in discussion and written work their understanding of different peoples and cultures in past environments and of how those cultures changed over the centuries.
PO3	They will be able to produce their own historical analysis of documents and develop the ability to think critically and historically when discussing the past
PO4	The study of history will give them the ability to compare and contrast different processes, modes of thoughts and modes of expression from different historical time periods and in different geographical areas.
PO5	Students will offer multi-causal explanations of major historical developments based on a contextualized analysis of interrelated political, social, economic, cultural and intellectual processes
PO6	Students will be able to write an original research paper that locates and synthesizes relevant primary and secondary sources and has a clear, coherent and plausible argument, logical structure, proper references.
PO7	Students will present orally their research or a summary of another's research in an organized, coherent and compelling fashion.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	Students will have the ability to apply historical methods to evaluate critically the past and how historians and others have interpreted it.
PSO2	Students will be able to acquire basic historical research skills, including the effective use of libraries, archives and data bases.

PSO3	Students will be able to organise and express their thhoughts clearly and coherently both in writing and orally.
PSO4	Students will be able to demonstrate broad knowledge of historical events and periods and their significance
PSO5	Students will be able to recognise how different individuals, groups, organisations, societies, cultures, countries and nations have affected history. History gave the students wisdom and foresight for the future.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (HISTORY OF INDIA – I)

CO1	After completing this course, the students shall be able to Reconstruct Ancient Indian History.
CO2	Pre-historic hunter-gatherers.
CO3	The advent of food production.
CO4	The Harappan civilization.
CO5	Cultures in transition.

Core – II (SOCIAL FORMATIONS AND CULTURAL PATTERNS)

CO1	On completing the course, the students will be able to understand Evolution of humankind.
CO2	Neolithic culture.
CO3	Bronze age civilizations.
CO4	Nomadic groups in central and west Asia.
CO5	Ancient Greece.

SEMESTER – II

Core – III (HISTORY OF INDIA – II)

CO1	The students will be able to understand Economy and Society.
CO2	Changing political formations (circa 300BCE to circa CE).
CO3	Towards early medieval India (circa CE fourth century to CE 750).
CO4	Religion, philosophy and society (circa 300 BCE-CE 750).
CO5	Cultural developments (circa 300 BCE-CE 750).

Core – IV (SOCIAL FORMATIONS AND CULTURAL PATTERNS OF THE MEDIEVAL WORLD)

CO1	The students will study Roman Republic.

CO2	Religion and culture in ancient Rome.
CO3	Economic developments in Europe from 7th to 14th centuries.
CO4	Religion and culture in medieval Europe.
CO5	Societies in Central Islamic lands.

SEMESTER –III

Core – V (HISTORY OF INDIA – III)

CO1	In this course, students will be studying early Medieval India.
CO2	Political Structure.
CO3	Agrarian Structure and Social change.
CO4	Trade and Commerce.
CO5	Religious and Cultural developments.

Core – VI (RISE OF MODERN WEST – I)

CO1	The students will be able to know transition from feudalism to capitalism.
CO2	Early colonial expansion.
CO3	Renaissance.
CO4	The reformation.
CO5	Economic developments of the sixteenth century.

Core – VII (HISTORY OF INDIA – IV)

CO1	After completion of the paper, the students shall be able to interpret the sources of Delhi Sultanate.
CO2	Sultanate Political structures.
CO3	Emergence of Regional identities.
CO4	Society and economy.
CO5	Religion, society and culture.

SEMESTER – IV

Core – VIII (RISE OF MODERN WEST – II)

CO1	The students will be able to understand 17th century European crises.
CO2	The English revolution and European politics in the 18th century.
CO3	Rise of modern science.
CO4	Mercantilism, European economies and Preludes to the Industrial Revolution.
CO5	The American Revolution of 1776.

Core – IX (HISTORY OF INDIA – V)

CO1	The students will be able to find out sources and Historiography.
CO2	Establishment of Mughal rule.
CO3	Consolidation of Mughal rule.
CO4	Society and economy.
CO5	Cultural ideas.

Core – X (HISTORICAL THEORIES & METHODS)

CO1	After completion of this course, the students shall be able to understand the meaning and scope of History.
CO2	Traditions of Historical Writings.
CO3	History as Interdisciplinary practice.
CO4	Modern theories.
CO5	Historical methods.

SEMESTER – V

Core – XI (HISTORY OF MODERN EUROPE – I)

CO1	The students will be able to understand The French Revolution.
CO2	Revolution and its European repercussions.
CO3	Restoration and Revolution: c. 1815 – 1848.
CO4	Capitalist Industrialization and Socio-Economic transformation.
CO5	Varieties of Nationalism and the remaking of states in the 19^{th} and 20^{th} centuries.

Core – XII (HISTORY OF INDIA – VII)

CO1	After completion of the course, the students shall be able to understand India in the mid 18^{th} century.
CO2	Expansion and consolidation od colonial power.
CO3	Colonial state of ideology.
CO4	Economy and society.
CO5	Popular resistance: causes and consequences.

DSE – I (HISTORY OF THE UNITED STATES OF AMERICA)

CO1	The students will be able to know the background of USA.
CO2	Making of the republic.
CO3	Evolution of American Democracy.
CO4	Early capitalism.
CO5	The Agrarian south and civil war.

DSE – II (HISTORY AND CULTURE OF ODISHA)

CO1	The students will be able to know socio-political life of early and medieval Odisha.
CO2	Religion, Art and Literature of early and medieval Odisha.
CO3	Political and economic structure in medieval Odisha.
CO4	Colonialism in Odisha.
CO5	Socio-cultural changes in modern Odisha.

SEMESTER – VI

Core – XIII (HISTORY OF INDIA – VIII)

CO1	The students are expected to know cultural changes and social and religious reform movements.
CO2	Nationalism: Trends upto 1919.
CO3	Gandhian nationalism after 1919: Ideas and movements.
CO4	Communalism and Partition.
CO5	Emergence of a New State.

Core – XIV (HISTORY OF MODERN EUROPE – II)

CO1	The students will be able to know liberal democracy, working class movements and socialism in the 19^{th} and 20^{th} centuries.
CO2	The crises of feudalism in Russia and experiments in socialism.
CO3	Imperialism, war and crises: c. 1880-1939.
CO4	Cultural transformation since circa 1850.
CO5	Intellectual developments since circa 1850.

DSE – III (HISTORY OF UNITED STATES OF AMERICA – II)

CO1	The students shall be able to know about Reconstructions: Political changes and Economic transformation.
CO2	Resistance and reform.
CO3	U.S. imperialism.
CO4	Afro-American movements.
CO5	Socio-Cultural, religious and intellectual movements.

5.HOME SCIENCE

A) PROGRAM OUTCOMES

PO1	CRITICAL THINKING: Take an informed and analytical approach to learning and demonstrate in-depth knowledge of the subject and give opinion(s) supported by logical reasoning that one have judged to be appropriate and understanding different approaches and using them .
PO2	EFFECTIVE COMMUNICATION: Demonstrate proficiency in communicating competently in groups and organizations, competence in interpersonal communication; possess skills to effectively deliver formal and informal presentations to a variety of audiences in multiple contexts .
PO3	SOCIAL INTERACTION: Foster social skills and peer interaction enabling them to make all people feel valued and respect their differences by being responsible citizens for creating a socially inclusive society GPO.4
PO4	ETHICAL STANDARDS: Recognize values such as justice, trust, equity, fairness, kindness and develop a commitment to meeting and upholding standards of ethical behavior in all walks of life and comprehending the moral dimensions of decisions and actions.
PO5	ENVIRONMENTAL CONSCIOUSNESS: Discern the issues of environmental contexts and engages in promoting values and attitudes that claim coexistence and sustainable living with reduced, minimal, or no harm upon ecosystems .
PO6	LIFELONG LEARNING: Acquire the skill to be an independent lifelong learner embracing real-time changes in the socio-technological context, promoting continuous development and improvement of the knowledge and skills needed for employment and personal fulfilment.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	Understand the basic concepts of Human Physiology, biochemistry, microbiology, environment and Human rights.
PSO2	Plan and prepare diet for healthy life style using the principles of food science and nutrition.
PSO3	Understand the principles and patterns of growth and development of humans from conception to old age and the role of family in development.
PSO4	Acquire scientific skills in the management of resources and develop basic skills for career options in the fields of dietetics, interior designing, textiles and fashion designing and preschool education.
PSO5	Appreciate the role of Home Science extension in community development and to conduct effective extension education programmes through different media.
PSO6	Apply the acquired conceptual knowledge of food quality assurance and sustainable waste management for holistic living .
PSO7	Use concepts, tools and techniques related to Chemistry and Zoology and its application in Home Science.
PSO8	Organize and deliver relevant applications of knowledge through effective

	written, verbal, graphical/virtual communications and internet productivity with people from diverse backgrounds.

C) COURSE OUTCOMES

SEMESTER – I

Core – 1 (INTRODUCTION TO NUTRITION AND FOOD SCIENCE)

CO1	Basic concepts in food and nutrition.
CO2	Nutrients.
CO3	Food
CO4	Methods of cooking and preventing nutrient losses.

Core – II (INTRODUCTION TO TEXTILE SCIENCE)

CO1	Textiles.
CO2	Fibre Science.
CO3	Yarn Science.
CO4	Fabric Production.

SEMESTER – II

Core – III (INTRODUCTION TO FAMILY RESOURCE MANAGEMENT)

CO1	Home management.
CO2	Family resources.
CO3	Time management.
CO4	Energy management.

Core – IV (HUMAN PHYSIOLOGY)

CO1	Digestive system.
CO2	Circulatory system.
CO3	Respiratory system.
CO4	The endocrine system.

SEMESTER – III

Core – V (HUMAN DEVELOPMENT)

CO1	Prenatal development.
CO2	Physical development.

CO3	Social development.
CO4	Definition, value characteristics and types of play.

Core – VI (FAMILY MEAL PLANNING)

CO1	Basic concepts and importance of meal planning.
CO2	Meal planning during childhood.
CO3	Meal planning during the adult years.
CO4	Meal planning during the physiological stress.

Core – VII (FAMILY CLOTHING AND CARE)

CO1	Clothing selection.
CO2	Clothing needs of the family members at different age groups.
CO3	Laundry products.
CO4	Laundry procedures (washing of cotton, silk and woollen garments).

SEMESTER – IV

Core – VIII (FAMILY FINANCE AND CONSUMER SCIENCE)

CO1	Money management.
CO2	Planning for family finance security.
CO3	Right and responsibility of consumer.
CO4	Consumer education.

Core – IX (HOME SCIENCE EXTENSION EDUCATION)

CO1	Extension education.
CO2	Home science extension education.
CO3	Extension teaching methods.
CO4	Teaching learning process.

Core – X (TEXTILE CHEMISTRY)

CO1	Identification of fibres.
CO2	Finishes.
CO3	Dyeing
CO4	Water.

SEMESTER – V

Core – XI (MARRIAGE AND FAMILY DYNAMICS)

CO1	Marriage.
CO2	Marriage rituals and ceremonies in different Indian communities.
CO3	Family.
CO4	Problems of family and marital life.

Core – XII (RESEARCH METHODOLOGY)

CO1	Research-Meaning, objective and types of research.
CO2	Research Process-Techniques involved in defining research problems.
CO3	Processing and analysis of data – Editing, coding, classification and tabulation of data.
CO4	Interpretation and report writing.

DSE – I (COMMUNITY NUTRITION)

CO1	Concept of community, health and nutrition.
CO2	Common nutritional problems in India.
CO3	Role of International and national agency in combating malnutrition.
CO4	Roe of national agency in combating malnutrition.

DSE – II (FUNDAMENTALS OF ART AND DESIGN)

CO1	An introduction to art design in interiors.
CO2	Colour-importance, characteristics and application.
CO3	Furniture and its arrangement.
CO4	The kitchen.

SEMESTER – VI

Core – XIII (INTRODUCTION TO FOOD PRESERVATION)

CO1	Introduction to food preservation.
CO2	Preservation by the use of temperature.
CO3	Preservation by removal of moisture.
CO4	Preservation by using sugar, chemicals and salt.

Core – XIV (COMMUNICATION IN EXTENSION EDUCATION)

CO1	Communication.
CO2	Models of communication.
CO3	Audio-visual aids classification.
CO4	Diffusion and adoption.

DSE – III (EARLY CHILDHOOD CARE)

CO1	Early childhood care.
CO2	Children's environment.
CO3	Psychological care of the child.
CO4	Early childhood care and development in India.
CO5	Provisions and policies for child care and development in India.

6. PHILOSOPHY

A) PROGRAM OUTCOMES

PO1	Students graduating through B.A. Hons Programme in Philosophy from this college are expected develop an analytical skill which will enable them to solve the problem related issues that he faces in next level of studies.
PO2	Students, although at the initial stage after getting admission faces difficulty in their language skill, but when they pass the programme, they are expected to become pretty able to communicate their understanding in the subject.
PO3	Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon the issues which invite cross discussions.
PO4	Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.
PO5	Project work and field study give them an experience to learn by themselves and experiment with the theoretical knowledge that they were given within the four wall of the classroom.
PO6	Students completing the programme become confident in the sense that they feel they are employable.
PO7	This college trains the students to undertake primary level of research work and thus they become motivated for advanced research when they go for higher studies.
PO8	The programme instils among the students the greater values of life to become worthy citizen of the country.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	BA Philosophy Honours students will be able to acquire knowledge that is vital to the disciple of Philosophy, including knowledge of core concepts, distinctions, theories, argumentative techniques, movements and influential figures within the core fields of aesthetics, ethics, epistemology, logic, metaphysics, social and political Philosophy.

PSO2	The students will be able to reason clearly, employing the principles of logic to construct cogent arguments in both speech and writing.
PSO3	The students will be able to speak and write clearly and cogently.
PSO4	They will be able to think creatively and independently.
PSO5	The students will develop a strong set of critical, imaginative and informed reasoning skills which will help them to understand human mind.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (GENERAL PHILOSOPHY)

CO1	Definition, nature and function of Philosophy.
CO2	Problems of being: Monism and Pluralism.
CO3	Problems of knowledge.
CO4	Problems of ethics.
CO5	Problems of metaphysics.

Core – II (LOGIC AND SCIENTIFIC METHOD)

CO1	Definition of logic.
CO2	Classification of propositions.
CO3	Inference – Immediate inference.
CO4	Inductive reasoning and scientific enquiry.
CO5	Science and probability.

SEMESTER – II

Core – III (SYSTEMS OF INDIAN PHILOSOPHY – I)

CO1	Salient features of Indian Philosophy.
CO2	Carvakas.
CO3	Jainism.
CO4	Bhuddhism.
CO5	Samkhya dualistic system.

Core – IV (SYMBOLIC LOGIC)

CO1	Introduction to symbolic logic.
CO2	The calculus of propositions.
CO3	The elements of predicate calculus.

SEMESTER –III

Core – V (SYSTEMS OF INDIAN PHILOSOPHY – II)

CO1	Yoga system of Patanjali.
CO2	Nyaya:Pramanas.
CO3	Upanisadic view of Atma and Brahman Vidya and Avidya.
CO4	Sankara's view on Maya, jiva, isvara.
CO5	Ramanuja.

Core – VI (ETHICS)

CO1	Definition, nature and scope of ethics.
CO2	Distinction between moral and non-moral action.
CO3	Utilitarianism, hedonism.
CO4	Rigorism, perfectionism.
CO5	Theories of punishment; Retributive, Reformative and Preventive theory.

Core – VII (HISTORY OF GREEK PHILOSOPHY)

CO1	Nature of Greek Philosophy.
CO2	Pre-Socratic Thought.
CO3	Socrates.
CO4	Plato.
CO5	Aristotle.

SEMESTER – IV

Core – VIII (CONTEMPORARY INDIAN PHILOSOPHY)

CO1	R. N. Tagore.
CO2	Swami Vivekananda.
CO3	Sri Aurobindo.
CO4	M. K. Gandhi.
CO5	S. Radhakrishnan.

Core – IX

CO1	Bacon-Theory of Idola.
CO2	Spinoza.
CO3	Locke.
CO4	Hume.
CO5	Kant.

Core – X (PHILOSOPHY OF LANGUAGE)

CO1	Word-Meaning.
CO2	Definitions: Denotative, Connotative and Ostensive defining.
CO3	Sentence-Meaning; Proposition and sentence word-meaning and sentence-meaning.
CO4	Analytic-synthetic, a priori and a posterior, distinction.
CO5	Concept; Nature and source.

SEMESTER – V

Core – XI (STUDY OF WESTERN CLASSIC)

CO1	Meditation - Sceptical doubts.
CO2	Meditation – Clear and distinct perceptions Theory of ideas.
CO3	Meditation – God is no Deceiver.
CO4	Meditation – Essence of Material Things.
CO5	Meditation – Mind-body Dualism.

Core – XII (ISAUPANISADS WITH SANKARA'S COMMENTARY)

CO1	What are Upanishads ?
CO2	Mantras.

SEMESTER –VI

Core – XIV (APPLIED ETHICS)

CO1	What is applied Ethics?
CO2	Taking life : Animals.
CO3	Environmental Ethics.
CO4	Professional Ethics –Business and Bio-medical Ethics.

DSE – III (GANDHIAN STUDIES)

CO1	Political thought of Gandhi.
CO2	Economic Thought of Gandhi.
CO3	Gandhi's social thought and social work.
CO4	Gandhi on Education and his idea of peace.

7. POLITICAL SCIENCE

A) PROGRAM OUTCOMES

PO1	Students graduating through B.A. Hons Programme in Political Science from this college are expected develop an analytical skill which will enable them to solve the problem related issues that he faces in next level of studies.
PO2	Students, although at the initial stage after getting admission faces difficulty in their language skill, but when they pass the programme, they are expected to become pretty able to communicate their understanding in the subject
PO3	Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon the issues which invite cross discussions.
PO4	Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.
PO5	Project work and field study give them an experience to learn by themselves and experiment with the theoretical knowledge that they were given within the four wall of the classroom.
PO6	Students completing the programme become confident in the sense that they feel they are employable.
PO7	This college trains the students to undertake primary level of research work and thus they become motivated for advanced research when they go for higher studies.
PO8	The programme instils among the students the greater values of life to become worthy citizen of the country.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	A basic understanding of the Programme creates capabilities to articulate and participate as an informed and responsible citizen who has a direct role to play in nation-building.
PSO2	The Programme provides an introduction to the dynamics of Indian politics.
PSO3	This activity equips the student for competitive exams conducted by UPSC, WBPSC, SSC, NET, SET and enhances employability.

PSO4	For those opting for a career in politics, study of this Programme greatly props ones meaningful engagement with policymaking and its implementation by developing relevant skills.
PSO5	With an exposure to the functioning of different political systems across the world and their constitutions and governing structures, students would have a leeway in taking up leadership roles as a result of this activity that enhances skills.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (UNDERSTANDING POLITICAL THEORY)

CO1	Introducing Political Theory.
CO2	Traditions of Political Theory.
CO3	Democracy: The History of an idea.
CO4	Procedural Democracy and its critique.
CO5	Paticipation and representation.

Core – II (CONSTITUTIONAL GOVERNMENT AND DEMOCRACY IN INDIA)

CO1	Philosophy of the Constitution.
CO2	Fundamental Rights and Directive Principles.
CO3	The Legislature : Parliament and The Executive: President and Prime Minister.
CO4	The Judiciary: Supreme Court.
CO5	Federalism: Divisions of Powers, Emergency Provisions, Fifth and Sixth Schedules and Panchayati Raj and Municipalities.

SEMESTER – II

Core – III (POLITICAL THEORY-CONCEPTS AND DEBATES)

CO1	Negative freedom: Liberty and Positive freedom: Freedom as Emancipation and Development.
CO2	Formal Equality: Equality of opportunity, Political equality, Egalitarianism.
CO3	Procedural Justice, Distructive Justice and Global Justice.
CO4	Natural Rights, Moral and Legal Rights, three generations of Rights and Rights and Obligations.
CO5	Major debates.

Core – IV (POLITICAL PROCESS IN INDIA)

CO1	Political parties and the party system.
CO2	Determinants of voting behaviour.
CO3	Regional aspirations.
CO4	Caste and Politics.
CO5	The changing nature of the Indian State.

SEMESTER – III

Core – V (INTRODUCTION TO COMPARATIVE GOVERNMENT AND POLITICS)

CO1	Understanding comparative politics.
CO2	Historical context of modern government.
CO3	Colonialism and decolonialism.
CO4	Themes of comparative analysis – Britain, Brazil, Nigeria and China.

Core – VI (PERSPECTIVES ON PUBLIC ADMINISTRATION)

CO1	Public administration as a discipline.
CO2	Theoretical perspectives.
CO3	Neo-Classical theories.
CO4	Public policy.
CO5	Major approaches in public administration.

Core – VII (PERSPECTIVES ON INTERNATIONAL RELATIONS AND WORLD HISTORY)

CO1	Studying International relations.
CO2	Classical realism and Neo-Realism & Liberalism and Neo-liberalism.
CO3	Marxist approaches, Feminist perspectives, Eurocentricism and perspectives from the global south.
CO4	World War – I, Significance of the Bolshevik Revolution, Rise of Facism and World War – II.
CO5	Cold War, Emergence of the third World, collapse of the USSR, post Cold War.

SEMESTER – IV

Core – VIII (POLITICAL PROCESSES AND INSTITUTIONS IN COMPARATIVE PERSPECTIVE)

CO1	Approaches to studying comparative politics.
CO2	Electoral system.
CO3	Party system.
CO4	Nation-State.
CO5	Democratization.

Core – IX (PUBLIC POLICY AND ADMINISTRATION IN INDIA)

CO1	Public policy.
CO2	Decentralization.
CO3	Budget.
CO4	Citizen and Administration interference.
CO5	Social welfare administration.

Core – X (GLOBAL POLITICS)

CO1	Globalization: Conceptions and Perspectives.
CO2	Contemporary Global issues.
CO3	Ecological issues, proliferation of Nuclear Weapons and Internationa Terrorism.
CO4	Migration, Human Security.

SEMESTER – V

Core – XI (CLASSICAL POLITICAL PHILOSOPHY)

CO1	Text and interpretation.
CO2	Antiquity Plato and Aristotle.
CO3	Interlude : Machiavelli
CO4	Possessive individualism hobbes.
CO5	Locke: Laws of Nature and Presentation themes.

Core – XII (INDIAN POLITICAL THOUGHT – I)

CO1	Traditions of Pre-colonial Indian Political Thought.
CO2	Ved Vyasa: Rajadharma and Manu: Social laws.
CO3	Kautilya: Theory of State.
CO4	Aggannasutta: Theory of Kingship.
CO5	Abul Fazal: Syncretism.

DSE – I (HUMAN RIGHTS IN A COMPARATIVE PERSPECTIVE)

CO1	Human Rights: Theory and Institutionalization.
CO2	Issus: Torture-USA and India.
CO3	Surveillance and Censorship: China and India.
CO4	Caste and Race: South Africa and India.
CO5	Gender and Violence, Adivasis/Aboriginals and the Land Question: Australia and India.

DSE – II (INDIA'S FOREIGN POLICY IN A GLOBALIZATION WORLD)

CO1	India's Foreign Policy: From a postcolonial state to an aspiring global power.
CO2	India's relations with the USA and USSR/Russia , India's engagements with china.
CO3	India in South Asia: Debating Regional Strategies.
CO4	India's negotiating style and strategies: Trade, Environment and Security regimes.
CO5	India in the contemporary multipolar world.

SEMESTER – VI

Core – XIII (MODERN POITICAL PHILOSOPHY)

CO1	Modernity and its discourses.
CO2	Romantics – Jean Jacques Rousseau and Mary Wollstonecraft.
CO3	Liberal socialist – John Stuart Mill.
CO4	Radicals – Karl Marx.
CO5	Alexandra Kollontal.

Core – XIV (INDIAN POLITICAL THOUGHT – II)

CO1	**Introduction to modern Indian Political Thought – Rammohan Roy: Rights.**
CO2	**Pandit Ramabai: Gender, Vivekananda: Ideal Society.**
CO3	**Gandhi: Swaraj, Ambedkar: Social Justice.**
CO4	**Tagore: Critique of Nationalism, Iqbal: Community and Savarkar: Hindutva.**
CO5	**Nehru: Secularism and Lohia: Socialism.**

DSE – III (WOMeN, POWER AND POLITICS)

CO1	**Patriarchy.**
CO2	**Feminism.**
CO3	**Family, Community and State.**
CO4	**History of the Women's Movement in India and Violence against women.**
CO5	**Work and Labour.**

8. SANSKRIT

A) PROGRAM OUTCOMES

PO1	Students graduating through B.A. Hons Programme in Sanskrit from this college are expected develop an analytical skill which will enable

	them to solve the problem related issues that he faces in next level of studies.
PO2	Students, although at the initial stage after getting admission faces difficulty in their language skill, but when they pass the programme, they are expected to become pretty able to communicate their understanding in the subject.
PO3	Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon the issues which invite cross discussions.
PO4	Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.
PO5	Project work and field study give them an experience to learn by themselves and experiment with the theoretical knowledge that they were given within the four wall of the classroom.
PO6	Students completing the programme become confident in the sense that they feel they are employable.
PO7	This college trains the students to undertake primary level of research work and thus they become motivated for advanced research when they go for higher studies.
PO8	The programme instils among the students the greater values of life to become worthy citizen of the country

B) PROGRAM SPECIFIC OUTCOMES

PSO1	Students are expected to develop the Sanskrit language skill to communicate both in writing and verbally.
PSO2	It is expected that at the end of the programme students will get a fair knowledge of the development of Sanskrit language and literature vis-à-vis its culture – how it emerged, evolved and sustained through the passage of more than thousand years.
PSO3	After graduating they are expected to grow the sense of art and literature that will enable them to understand better the human social and cultural relationships.
PSO4	Students will also become able to appreciate the art and literature, especially in terms of great Indian heritage which is embedded in Sanskrit literature.
PSO5	Students are also expected to learn analytical skills while learning the appreciation ability.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (MORAL TEACHINGS AND BASICS OF SANSKRIT)

CO1	Hitopadesa.
CO2	Yaksaprasna of Mahabharata
CO3	Sabdarupa and dhaturupa.

Core – II (DRAMA-I & HISTORY OF SANSKRIT LITERATURE-I)

CO1	Abhijnanasakuntalam (Act I – IV)
CO2	History of Sanskrit Literature-I.

SEMESTER – II

Core – III (DRAMA-II & DRAMATURGY)

CO1	Abhijnanasakuntalam (Act V-VII)
CO2	Dramaturgy.

Core – IV (AN INTRODUCTION TO THE TECHNIQUE OF PANINIAN GRAMMAR & PROSODY)

CO1	Vocabulary relevant to Sanskrit grammar and arrangement of Paninian Grammar.
CO2	Samjnaprakaranam.
CO3	Chandas.

SEMESTER – III

Core – V (POETRY & HISTORY OF SANSKRIT LITERATURE-II)

CO1	Meghadutam.
CO2	History of Sanskrit Literature-II.

Core – VI (META-RULES OF PANINIAN GRAMMAR, POETICS AND FIGURES OF SPEECH)

CO1	Paribhasaprakaranam.
CO2	Sahityadarpanah (Ch. I & II)
CO3	Sahityadarpanah (Alamkaras).

Core – VII (CASES AND CASE ENDINGS IN PANINIAN GRAMMAR & TRANSLATION-I)

CO1	Siddhantakaumudi (Karaka-Vibhakti I-IV)
CO2	Translation from Sanskrit-Odia/English.

SEMESTER –IV

Core – VIII (INSCRIPTIONS, UPANISAD & BHAGAVADGITA)

CO1	Inscriptions.
CO2	Kathopanisad .
CO3	Bhagavatagita.

Core – IX (CASE AND CASE ENDINGS OF PANINIAN GRAMMAR, TRANSLATION-II)

CO1	Siddhantakaumudi.
CO2	Translation from Odia/English passage-Sanskrit.
CO3	Amarakosa.

Core – X (ORNATE PROSE & PROSE WRITING)

CO1	Dasakumarracharitam.
CO2	Sukanasopadesa.
CO3	Essay in Sanskrit.
CO4	Expansion of idea in Sanskrit.

SEMESTER – V

Core – XI (ORNATE POETRY IN SANSKRIT & HISTORY OF SANSKRIT LITERATURE-III)

CO1	Sisupalabadham.
CO2	Kiratarjuniyam.
CO3	History of Sanskrit Literature-III (Mahakavyas and Champu).

Core – XII (VEDA, VEDIC GRAMMAR & HISTORY OF VEDIC LITERATURE)

CO1	Vedic Suktas.
CO2	Vedic Grammar.
CO3	History of Vedic Literature.

DSE – I (THE SCIENCE OF VASTU AND VRKSA)

CO1	Gruhopakarana Prakarana of Vastu Ratnakara.
CO2	Vrksayurveda in Brhatsamhita.

DSE- II (SOCIO-POLITICAL THOUGHT IN ANCIENT INDIA)

CO1	Yajnavalkyasmrti.
CO2	Manusmrti.

SEMESTER – VI

Core – XIII (ARTHASASTRA, DHARMASASTRA AND AYURVEDA)

CO1	Arthasastra.
CO2	Manusmrti.
CO3	Ayurveda.

Core – IV (TECHNICAL LITERATURE IN SANSKRIT)

CO1	Jyotisha.
CO2	Vastu.

DSE – III (ETHICAL LITERATURE IN SANSKRIT)

CO1	Chanakyaniti.
CO2	Nitisataka of Bhartrrhari.
CO3	Viduraniti.

9. SOCIOLOGY

A) PROGRAM OUTCOMES

PO1	Sociology seeks to understand all aspects of human social behaviour, including the behaviour of individuals as well as the social dynamics of small groups, large organizations, communities, institutions, and entire societies.
PO2	Sociologists are typically motivated both by the desire to better understand the principles of social life and by the conviction that understanding these principles may aid in the formulation of enlightened and effective social policy.
PO3	Sociology provides an intellectual background for students considering careers in the professions or business.
PO4	Students graduating through B.A. Honsin Sociology Programme from this college are expected develop an analytical skill which will enable them to solve the problem related issues that he faces in next level of studies.
PO5	Students, although at the initial stage after getting admission faces difficulty in their language skill, but when they pass the programme, they are expected to become pretty able to communicate their understanding in the subject.
PO6	Students of this programme will become capable to ask questions, critically appreciate a scholarly presentation of any form and debate upon

	the issues which invite cross discussions.
PO7	Students graduating from this college in this programme become able to relate the social and national issues to what they have learnt from their books and in the classroom situations.
PO8	Project work and field study give them an experience to learn by themselves and experiment with the theoretical knowledge that they were given within the four wall of the classroom.

B) PROGRAM SPECIFIC OUTCOMES

PSO1	Critical Thinking: The programme seeks to develop in students the sociological knowledge and skills that will enable them to think critically and imaginatively about society and social issues.
PSO2	Sociological Understanding: The ability to demonstrate sociological understandings of phenomena, for example, how individual biographies are shaped by social structures, social institutions, cultural practices, and multiple axes of difference and inequality.
PSO3	Written and Oral Communication: The ability to formulate effective and convincing written and oral arguments.
PSO4	Better understanding of real life situation: The ability to apply sociological concepts and theories to the real world and ultimately their everyday lives.
PSO5	Analytical thinking: Field survey and preparation of dissertation paper is an inseparable part of Sociology Hons Programme. Students have to collect primary data for census as well as his/her research topic and analyse the data to draw conclusions. So, qualitative and quantitative analytical skills are enhanced.
PSO6	Observation power: a sensible observation power is necessary to identify the research problems in field study. So a perception about human society slowly grows up.
PSO7	Communication skills and Social interaction power: Students of Sociology stream have to work beyond the class room boundary at the time of field study activities. As a result good communication skill develops while interacting with local people.
PSO8	Ethical and Social Responsibility: Students have to learn about institutions, folkways , mores, culture, social control ,social inequality, population composition, population policy, society and culture of India. All these help to instil among the students of Sociology a sense of ethical and social responsibility.
PSO9	Professional and Career Opportunities: Students will have the opportunity to join professional careers in Sociology and allied fields. Sociology provides an intellectual background for students considering careers in business, social services, public policy, government service, nongovernmental organizations, foundations, or academia. This programme lays foundation for further study in Sociology, Social work, Rural Development, Social Welfare and in other allied subjects.

C) COURSE OUTCOMES

SEMESTER – I

Core – I (INTRODUCTION TO SOCIOLOGY)

CO1	Sociology: Definition and subject matter, nature and scope.
CO2	Basic Concepts: Society, culture, community, institutions, etc.
CO3	Individual and Society: Individual and Society, socialization, stages and agencies of socialization, etc.
CO4	Social Stratification: Meaning and definition, dimensions of stratification, etc.
CO5	Social Control: Meaning and types, formal and informal social control, etc.

Core – II (INDIAN SOCIETY)

CO1	Composition of Indian Society: Caste, Tribe, Religion, Language.
CO2	Hindu Social Organisation: Bases of Hindu Social Organisation, Varna, Ashrama and Purushartha. Doctrine of Karma.
CO3	Marriage and Family in India: Hindu marriage as Sacrament, forms of hindu marriage, etc.
CO4	The caste system in India: Origin, features and functions, caste and class, etc.
CO5	Socia change in modern India: Sanskritization, westernization, secularization and modernization.

SEMESTER – II

Core – III (SOCIOLOGICAL THOUGHT)

CO1	Auguste Comte.
CO2	Herbert Spencer.
CO3	Karl Max.
CO4	Emile Durkheim.
CO5	Max Weber.

Core – IV (SOCIAL CHANGE AND DEVELOPMENT)

CO1	Social Change.
CO2	Theories of Social Change.
CO3	Factors of Social Change.
CO4	Economic Growth and Social Development.
CO5	Models of Development.

SEMESTER – III

Core – V (RESEARCH METHODOLOGY)

CO1	Meaning and Significance of Social Research.
CO2	Research Design and Types of Research Design.
CO3	Hypothesis: Meaning, characteristics etc.
CO4	Qualitative Social Research.
CO5	Quantitative methods in Social Research.

Core – VI (GENDER AND SOCIETY)

CO1	Social Construction of Gender.
CO2	Feminism: Meaning, origin and growth of Feminist Theories.
CO3	Gender and Development.
CO4	Status of Women in India.
CO5	Major Challenges and issues affecting Women in India.

Core – VII (RURAL SOCIOLOGY)

CO1	Origin and Scope of Rural Sociology.
CO2	Rural social structure.
CO3	Rural social problems.
CO4	History of Evolution.
CO5	Rural Development Programmes.

SEMESTER – IV

Core – VIII (GLOBALIZATION AND SOCIETY)

CO1	Meaning and characteristics of globalization.
CO2	Dimensions of contemporary globalization.
CO3	Consequences of globalization.
CO4	Globalization and Indian Society.
CO5	Impact of globalization on religion, culture, education, family, marriage, women and tribes.

Core – IX (MARRIAGE, FAMILY AND KINSHIP)

CO1	Theoretical perspectives.
CO2	Marriage.
CO3	The family.
CO4	Contemporary issues.
CO5	The kinship and clan system.

Core – X (SOCIAL DISORGANIZATION AND DEVIANCE)

CO1	Social disorganization.
CO2	Theories of deviant behaviour.
CO3	Crime and punishment.
CO4	Social problems.
CO5	Atrocities against women, domestic violence, dowry and divorce.

SEMESTER – V

Core – XI (POLITICAL SOCIOLOGY)

CO1	State: Characteristics, Aristotle's classification of types of state.
CO2	Influence, power and authority.
CO3	Political culture and political socialization.
CO4	Political participation.
CO5	Political parties and pressure groups.

Core – XII (ENVIRONMENT AND SOCIETY)

CO1	Environment and its concepts.
CO2	Environmental issues.
CO3	Environmental movements.
CO4	Contemporary environmental problems.
CO5	Environment protection efforts at the global level and the national level in India.

DSE – I (SOCIOLOGY OF MOVEMENTS)

CO1	Social movements.
CO2	Religious movements in India.
CO3	Peasants movements in India.
CO4	Backward class movements in India.
CO5	Women's movements in India.

DSE – II (INDUSTRIAL SOCIOLOGY)

CO1	Introduction: Meaning and definition of Industrial Sociology.
CO2	Social-Industrial thought.
CO3	The Development of Industry.
CO4	Industrial Organisation.
CO5	Industrial and labour relations.

SEMESTER – VI

Core – XIII (URBAN SOCIOLOGY)

CO1	Meaning, nature, scope and importance of Urban Sociology.
CO2	Theories of patterns of city growth.
CO3	Social institutions of Indian urban communities.
CO4	Urban social problems.
CO5	Urban development in India plans.

Core – XIV (SOCIOLOGY OF SOCIAL INSTITUTIONS)

CO1	Community, groups, institutions and organizations.
CO2	Family, marriage and kinship.
CO3	Religion.
CO4	Education.
CO5	Economy.

DSE – III (POPULATION STUDIES)

CO1	Population studies.
CO2	Population theories.
CO3	Population consumptions in India.
CO4	Population planning and policies.
CO5	Population control.

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PROGRAM OUTCOMES(POs), PROGRAM SPECIFIC OUTCOMES(PSO) AND COURSE OUTCOMES(COs)

SCIENCE FACULTY

1) CHEMISTRY

Department of Chemistry	After successful completion of three year degree program in Chemistry a student should be able to;
Programme Outcomes	PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion. PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions. PO-4. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community. PO-5. Find out the green route for chemical reaction for sustainable development. PO-6. To inculcate the scientific temperament in the students and outside the scientific community. PO-7. Use modern techniques, decent equipments and Chemistry software‟s

Programme Specific Outcomes	PSO-1. Gain the knowledge of Chemistry through theory and practical"s. PSO-2. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions. PSO-3. Identify chemical formulae and solve numerical problems. PSO-4. Use modern chemical tools, Models, Chem-draw, Charts and Equipments. PSO-5. Know structure-activity relationship. PSO-6. Understand good laboratory practices and safety. PSO-7. Develop research oriented skills. PSO-8.make aware and handle the sophisticated instruments/equipments.

Course Outcomes

After completion of these courses students should be able to;

CO-1. Write an expression for rate constant K for third order reaction
CO-2. Solve the numerical problems based on Rate constant
CO-3.Understand the term specific volume, molar volume and molar refraction
CO-4. Know the meaning of phase, component and degree of freedom and derive the expression for rotational spectra for the transition from
J to J+1

CO-5. Know the meaning of various terms involved in co-ordination chemistry
CO-6. To understand Werner's formulation of complexes and identify the types of valences

CO-7. Know the limitations of VBT
CO-8. Knowthe shapes ofd-orbital's and degeneracyofd-orbital's and draw the geometrical and optical isomerism of complexes

CO-9. Define organic acids and bases.

CO-10. Distinguish between geometrical and optical isomerism.

CO-11. Discuss kinetics, mechanism and stereochemistry of SN^1 and SN^2 reactions.
CO-12. Compare between E_1 and E_2 reactions.
CO-13. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions.

CO-14. Know the principles of common ion effect and solubility product and study the methods of thermo-gravimetric analysis.

CO-15. Understand the principles of Spectro-photometric analysis and properties of electromagnetic radiations.

CO-16. Study the Voltammetry and Polarography as an analytical tool and measure the absorbance of atoms by AAS.

CO-17. Know the importance of chemical industry and classify various insecticides.

CO-18. Study the nutritive aspects of food constituents.

CO-19. Understand the characteristics of some food starches and study the manufacture of cement, dyes, Glass, Soap and detergents by modern methods.

CO-20. Know the role of agriculture chemistry and its potential

CO-21. Understand the basic concept of soil, properties of soil & its classification on the basis of pH.

CO-23. Know the different plant nutrients, their functions and deficiency symptoms.

CO-24. Identify the problematic soil and recommend a method for their reclamation.

CO-25. Have the knowledge of various pesticides, insecticides, fungicides and herbicides.

CO-26.Understand Mechanics of system of particles and know the Redox reaction.

CO-27. Study the Crystal Field Theory.

CO-28.Solve the cell reaction and calculate EMF and calculate interplanar distance.

CO-29.Understand De-Broglie hypothesis and Uncertainty principle

CO-30. Derive Schrödinger's time dependent and independent equations

CO-31 Study the electronic configuration of lanthanides and actinides and get knowledge of Crystalline solid.

CO-32. Understand different operation in stoichiometric molecule and study the Bio-inorganic chemistry.

CO-33. Understand the p-type semiconductor and n-type semiconductor.

CO-34.To study UV, IR and NMR spectroscopy.

CO-35. Discuss different types of rearrangement reactions.

CO-36. Determine structure of compound by spectroscopic methods and understand the difference between carbocation and carbanion.

CO-37.To study alkaloids, Ephedrine, citral molecule with their properties and application.

CO-38. Know the different analytical techniques.

CO-39. To understand different types of separation techniques and to study principle, construction and working of GC and HPLC and to give an extended knowledge about chromatographic techniques used for separation of amino acids.

CO-40. Discuss the problem based on distribution coefficient and extraction techniques.

CO-41. Know the various pharmaceutical drugs, their application and synthesis.
CO-42. To study the waste management.

CO-43. To understand the function of dyes, paints and pigments.
CO-44. To study the various type of surfactants.
CO-45. To know about molasses and bagasse and to study the different types ofpolymer.

CO-46. Know the market of milk in different breeds.

CO-47. Understand the basic principle of sterilization, homogenization, and standardization of milk.
CO-48. Study the flow sheet diagram of shrikhand powder, whey powder, and ice-cream.
CO-49. Study the different nutrient value in milk.

CO-50. Calculate molar and normal solution of various concentrations and determine specific rotations and percentage of to optically active substances by polorimetrically.
CO-51. Study the energy of activation and second order reaction and study the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry.
CO-52. Find out the acidity, Basicity and PKa Value on pH meter.

CO-53. Study the gravimetric and volumetric analysis of ores and alloy and prepare a various inorganic complexes and determine its % purity and to study binary mixture with removal of borate and phosphate.
CO-54. To understand the chromatographic techniques

CO-55. Perform the Binary mixtures.
CO-56. Preparation of organic compounds, their purifications and run TLC.
CO-57. Determination of physical constant: Melting point, Boiling point.
CO-58. Different separation techniques.

2) PHYSICS

Department of Physics	After successful completion of three year degree program in physics a student should be able to;
PROGRAM OUTCOMES	PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of physics.
	PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion.
	PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.

	PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.
	PO-5. To inculcate the scientific temperament in the students and outside the scientific community.
	PO-6. Use modern techniques, decent equipments and Phonics software's

PROGRAM SPECIFIC OUTCOMES

PSO-1.	Gain the knowledge of Physics through theory and practical‟s.
PSO-2.	Understand good laboratory practices and safety.
PSO-3.	Develop research oriented skills
PSO-4.	Make aware and handle the sophisticated instruments/equipments.

COURSE OUTCOMES

CO-1. Know the Cartesian, spherical polar and cylindrical co-ordinate systems.
CO-2. To understand the Special Theory of Relativity.
CO-3. Discuss the Michelson- Morley Experiment.
CO-4 To obtain the series solution by Frobenius method .
CO-5 Study the Generating function for Legendre, Hermite polynomials.

CO-6. Know the principles of structures determination by diffraction
CO-7. To understand the principles and techniques of X-rays diffraction
CO-8. Know the fundamental principles of semiconductors and be able to estimate the charge carrier mobility and density
CO-9. To give an extended knowledge about magnetic properties like diamagnetic, paramagnetic, ferromagnetic, ferrites and superconductors.

CO-10.Understand Newton's Laws of motion and their applications such as projectile and rocket motion
CO-11. Gain the knowledge of motion in central force field
CO-12. Classify elastic and inelastic scattering
CO-13. Know the difference between Laboratory and centre of mass system
CO-14. Understands Lagrangian and Hamiltonian formulation
CO-15 Solve the problems using Lagrangian and Hamiltonian formulation

CO-16 Get knowledge of canonical trans formation and Poisson's bracket .

CO-17. To know the Rutherford Experiment of atom.
CO-18. To understand molecular spectra of atom.
CO-19. To study the Raman spectra.
CO-20. To study the Zeeman Effect.

CO-21. To understand the Quantum Numbers.

CO-22. Write algorithm and flow chart for c-programming language.
CO-23. To use of iterative, decision making and the jump statement.
CO-24. Understand the concept of arrays and pointers.
CO-25. Study of user defined functions and program structures.

CO-26. Able to use the concept graphics in c language.

CO-27. To study the Mechanical, Electrical and Thermal Properties of material.
CO-28. Discuss the type of Phase Diagrams.

CO-29. Know the solid solution and types of solid solution.

CO-30. Understanding the Point Defect, Line Defect with example.
CO-31.Study the Diffusion Mechanism.
CO-31. Know the difference between Elastic and Plastic Deformation.
CO-32. To understand the Polymer Vulcanization of rubber.

CO-33. Know the AX-type crystal structure – eg. NaCl, ZnS etc.

CO-34.Understand Mechanics of system of particles.
CO-35.Know the Motion in Central Force Field.
CO-36 Elastic and inelastic scattering.
CO-37.Solve Langrangian and Hamiltonian formulation.

CO-38. Learn Canonical Transformation and Poisson"s Bracket.

CO-39.Understand De-Broglie hypothesis and Uncertainty principle.

CO-40. Derive Schrödinger's time dependent and independent equations
CO-41. Solve the problems using Schrödinger"s steady state equation
CO-42. Get knowledge of rigid rotator

CO-43. Understand different operators in Quantum Mechanics.

CO-44.Tomstudy kinetic theory of Gases.

CO-45. To study Maxwell Relations and Application.
CO-46. Know the elementary concept of statistics.
CO-47. Understand statistical distribution of system of particles.
CO-48.To study statistical ensembles.

CO-49.To study Quantum statistics.

CO-50. Know the properties of nucleus likes binding energy, magnetic dipole moment and

electric quadruple moment

CO-51. To understand the concept of radioactivity and decays law

CO-52. To study achievement of Nuclear Models of Physics and its limitations

CO-53. To give an extended knowledge about nuclear reactions such as nuclear fission and fusion

CO-54. To understand the basic concept of Particle Physics.

CO-55. Know the special purpose Diode.

CO-56. To study the Transistor Amplifier.

CO-57. To understand the FET, JFET,MOSFET.

CO-58. To study the Operational Amplifier and their types. CO-59. To know the Timer IC- 555 and its classification. CO-60. To study the Regulated Power supply.

CO-61. To understand the Sequential Logic Circuits.

CO-62. Know the history of LASERS and its basic concepts.

CO-63. Understand the basic principle and working of different types of lasers.

CO-64. Know the applications of lasers in various fields.

CO-65. Understand the characteristics of LASERS.

CO-66. Learn safety precaution sand measures while handling the lasers.

3) MATHEMATICS

PROGRAM OUTCOMES

PO1.	Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
PO2.	A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
PO3.	Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
PO4.	Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.
PO5.	Enhancing students' overall development and to equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
PO6.	Ability to pursue advanced studies and research in pure and applied mathematical science.

PROGRAM SPECIFIC OUTCOMES

PSO1.	Think in a critical manner.
PSO2.	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
PSO3.	Formulate and develop mathematical arguments in a logical manner.
PSO4.	Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
PSO5	.Understand, formulate and use quantitative models arising in social science, Business and other context.

COURSE OUTCOMES

CO1. Learn to solve system of linear equation.
CO2. Learn to solve Diophantine equation.
CO3. Learn to find roots of polynomial over rational.
CO4. Learn to find graphs, roots and primes integer using maxima software.
CO5. Introduction to complex analysis.
CO6. Gain Knowledge of fundamental concepts of real numbers.
CO7. Verify the value of the limit of a function at a point using the definition of the limit
CO8. Introduction to sequence and series.
CO9. Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.
CO10. Learn Maxima software.
CO11. Problem solve on algebra and calculus by using maxima software.
CO12. Knowledge of application of mathematics
CO13. Introduction to analytical geometry of 2 dimensional.
CO14. Study of lines in 2 and 3 dimension.
CO15. Finding equation in various form of line, circle, ellipse, sphere, cones etc.
CO16. Give the knowledge of geometry using maxima software.
CO17. Student will be to understand differentiation and fundamental theorem in differentiation and various rules.
CO18. Geometrical representation and problem solving on MVT and Rolls theorem.
CO19. Finding extreme values of function.
CO20. Introduction to Ordinary Differential Equation.
CO21. Learn Maxima software.
CO22. Problem solve on analytic geometry and calculus by using maxima software.
CO23. Problem solving on geometry and calculus.
CO24. Gain Knowledge of fundamental concepts of real numbers in n dimensions. verify the value of the limit of a function at a point using the definition of the limit in R*R
CO25. Find the extreme value in 2 dimensions.
CO26. Study multiple integration.
CO27. To understand logical concepts and to show logical equivalences by using truth tables and rules in logics.

CO28. Learn concept related to counting.
CO29. Introduction to advanced counting.
CO30. Problem solving on multivariable calculus and discrete mathematics.
CO31. Introduction to application of mathematics in real life.
CO32. Learn to build logical concept.
CO33. Introduction to vector space and subspace.
CO34. Use computational techniques and algebraic skills essential for the study of systems of CO35. Linear equations, matrix algebra, vector spaces, eigen values and eigenvectors,
CO36. Orthogonality and Diagonalization.
CO37. To apply appropriate numerical methods to solve the problem with most accuracy.
CO38. Using appropriate numerical methods determine approximate solution of ODE and system of linear equation.
CO39. Compare different methods in numerical analysis w.r.t accuracy and efficiency of solution.
CO40. To demonstrate used of interpolation method in numerical analysis.
CO41. Use computational techniques and algebraic skills essential for the study of systems of Linear equations, matrix algebra, vector spaces, eigen values and eigenvectors, Orthogonality and Diagonalization.
CO42. Able to understand the Euclidean distance function on R n and appreciate its properties, and state and use the Triangle and Reverse Triangle Inequalities for the Euclidean distance function on R n Explain the definition of continuity for functions from R n to R m and determine whether a given function from R n to R m is continuous
CO43. Explain the geometric meaning of each of the metric space
CO44. Distinguish between open and closed balls in a metric space
CO45. Define convergence for sequences in a metric space and
CO46. Determine whether a given sequence in a metric space converges
CO47. Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
CO48. Comprehend rigorous arguments developing the theory underpinning real analysis.
CO49. Demonstrate an understanding of limits and how they are used in sequences, series,
CO50. Construct rigorous mathematical proofs of basic results in real analysis
CO51. Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
CO52. Problem solving on metric space and connected and contactless.
CO53. Understand the importance of algebraic properties with regard to working within various number systems.
CO54. Extend group structure to finite permutation groups (Caley Hamilton Theorem). Generate groups given specific conditions.
CO55. Symmetry using group theory.
CO56. Understand the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.
CO57. Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.

CO58. Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.
CO59. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.
CO60. Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters.
CO61. Demonstrate by solving various problem based on Symmetry using group theory
CO62. Find quotients and remainders from integer division
CO63. Apply Euclid's algorithm and backwards substitution
CO64. Understand the definitions of congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
CO65. Determine multiplicative inverses, modulo n and use to solve linear congruence.
CO66. Theory of quadratic residue
Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.
CO67. Understand the mathematical tools that are needed to solve optimization problems.
CO68. Formulate pure, mixed, and binary integer programming models.
Formulate the nonlinear programming models.
Use some solution methods for solving the nonlinear optimization problems.
CO69. Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering
CO70. Understand the definitions of congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
CO71. Application based on Diophantine and Chinese remainder theorem and operational research. Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers · Define and analyze limits and continuity for complex functions as well as consequences of continuity Conceive the concepts of analytic functions and will be familiar with the elementary complex functions and their properties ·
CO72. Determine whether a given function is differentiable, and if so find its derivative.
Applies the theory into application of the power series expansion of analytic functions · Understand the basic methods of complex integration and its application in contour integration. · Analyze sequences and series of analytic functions and types of convergence, ·
CO73. Evaluate complex contour integrals directly and by the fundamental theorem, apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula.
CO74. Understand Integrability and theorems on integrability. Recognize the difference between point wise and uniform convergence of a sequence of functions.
Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.
CO75. Study improper integration using Riemann integration.
Applies the theory into application of the power series expansion of analytic functions · CO76. Understand the basic methods of complex integration and its application in contour integration. ·

CO77. To analyze sequences and series of analytic functions and types of convergence,
Evaluate complex contour integrals directly and by the fundamental theorem, apply the CO78.
Cauchy integral theorem in its various versions, and the Cauchy integral formula
Solve improper integration using Riemann integration.
Solve problem on convergence of function.
CO79. Students will be able to define ring and subrings.
Study of ideals and concept related to ideal.
Study of various integral domain in ring.
CO80. Introduction to field.
Be familiar with the modeling assumptions and derivations that lead to PDEs.
Recognize the major classification of PDEs and the qualitative differences between the classes of equations.
CO81. Be competent in solving linear PDEs using classical solution methods.
Problem on ring and PDE.
Application of PDE in real life.
CO82. Various structural study of ring.
Students will able to understand two dimensional transformations.
CO83. Students will able to understand three dimensional transformations.
To get acquainted with typical problem on CG and existence solution.
CO84. Introduction to projection and its types. Bezier curves.
Understand and apply the concept of optimality criteria for various type of optimization problems.
CO85. Solve various constrained and unconstrained problems in single variable as well as multivariable. Solve simple games using various techniques ·
CO86. Analyze economic situations using game theoretic techniques ·
Recommend and prescribe which strategies to implement
CO87. Problem solving on CG & OT.
Application of projection in real life.
CO88. Solve optimal real life problem based on supply and demands.
Solve simple games using various techniques ·
CO89. Analyze economic situations using game theoretic techniques ·
Recommend and prescribe which strategies to implement.

4) BOTANY

PROGRAM OUTCOME

PO1.	Knowledge and understanding of: 1. The range of plant diversity in terms of structure, function and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification and the flora of Maharashtra. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics. 6. Statistics as applied to biological data.
PO2.	**Intellectual skills – able to**: 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading

	and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.
PO3.	**Practical skills:** Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry. 5. Analyze data using appropriate statistical methods and computer packages. 6. Plant pathology to be added for sharing of field and lab data abtained.
PO4.	Transferable skills: 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to work as part of a team. 4. Ability to use library resources. 5. Time management. 6. Career planning.
PO5.	**Scientific Knowledge:** Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.
PO6.	**Problem analysis:** Identify the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PROGRAM SPECIFIC OUTCOMES

PSO1.	Design solutions from medicinal plants for Health problems, disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health.
PSO2	. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.
PSO3.	Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology, Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.
PSO4.	Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.
PSO6.	Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.

PSO7.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

COURSE OUTCOMES

1. Understand the diversity among Algae.
2. Know the systematic, morphology and structure, of Algae. Understand the life cycle pattern of Algae.
3. Understand the useful and harmful activities of Algae.
4. Understand the Biodiversity of Fungi
5. Know the Economic Importance of Fungi
6. Understand the morphological diversity of Bryophytes.
7. Understand the economic importance of the Bryophytes.
8. Understand the Biochemical nature of cell.
9. Know the chemical nature of biomolecules.
10. Understand the different types of interaction in Biomolecules.
11. Structure and general features of enzymes.
12. Concept of enzyme activity and enzyme inhibition.
13. Learn about the movement of sap and absorption of water in plant body.
14. Understand the plant movements.
15. Understand the morphological diversity of Bryophytes and Pteridophytes and Gymnosperms.
16. Understand the economic importance of the Bryophytes and Pteridophytes and Gymnosperms.
17. Know the evolution of Bryophytes and Pteridophytes and Gymnosperms.
18. Understand the habit of the angiosperm plant body.
19. Know the vegetative characteristics of the plant.
20. Learn about the reproductive characteristics of the plant.
21. Understand the plant morphology and basic taxonomy.
22. The eukaryotic cell cycle and mitotic and meiotic cell division
23. Structure and organization of cell membrane
24. Process of membrane transport and membrane models
25. Mendelian and Neo-mendelian genetics
26. To study the phenomenon of dominance, laws of segregation, independent

assortment of genes.

27. To understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc.

28. Understand the diversity among Algae.
29. Know the systematic, morphology and structure, of Algae.
30. Understand the life cycle pattern of Algae.
31. Understand the useful and harmful activities of Algae.
32. Understand the Biodiversity of Fungi
33. Know the Economic Importance of Fungi
34. Understand the morphological diversity of Bryophytes.
35. Understand the economic importance of the Bryophytes.
36. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.
37. Become aware of applications of different plants in various industries.
38. To highlight the potential of these studies to become an entrepreneur.
39. To equip the students with skills related to laboratory as well as industries based studies

40. Know importance and scope of plant physiology.
41. 2Understand the plants and plant cells in relation to water.
42. Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.
43. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
44. Learn about the movement of sap and absorption of water in plant body
45. Understand the plant movements.

46. Know the scope and importance of the discipline.
47. Understand plant communities and ecological adaptations in plants.
48. Know the concept of methodology in taxonomy.
49. Learn about conservation of biodiversity, Non-conventional Energy and Pollution.
50. Discover botanical regions of India and vegetation types of Maharashtra.
51. Understand Bioremediation, Global warming and climate change.
52. On completion of the course, students are able to:
53. Gain knowledge about “Cell Science”.
54. Understand Cell wall Plasma membrane, Cell organelles and cell division.

55. Learn the scope and importance of molecular biology.

56. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.

57. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

58. Understand the role plants in human welfare.

59. Gain knowledge about various plants of economic use.

60. Know importance of plants & plant products.

61. Understand the chemical contents of the plant products.

62. Know about the utility of plant resources.

63. Understand the diversity among Algae.

64. Know the systematic, morphology and structure, of Algae.

65. Understand the life cycle pattern of Algae.

66. Understand the useful and harmful activities of Algae.

67. Understand the Biodiversity of Fungi

68. Know the Economic Importance of Fungi

69. Understand the morphological diversity of Bryophytes.

70. Understand the economic importance of the Bryophytes.

71. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.

72. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.

73. Understand the various fossil genera representing different fossil groups.

74. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.

75. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

76. Know the details of Microscopy- Principles of light microscopy, electron microscopy (TEM and SEM).

77. Understand & perform Chromatography and cultural techniques in Botany.

78. Understand the methods used in Micrometry, Microtomy and Microphotography.

79. Learn and understand about mineral nutrition in plants.

80. Understand the growth and developmental processes in plants.

81. Know about Photosynthesis and Respiration in plants.

82. Understand the process of translocation of solutes in plants

83. Know the nitrogen metabolism and its importance.

84. Understand the properties of Monosaccharides, Oligosaccharides and Polysaccharides.

85. They will learn about the Significance of Carbohydrates.

86. Understand the Properties of saturated fatty acids, and unsaturated fatty acids.

87. Understand lipid metabolism in plants.

88. Understand the Beta Oxidation, Gluconeogenesis and its role in mobilization of fatty acids during germination.

89. They will learn about the Significance of lipids.

90. They will be able to understand Brief outline of biosynthesis of amino acid.

91. Understand the protein - structure and classification and protein biosynthesis in prokaryotes and eukaryotes.

92. They will learn about the nucleic acid metabolism.

93. Understand the diversity of Gymnosperms in India

94. Know the evolutionary trends and affinities of living gymnosperms with respect to external and internal features

95. Know the conceptual development of „taxonomy" and „systematics"

96. Understand the Phylogeny of angiosperms -A general account of the origin of Angiosperms.

97. Understand the general range of variations in the group of angiosperms.

98. Trace the history of development of systems of classification emphasizing angiospermic taxa.

99. To learn the wide activities in angiosperm and trends in classification.

100. Learn about the characters of biologically important families of angiosperms.

101. Know the floral variations in angiospermic families, their phylogeny and evolution.

102. Understand various rules, principles and recommendations of plant nomenclature produces in plant identification.

103. Understand major evolutionary trends in various parts of angiospermic plants

104. Know the methods of pollination and fertilization.

105. Know fertilization, endosperm and embryogeny.

106. Understand the scope & importance of Anatomy.

107. Know various tissue systems.

108. Understand the normal and anomalous secondary growth in plants and their causes.

109. Perform the techniques in anatomy.

110. With respect to recent knowledge students should know about the different tools in the taxonomy so as to relocate the phylogenetic position of plant or taxa.

111. Understand the concept, principle and types of sterilization methods.

112. Know the concept and characteristics of antiseptic, disinfectant and their mode of action.

113. Know the cultivation methods of bacteria, yeast, fungi and virus.

114. Principle, working and applications of instruments viz, pH meters, spectrophotometer, centrifuge, viscometer, and laminar air flow.

115. Understand the Microbial Genetics and Recombination in Bacteria.

116. Know the terminologies in plant pathology.

117. Understand the scope and importance of Plant Pathology.

118. Know the prevention and control measures of plant diseases and its effect on economy of crops.

119. Understand the science of plant breeding.

120. To introduce the student with branch of plant breeding for the survival of human being from starvation.

121. To study the techniques of production of new superior crop verities.

122. Understand the modern strategies applied in Genetics and Plant Breeding to sequence and analyze genomes

123. Get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e. Mass selection, Pureline Selection and Clonal selection.

124. Know about exploitation of Heterosis, hybrid and variety development and their release through artificial hybridization.

125. Understand the role plants in human welfare.

126. Gain knowledge about various plants of economic use.

127. Know importance of plants & plant products.

128. Understand the chemical contents of the plant products.

129. Know about the utility of plant resources.

130. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.

131. Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication.

132. Understand the fundamentals of Recombinant DNA Technology.

133. Know about the Genetic Engineering.

134. Understand the principle and basic protocols for Plant Tissue Culture.

135. The concept of operon and its structure and regulation.

5) ZOOLOGY

PROGRAM OUTCOMES

PO-1.	Demonstrate, solve and an understanding of major concepts in all disciplines of Zoology.
PO-2	. Solve the problem and also think methodically, independently and draw a logical conclusion.
PO-3.	Understand the evolution, history of phylum.
PO-4.	Create an awareness of the impact of Zoology on the environment, society, and development outside the scientific community.
PO-5.	To study and understand the classification of whole phyla includes in Non chordates with the help of charts/models/pictures.
PO-6.	To inculcate the scientific temperament in the students and outside the scientific community.
PO-7.	Use modern techniques, decent equipments and Zoology software"s

PROGRAM SPECIFIC OUTCOMES

PSO-1.	Gain the knowledge of Zoology through theory and practical"s.
PSO-2.	Study and understand the DNA Recombinant technology.
PSO-3.	Understand the testing of hypothesis.
PSO-4.	Use modern Zoological tools, Models, Charts and Equipments.
PSO-5.	Know structure-activity relationship.
PSO-6.	Understand good laboratory practices and safety.
PSO-7.	Develop research oriented skills.
PSO-8.	Make aware and handle the sophisticated instruments/equipments.

COURSE COUTCOMES

CO-1 Understand the evolution, history of phylum.
CO-2 Understand about the Non Chordate animals.
CO-3 To study the external as well as internal characters of non chordates.
CO-4 To study the distinguishing characters of non chordates.
CO-5 Understand the economical importance of Molluscs

CO-6 Understand the various internal systems like Digestive system, nervous system with the help of charts.

CO-7 Understand the functions of Gemmules and spicules.
CO-8 Understand the economical importance of Molluscan shells.

CO-9. Understand the terms Histology and Physiology

CO-10. Understand the cell, tissue, organ, system and organisms.

CO-11. Study the derivatives of skin- horns, nails, hairs.

CO_12. Study and understand the terms- acidosis, alkalosis, asphexia, hypoxia, anoxia and cyanosis.

CO-13. Understand about the agencies responsible for Production of various products using biochemistry.

CO-14. Understand the term pH, Buffer.

CO-15. Understand the structure and function of carbohydrate, amino acids, proteins, and lipids.

CO-16. Understand the concept Enzymes and also Vitamins and minerals.

CO-17. Understand the Principle role of Vitamins in metabolism and Deficiency diseases.

CO-18. Know the biotic and abiotic components of ecosystem.

CO-19.Food chain & food web in ecosystem.

CO-20.Understand diversity among various groups of animal kingdom.

CO-21.Understand Animal community & ecological adaptation in animals.

CO-22. Scope , importance and management of biodiversity

CO-23.To study and understand the scope and branches of Medical Zoology. CO-24. To aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.

CO-25. To increase awareness for the health in students.

CO-26. Understand the various disease causing vectors like Mosquitoes. CO-27. To aware about the typhoid, cholera likes disease.

CO-28. Understand the importance of medical diagnostic and also understand the term forensic Entomology

CO-29. Understand the Scope of cell biology, because cell is the basic unit of life.

CO-30. Understand the Main distinguishing characters between plant cell and animal cell.

CO-31. To study and understand the whole cell organelles with their structure and function.

CO-32. Understand the cell cycle and know the importance of various cells in body of organisms.

CO-33. Understand the various applications of cells by using cell biology like study of various types of tumour.

CO-34.Understand the Animal cells and various cell organelles by using microphotographs.

CO-35.Understand the various Applications of Biotechnology.

CO-36. Study and Understand the Hybridoma technology as well as Enzyme biotechnology.

CO-37. Study and understand the DNA Recombinant technology.

CO-38. Understand the industrial and environmental biotechnology.

CO-39. Study and understand the Stem cell biotechnology.

CO- 40. Understand the Scope and Significance of Biotechnology.

CO-41.Understand the Importance of physiology and branches of it.

CO-42.Understand the terms-Osmosis, diffusion, pH and Buffer.

CO-43.Understand the Digestion and Excretion process, by studying the Organs of it

CO-44.Understand the process of Metabolism.

CO-45.Understand the term Detoxification.

CO-46.Understand the Circulatory system and Lymphatic system.
CO-47.Study the nervous system.
CO-48.Understand the Molecular biology and molecular biology.
CO-49.Understand the cell divisions and types of mutation.
CO-50.Understand the structure and function of the cells.
CO-51.Understand the term cell signalling.
CO-52.Aware the students for Cancer.
CO-53.Understand the Tools and Techniques in Molecular Biology.
CO- 54.Understand the term ELISA technique and DNA finger printing.
CO-55. To understand Origin of life with respect to prokyariotic and eukaryotic cells.
CO-56. Understand the evidences of organic evolution by anatomical embryological list, paleontological, physiological, genetics and molecular biology evidences.
CO-57. Understand theories of organic evolution, isolation, speciation. CO-58. Understand geological time scale, methods and classification of animal distribution and factors affecting animal distribution.
CO-59.Understand the terms: Gametogenesis, Fertilization and early development.
CO- 60.Understand the Morphogenesis and Organogenesis in animals. CO-61.Understand the Aging, Apoptosis and Senescence.
CO-62.Understand the fundamentals of agricultural, forest, medical and veterinary entomology.
CO-63.Understand, Morphology and Anatomy of Insects.
CO-64. Understand intra specific and inter specific relationships among insects.
CO-65. To understand significance of beneficial and harmful insects with reference to their habit and habitat, life cycle, diseases caused by them and their control measures.

6) STATISTICS

PROGRAM OUTCOMES

When the student joins college after school they are free to make their own choices which are very instrumental in changing their attitude towards life and society. It is very important to give them an appropriate and conducive environment to learn and grow. After completion of the degree apart from his/her specialty in the program of his/her choice the student learns a lot during their three year stay that makes them mature enough to take the right decisions at the right time. Students develop analytical thinking and good communication skills during classroom teaching (through projects/presentation/practical) and also as they participate in various activities both at departmental as well as college level.

Being a Central University, the student gets a chance to communicate with students of other states of India which makes them culturally sensitive and socially interactive.

As part of various departmental /college seminars and workshops he learns to respect and protect the environment. These programs also help in generating gender sensitization and building of ethical values to become a responsible citizen when he/she graduates from the college.

PROGRAM SPECIFIC OUTCOMES

Statistics is the language of the uncertainties riddled modern information age. This program

is a compact combination of detailed courses of Statistics and adequate amount of courses on Computer Science, Mathematics and Operations research to complement and offer diversification after the completion of program. The thrust of the program is to provide a platform for pursuing higher studies leading to post-graduate or doctorate degrees. Along with this students are equipped with skill enhancement courses like Research methodology, Statistical packages and R language. Apart from this there is a range of Generic electives courses in Economics, Commerce, Computer Science etc. which students choose as per their interest and aptitude. This enhances theoretical rigor with technical skills which prepare students to become globally competitive to enter into a promising professional life even after graduation.

This program offers a range of traditional avenues in academics, Govt. Service, IAS, Indian Statistical/ Economic Services, Industries, Commerce, Investment Banking, Banks and Insurance Sectors, CSO and NSSO, Research Personnel/Investigator in Govt. organizations such as NCAER, IAMR, ICMR, Statistical and Economic Bureau & various PSUs., Market Research, Actuarial Sciences, Biostatistics, Demography etc. It also provides an array of non-traditional employment avenues ranging from Stock Brokers Analyst, Sports Analyst, Poll Analyst, Business Analyst, Financial Analyst, Content Analyst etc.

COURSE OUTCOMES

Descriptive Statistics

The learning objectives include summarizing the data and to obtain its salient features from the vast mass of original data.

After completing this course, the students should have developed a clear understanding of

- Concepts of statistical population and sample, variables and attributes.
- Tabular and graphical representation of data based on variables.
- 'Conditions for the consistency' and criteria for the independence of data based on attributes.
- Measures of central tendency, Dispersion, Skewness and Kurtosis.
- Moments and their use in studying various characteristics of data.
- Different approaches to the theory of probability.
- Important theorems on probability and their use in solving problem
- Concept of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient.
- Concept of Principle of least squares for curve fitting and regression lines.

Calculus

Calculus is versatile and Valuable tool for the statistics. Calculus being used in statistics involves integrating over sections of a probability distribution. The content of this paper involves differential calculation, integral calculus and solution of different differential equations which are extremely prevalent in more advanced statistical application.

Probability and Probability Distributions

A probability distribution is a statistical model that shows the possible outcomes of a particular event or course of action as well as the statistical likelihood of each event. Probability distribution functions are quite important and widely used in actuarial science

(insurance), engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.

Algebra

Algebra is one of the most important courses in the field of statistical computing. The course serves as a building block that will enable students to learn more advanced techniques that will help them to solve problems more quickly and easily.

After completing course, students should have developed a clear understanding of:

- Theory of equations
- Properties of matrices and determinants
- Linear equations
- Rank of a matrix
- Generalized inverse
- Characteristics roots and vectors
- Quadratic forms

. The students will be conversant for their potential studies of Markov chain & stochastic process, Multivariate analysis, Regression analysis, Design of Experiments.

Sampling Distribution

1. To understand the concept of sampling distributions and their applications in statistical inference.
2. To understand the process of hypothesis testing and its significance
3. Importance of Standard Error and to draw conclusions using p-value

Survey Sampling and Indian Official Statistics

Survey Sampling provides the tolls/ techniques for selecting a sample of elements from a target population keeping in mind the objectives and nature of population. Most of the research work is done through Sample Survey. The students are able to know about Indian Official Statistical System.

After completing the course, students should have developed clear understanding of:

- Basic concepts of survey sampling
- Principles of survey sampling and main steps involved in selecting a sample
- Simple random sampling
- Stratified random sampling
- Systematic sampling
- Ratio and Regression method of estimation
- Cluster sampling (equal cluster size)
- Concepts of sub sampling
- Indian Official Statistical System

Mathematical Analysis

Numerical Analysis:

Theory of finite differences deals with the changes that take place in the value of the dependent variable due to finite changes in the independent variable.

On completion of the course, students should have achieved the following

1) Mathematical Operators (Forward and Backward difference operators , Shift Operator ,Central difference operator ,Derivative)
2) Approximating a given set of data by a function using interpolation formula.
3) Newton Gregory interpolation formula (forward and backward) for arguments at equal intervals
4) Newton's Divided difference interpolation formula and Lagrange's interpolation formula(for unequal intervals)
5) Central Difference interpolation formula(Gauss and Sterling's)
6) Representation of a polynomial in factorial Notation
7) Numerical Quadrature using the interpolation formula(Trapezoidal Rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ quadrature formula
8) Solution of Difference equations

Real Analysis:

Students will have the knowledge of basic properties of the field of real numbers, the knowledge of the series of real numbers and convergence, Bolzano –Weirstrass theorem, Cauchy criteria, the knowledge of real functions-limits of functions and their properties, notion of continuous functions and their properties and the differentiability of real functions and related theorems

Statistical Inference

Statistical inference: Drawing conclusions about the whole population on the basis of a sample.

Statistical inference is the process of deducing properties of an underlying probability distribution by analysis of data. Inferential statistical analysis infers properties about a population, this includes testing hypotheses and deriving estimates.

Linear Models

The learning objectives includes developing a clear understanding of the fundamental concepts of linear models and a range of associated skills allowing the students to work effectively with them. The linear models are useful both in the planning stages of research and in the analysis of resulting data. The combination of theory and applications will prepare students to explore the course & more correctly interpret the output from linear model computer package.

After completing the course students should have developed clear understanding of:

- Basic concepts of linear models. Theory and estimation of linear models
- Gauss Markov Theorem and its use

- Fitting of these models, derivation of confidence interval, testing the hypothesis and interpretation of results
- Simple and multiple linear regression models and their applications
- Distribution of Quadratic Forms
- Techniques of analysis of variance and covariance for fixed effect models
- Concepts of residuals and outliers.

Stochastic Processes and Queuing Theory

After completing this course, students should have developed a clear understanding of

1) The fundamental concepts of stochastic processes
2) Tools needed to analyze stochastic processes
3) Markov chains
4) Stability of Markov chains
5) Poisson process and its variations
6) Queuing systems
7) Random walk and ruin theory
8) To identify the real life applications of stochastic processes

Statistical Computing Using C/C++ Programming

1 In this course students learn to write code in C to do statistical computing and its role in problem solving. C is a powerful, structured programming language widely used in all areas of study.

2 Student will understand basic data structures and develop logics which will help them to create well-structured programs using C language. It develops the analytical as well as logical thinking of the student.

3 It also opens the adaptability to learn any other programming language and using computer languages/software as a tool to analyze data statistically.

Design of Experiments

DOE is a tool to develop an experimentation strategy that maximizes learning using a minimum of resources. Extensively used by engineers and scientists involved in the improvement of manufacturing processes to maximize yield and decrease variability. It is widely used in many fields with broad application across all the natural and social sciences, to name a few: Biostatistics, Agriculture, Marketing, Software engineering. Industry etc. After completing Course in DOE students should have developed a clear understanding of:

- The fundamental concepts of design of experiments.
- Introduction to planning valid and economical experiments within given resources.
- Completely randomized design.
- Randomized block design.
- Latin square design.

- Balanced incomplete block design.
- Full and confounded factorial designs with two and three levels.
- Fractional factorial designs with two levels.

Multivariate Analysis and Nonparametric Methods

The learning objectives include:

1) Study of theoretical concepts of Bi variant Normal and Multivariate Normal Distributions along with their properties.
2) Analyze multivariate data.
3) Application of Wald's SPRT and Non-Parametric methods of testing of hypothesis

On completion of the course, students should have achieved the following

1) The understanding of basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution.
2) Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
3) Classification method namely Discriminate Analysis.
4) Application of Wald's SPRT for testing simple null hypothesis vs simple alternative hypothesis along with the study of the O.C. function and the ASN function for various underlying continuous and discrete distributions.
5) Testing of hypothesis using Non-Parametric tests like Median test, Runs test, U test, Kruskal Wallis test etc. and ability to use them judiciously for the testing of given data.

Discipline Specific Elective Papers

Students of this course are taught to understand and predict the changes in economy. Areas of learning include:

1 Profit of experience.
2 Safety from future
3 Utility Studies
4 Sales Forecasting
5 Budgetary Analysis
6 Stock Market Analysis
7 Yield projections
8 Economic Forecasting
9 Census Analysis
10 Risk Analysis & Evaluation of changes.

The 'Operations Research' is not only confined to any specific agency like defense services but today it is widely used in all industrial organizations. It can be used to find the best solution to any problem be it simple or complex. It is useful in every field of human activities. Thus, it attempts to resolve the conflicts of interest among the components of organization in a way that is best for the organization as a whole. Main fields where OR is extensively used are:

1. National Planning and Budgeting
2. Defense Services
3. Industrial Establishment and Private Sector Units
4. Research & Development and Engineering

Econometrics deals with the measurement of economic relationships. It is an integration of economics, mathematical economics and statistics with an objective to provide numerical values to the parameters of economic relationships. It may be pointed out that the econometric methods can be used in other areas like engineering sciences, biological sciences, medical sciences, geosciences, agricultural sciences etc. In simple words, whenever there is a need of finding the stochastic relationship in mathematical format, the econometric methods and tools help.

After completing this course, students should have developed a clear understanding of:

- The fundamental concepts of econometrics.
- Specification of the model.
- Multiple Linear Regression.
- Multi collinearity.
- Hetero scedasticity.
- Autocorrelation.
- Autoregressive and Lag models
- Use of Dummy Variables
- Specification Errors

Students learn to handle censored data, techniques and tools to obtain survival probability and knowledge of clinical drug trials. After completion they can work in health industry.

In this course students learn about Probability, Tools Needed for Option Pricing: Wiener process, stochastic integration, and stochastic differential equations; Pricing Derivatives: Arbitrage relations and perfect financial markets, pricing futures, put-call parity for European options, relationship between strike price and option price; Stochastic Models in Finance; Continuous time-process-geometric Brownian motion; Ito's lemma, Black-Scholes formula for European options; Hedging portfolios: Delta, Gamma and Theta hedging; Binomial Model for European options: Cox-Ross-Rubinstein approach to option pricing and discrete dividends

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PROGRAM OUTCOMES(POs), PROGRAM SPECIFIC OUTCOMES(PSO) AND COURSE OUTCOMES(COs)

SCIENCE FACULTY

A)CHEMISTRY

Department of Chemistry	After successful completion of three year degree program in Chemistry a student should be able to;
Programme Outcomes	PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of chemistry. PO-2. Solve the problem and also think methodically, independently and draw a logical conclusion. PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of chemical reactions. PO-4. Create an awareness of the impact of chemistry on the environment, society, and development outside the scientific community. PO-5. Find out the green route for chemical reaction for sustainable development. PO-6. To inculcate the scientific temperament in the students and outside the scientific community. PO-7. Use modern techniques, decent equipments and Chemistry software‟s

Programme Specific Outcomes	PSO-1. Gain the knowledge of Chemistry through theory and practical‟s. PSO-2. To explain nomenclature, stereochemistry, structures, reactivity, and mechanism of the chemical reactions. PSO-3. Identify chemical formulae and solve numerical problems. PSO-4. Use modern chemical tools, Models, Chem-draw, Charts and Equipments. PSO-5. Know structure-activity relationship. PSO-6. Understand good laboratory practices and safety. PSO-7. Develop research oriented skills. PSO-8.make aware and handle the sophisticated instruments/equipments.

Course Outcomes

After completion of these courses students should be able to;

CO-1. Write an expression for rate constant K for third order reaction

CO-2. Solve the numerical problems based on Rate constant

CO-3.Understand the term specific volume, molar volume and molar refraction

CO-4. Know the meaning of phase, component and degree of freedom and derive the expression for rotational spectra for the transition from J to J+1

CO-5. Know the meaning of various terms involved in co-ordination chemistry

CO-6. To understand Werner's formulation of complexes and identify the types of valences

CO-7. Know the limitations of VBT

CO-8. Knowthe shapes ofd-orbital's and degeneracyofd-orbital's and draw the geometrical and optical isomerism of complexes

CO-9. Define organic acids and bases.

CO-10. Distinguish between geometrical and optical isomerism.

CO-11. Discuss kinetics, mechanism and stereochemistry of SN^1 and SN^2 reactions.

CO-12. Compare between E_1 and E_2 reactions.
CO-13. Understand the evidences, reactivity and mechanism of various elimination and substitution reactions.

CO-14. Know the principles of common ion effect and solubility product and study the methods of thermo-gravimetric analysis.

CO-15. Understand the principles of Spectro-photometric analysis and properties of electromagnetic radiations.

CO-16. Study the Voltammetry and Polarography as an analytical tool and measure the absorbance of atoms by AAS.

CO-17. Know the importance of chemical industry and classify various insecticides.
CO-18. Study the nutritive aspects of food constituents.

CO-19. Understand the characteristics of some food starches and study the manufacture of cement, dyes, Glass, Soap and detergents by modern methods.
CO-20. Know the role of agriculture chemistry and its potential

CO-21. Understand the basic concept of soil, properties of soil & its classification on the basis of pH.
CO-23. Know the different plant nutrients, their functions and deficiency symptoms.
CO-24. Identify the problematic soil and recommend a method for their reclamation.
CO-25. Have the knowledge of various pesticides, insecticides, fungicides and herbicides.

CO-26.Understand Mechanics of system of particles and know the Redox reaction.
CO-27. Study the Crystal Field Theory.
CO-28.Solve the cell reaction and calculate EMF and calculate interplanar distance.
CO-29.Understand De-Broglie hypothesis and Uncertainty principle
CO-30. Derive Schrödinger's time dependent and independent equations

CO-31 Study the electronic configuration of lanthanides and actinides and get knowledge of Crystalline solid.
CO-32. Understand different operation in stoichiometric molecule and study the Bio-inorganic chemistry.
CO-33. Understand the p-type semiconductor and n-type semiconductor.

CO-34.To study UV, IR and NMR spectroscopy.

CO-35. Discuss different types of rearrangement reactions.

CO-36. Determine structure of compound by spectroscopic methods and understand the difference between carbocation and carbanion.
CO-37.To study alkaloids, Ephedrine, citral molecule with their properties and application.

CO-38. Know the different analytical techniques.

CO-39. To understand different types of separation techniques and to study principle, construction and working of GC and HPLC and to give an extended knowledge about chromatographic techniques used for separation of amino acids.
CO-40. Discuss the problem based on distribution coefficient and extraction techniques.

CO-41. Know the various pharmaceutical drugs, their application and synthesis.
CO-42. To study the waste management.

CO-43. To understand the function of dyes, paints and pigments.
CO-44. To study the various type of surfactants.
CO-45. To know about molasses and bagasse and to study the different types ofpolymer.

CO-46. Know the market of milk in different breeds.

CO-47. Understand the basic principle of sterilization, homogenization, and standardization of milk.
CO-48. Study the flow sheet diagram of shrikhand powder, whey powder, and ice-cream.
CO-49. Study the different nutrient value in milk.

CO-50. Calculate molar and normal solution of various concentrations and determine specific rotations and percentage of to optically active substances by polorimetrically.
CO-51. Study the energy of activation and second order reaction and study the stability of complex ion and stranded free energy change and equilibrium constant by potentiometry.
CO-52. Find out the acidity, Basicity and PKa Value on pH meter.

CO-53. Study the gravimetric and volumetric analysis of ores and alloy and prepare a various inorganic complexes and determine its % purity and to study binary mixture with removal of borate and phosphate.
CO-54. To understand the chromatographic techniques

CO-55. Perform the Binary mixtures.
CO-56. Preparation of organic compounds, their purifications and run TLC.
CO-57. Determination of physical constant: Melting point, Boiling point.
CO-58. Different separation techniques.

2)PHYSICS

Department of Physics	After successful completion of three year degree program in physics a student should be able to;
PROGRAM OUTCOMES	PO-1. Demonstrate, solve and an understanding of major concepts in all disciplines of physics.
	PO-2. Solve the problem and also think methodically, independently

	and draw a logical conclusion.
	PO-3. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.
	PO-4. Create an awareness of the impact of Physics on the society, and development outside the scientific community.
	PO-5. To inculcate the scientific temperament in the students and outside the scientific community.
	PO-6. Use modern techniques, decent equipments and Phonics software's

PROGRAM SPECIFIC OUTCOMES

PSO-1.	Gain the knowledge of Physics through theory and practical‟s.
PSO-2.	Understand good laboratory practices and safety.
PSO-3.	Develop research oriented skills
PSO-4.	Make aware and handle the sophisticated instruments/equipments.

COURSE OUTCOMES

CO-1. Know the Cartesian, spherical polar and cylindrical co-ordinate systems.
CO-2. To understand the Special Theory of Relativity.
CO-3. Discuss the Michelson- Morley Experiment.
CO-4 To obtain the series solution by Frobenius method .
CO-5 Study the Generating function for Legendre, Hermite polynomials.

CO-6. Know the principles of structures determination by diffraction
CO-7. To understand the principles and techniques of X-rays diffraction
CO-8. Know the fundamental principles of semiconductors and be able to estimate the charge carrier mobility and density
CO-9. To give an extended knowledge about magnetic properties like diamagnetic, paramagnetic, ferromagnetic, ferrites and superconductors.

CO-10.Understand Newton's Laws of motion and their applications such as projectile and rocket motion

CO-11. Gain the knowledge of motion in central force field
CO-12. Classify elastic and inelastic scattering
CO-13. Know the difference between Laboratory and centre of mass system
CO-14. Understands Lagrangian and Hamiltonian formulation
CO-15 Solve the problems using Lagrangian and Hamiltonian formulation
CO-16 Get knowledge of canonical trans formation and Poisson's bracket .

CO-17. To know the Rutherford Experiment of atom.
CO-18. To understand molecular spectra of atom.
CO-19. To study the Raman spectra.
CO-20. To study the Zeeman Effect.
CO-21. To understand the Quantum Numbers.

CO-22. Write algorithm and flow chart for c-programming language.
CO-23. To use of iterative, decision making and the jump statement.
CO-24. Understand the concept of arrays and pointers.
CO-25. Study of user defined functions and program structures.
CO-26. Able to use the concept graphics in c language.

CO-27. To study the Mechanical, Electrical and Thermal Properties of material.
CO-28. Discuss the type of Phase Diagrams.
CO-29. Know the solid solution and types of solid solution.
CO-30. Understanding the Point Defect, Line Defect with example.
CO-31.Study the Diffusion Mechanism.
CO-31. Know the difference between Elastic and Plastic Deformation.
CO-32. To understand the Polymer Vulcanization of rubber.
CO-33. Know the AX-type crystal structure – eg. NaCl, ZnS etc.

CO-34.Understand Mechanics of system of particles.
CO-35.Know the Motion in Central Force Field.
CO-36 Elastic and inelastic scattering.
CO-37.Solve Langrangian and Hamiltonian formulation.
CO-38. Learn Canonical Transformation and Poisson"s Bracket.

CO-39.Understand De-Broglie hypothesis and Uncertainty principle.

CO-40. Derive Schrödinger's time dependent and independent equations
CO-41. Solve the problems using Schrödinger"s steady state equation
CO-42. Get knowledge of rigid rotator
CO-43. Understand different operators in Quantum Mechanics.

CO-44.Tomstudy kinetic theory of Gases.

CO-45. To study Maxwell Relations and Application.
CO-46. Know the elementary concept of statistics.
CO-47. Understand statistical distribution of system of particles.
CO-48.To study statistical ensembles.

CO-49.To study Quantum statistics.

CO-50. Know the properties of nucleus likes binding energy, magnetic dipole moment and electric quadruple moment
CO-51. To understand the concept of radioactivity and decays law
CO-52. To study achievement of Nuclear Models of Physics and its limitations
CO-53. To give an extended knowledge about nuclear reactions such as nuclear fission and fusion

CO-54. To understand the basic concept of Particle Physics.

CO-55. Know the special purpose Diode.
CO-56. To study the Transistor Amplifier.
CO-57. To understand the FET, JFET,MOSFET.
CO-58. To study the Operational Amplifier and their types. CO-59. To know the Timer IC- 555 and its classification. CO-60. To study the Regulated Power supply.

CO-61. To understand the Sequential Logic Circuits.

CO-62. Know the history of LASERS and its basic concepts.
CO-63. Understand the basic principle and working of different types of lasers.
CO-64. Know the applications of lasers in various fields.
CO-65. Understand the characteristics of LASERS.

CO-66. Learn safety precaution sand measures while handling the lasers.

4)MATHEMATICS

PROGRAM OUTCOMES

PO1.	Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
PO2.	A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
PO3.	Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
PO4.	Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.

PO5.	Enhancing students' overall development and to equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
PO6.	Ability to pursue advanced studies and research in pure and applied mathematical science.

PROGRAM SPECIFIC OUTCOMES

PSO1.	Think in a critical manner.
PSO2.	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
PSO3.	Formulate and develop mathematical arguments in a logical manner.
PSO4.	Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
PSO5	.Understand, formulate and use quantitative models arising in social science, Business and other context.

COURSE OUTCOMES

CO1. Learn to solve system of linear equation.
CO2. Learn to solve Diophantine equation.
CO3. Learn to find roots of polynomial over rational.
CO4. Learn to find graphs, roots and primes integer using maxima software.
CO5. Introduction to complex analysis.
CO6. Gain Knowledge of fundamental concepts of real numbers.
CO7. Verify the value of the limit of a function at a point using the definition of the limit
CO8. Introduction to sequence and series.
CO9. Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.
CO10. Learn Maxima software.
CO11. Problem solve on algebra and calculus by using maxima software.
CO12. Knowledge of application of mathematics
CO13. Introduction to analytical geometry of 2 dimensional.
CO14. Study of lines in 2 and 3 dimension.
CO15. Finding equation in various form of line, circle, ellipse, sphere, cones etc.
CO16. Give the knowledge of geometry using maxima software.
CO17. Student will be to understand differentiation and fundamental theorem in differentiation and various rules.
CO18. Geometrical representation and problem solving on MVT and Rolls theorem.
CO19. Finding extreme values of function.
CO20. Introduction to Ordinary Differential Equation.

CO21. Learn Maxima software.
CO22. Problem solve on analytic geometry and calculus by using maxima software.
CO23. Problem solving on geometry and calculus.
CO24. Gain Knowledge of fundamental concepts of real numbers in n dimensions.
verify the value of the limit of a function at a point using the definition of the limit in R*R
CO25. Find the extreme value in 2 dimensions.
CO26. Study multiple integration.
CO27. To understand logical concepts and to show logical equivalences by using truth tables and rules in logics.
CO28. Learn concept related to counting.
CO29. Introduction to advanced counting.
CO30. Problem solving on multivariable calculus and discrete mathematics.
CO31. Introduction to application of mathematics in real life.
CO32. Learn to build logical concept.
CO33. Introduction to vector space and subspace.
CO34. Use computational techniques and algebraic skills essential for the study of systems of CO35. Linear equations, matrix algebra, vector spaces, eigen values and eigenvectors,
CO36. Orthogonality and Diagonalization.
CO37. To apply appropriate numerical methods to solve the problem with most accuracy.
CO38. Using appropriate numerical methods determine approximate solution of ODE and system of linear equation.
CO39. Compare different methods in numerical analysis w.r.t accuracy and efficiency of solution.
CO40. To demonstrate used of interpolation method in numerical analysis.
CO41. Use computational techniques and algebraic skills essential for the study of systems of Linear equations, matrix algebra, vector spaces, eigen values and eigenvectors, Orthogonality and Diagonalization.
CO42. Able to understand the Euclidean distance function on R n and appreciate its properties, and state and use the Triangle and Reverse Triangle Inequalities for the Euclidean distance function on R n Explain the definition of continuity for functions from R n to R m and determine whether a given function from R n to R m is continuous
CO43. Explain the geometric meaning of each of the metric space
CO44. Distinguish between open and closed balls in a metric space
CO45. Define convergence for sequences in a metric space and
CO46. Determine whether a given sequence in a metric space converges
CO47. Describe fundamental properties of the real numbers that lead to the formal development of real analysis.
CO48. Comprehend rigorous arguments developing the theory underpinning real analysis.
CO49. Demonstrate an understanding of limits and how they are used in sequences, series,
CO50. Construct rigorous mathematical proofs of basic results in real analysis
CO51. Appreciate how abstract ideas and rigorous methods in mathematical analysis can be applied to important practical problems.
CO52. Problem solving on metric space and connected and contactless.

CO53. Understand the importance of algebraic properties with regard to working within various number systems.
CO54. Extend group structure to finite permutation groups (Caley Hamilton Theorem). Generate groups given specific conditions.
CO55. Symmetry using group theory.
CO56. Understand the three major concrete models of Boolean algebra: the algebra of sets, the algebra of electrical circuits, and the algebra of logic.
CO57. Student will be able to solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases.
CO58. Student will be able to find the complete solution of a nonhomogeneous differential equation as a linear combination of the complementary function and a particular solution.
CO59. Student will have a working knowledge of basic application problems described by second order linear differential equations with constant coefficients.
CO60. Student will be able to find the complete solution of a differential equation with constant coefficients by variation of parameters.
CO61. Demonstrate by solving various problem based on Symmetry using group theory
CO62. Find quotients and remainders from integer division
CO63. Apply Euclid's algorithm and backwards substitution
CO64. Understand the definitions of congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
CO65. Determine multiplicative inverses, modulo n and use to solve linear congruence.
CO66. Theory of quadratic residue
Develop linear programming (LP) models for shortest path, maximum flow, minimal spanning tree, critical path, minimum cost flow, and transshipment problems.
CO67. Understand the mathematical tools that are needed to solve optimization problems.
CO68. Formulate pure, mixed, and binary integer programming models.
Formulate the nonlinear programming models.
Use some solution methods for solving the nonlinear optimization problems.
CO69. Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering
CO70. Understand the definitions of congruence, residue classes and least residues add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
CO71. Application based on Diophantine and Chinese remainder theorem and operational research. Compute sums, products, quotients, conjugate, modulus, and argument of complex numbers · Define and analyze limits and continuity for complex functions as well as consequences of continuity Conceive the concepts of analytic functions and will be familiar with the elementary complex functions and their properties ·
CO72. Determine whether a given function is differentiable, and if so find its derivative. Applies the theory into application of the power series expansion of analytic functions · Understand the basic methods of complex integration and its application in contour integration. · Analyze sequences and series of analytic functions and types of convergence, ·
CO73. Evaluate complex contour integrals directly and by the fundamental theorem, apply

the Cauchy integral theorem in its various versions, and the Cauchy integral formula.
CO74. Understand Integrability and theorems on integrability. Recognize the difference between point wise and uniform convergence of a sequence of functions.
Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.
CO75. Study improper integration using Riemann integration.
Applies the theory into application of the power series expansion of analytic functions · CO76. Understand the basic methods of complex integration and its application in contour integration. ·
CO77. To analyze sequences and series of analytic functions and types of convergence,
Evaluate complex contour integrals directly and by the fundamental theorem, apply the CO78. Cauchy integral theorem in its various versions, and the Cauchy integral formula
Solve improper integration using Riemann integration.
Solve problem on convergence of function.
CO79. Students will be able to define ring and subrings.
Study of ideals and concept related to ideal.
Study of various integral domain in ring.
CO80. Introduction to field.
Be familiar with the modeling assumptions and derivations that lead to PDEs.
Recognize the major classification of PDEs and the qualitative differences between the classes of equations.
CO81. Be competent in solving linear PDEs using classical solution methods.
Problem on ring and PDE.
Application of PDE in real life.
CO82. Various structural study of ring.
Students will able to understand two dimensional transformations.
CO83. Students will able to understand three dimensional transformations.
To get acquainted with typical problem on CG and existence solution.
CO84. Introduction to projection and its types. Bezier curves.
Understand and apply the concept of optimality criteria for various type of optimization problems.
CO85. Solve various constrained and unconstrained problems in single variable as well as multivariable. Solve simple games using various techniques ·
CO86. Analyze economic situations using game theoretic techniques ·
Recommend and prescribe which strategies to implement
CO87. Problem solving on CG & OT.
Application of projection in real life.
CO88. Solve optimal real life problem based on supply and demands.
Solve simple games using various techniques ·
CO89. Analyze economic situations using game theoretic techniques ·
Recommend and prescribe which strategies to implement.

D)BOTANY

PROGRAM OUTCOME

PO1.	Knowledge and understanding of: 1. The range of plant diversity in terms of structure, function and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification and the flora of Maharashtra. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics. 6. Statistics as applied to biological data.
PO2.	**Intellectual skills – able to**: 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.
PO3.	**Practical skills:** Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry. 5. Analyze data using appropriate statistical methods and computer packages. 6. Plant pathology to be added for sharing of field and lab data abtained.
PO4.	Transferable skills: 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to work as part of a team. 4. Ability to use library resources. 5. Time management. 6. Career planning.
PO5.	**Scientific Knowledge:** Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.
PO6.	**Problem analysis:** Identify the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PROGRAM SPECIFIC OUTCOMES

PSO1.	Design solutions from medicinal plants for Health problems, disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health.
PSO2	. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.
PSO3.	Create, select, and apply appropriate techniques, resources, and modern instruments and equipments for Biochemical estimation, Molecular Biology,

	Biotechnology, Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.
PSO4.	Apply reasoning informed by the contextual knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.
PSO6.	Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.
PSO7.	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

COURSE OUTCOMES

136. Understand the diversity among Algae.

137. Know the systematic, morphology and structure, of Algae. Understand the life cycle pattern of Algae.

138. Understand the useful and harmful activities of Algae.

139. Understand the Biodiversity of Fungi

140. Know the Economic Importance of Fungi

141. Understand the morphological diversity of Bryophytes.

142. Understand the economic importance of the Bryophytes.

143. Understand the Biochemical nature of cell.

144. Know the chemical nature of biomolecules.

145. Understand the different types of interaction in Biomolecules.

146. Structure and general features of enzymes.

147. Concept of enzyme activity and enzyme inhibition.

148. Learn about the movement of sap and absorption of water in plant body.

149. Understand the plant movements.

150. Understand the morphological diversity of Bryophytes and Pteridophytes and Gymnosperms.

151. Understand the economic importance of the Bryophytes and Pteridophytes and Gymnosperms.

152. Know the evolution of Bryophytes and Pteridophytes and Gymnosperms.

153. Understand the habit of the angiosperm plant body.

154. Know the vegetative characteristics of the plant.

155. Learn about the reproductive characteristics of the plant.

156. Understand the plant morphology and basic taxonomy.

157. The eukaryotic cell cycle and mitotic and meiotic cell division

158. Structure and organization of cell membrane

159. Process of membrane transport and membrane models

160. Mendelian and Neo-mendelian genetics

161. To study the phenomenon of dominance, laws of segregation, independent assortment of genes.

162. To understand the different types of genetic interaction, incomplete dominance, codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance etc.

163. Understand the diversity among Algae.

164. Know the systematic, morphology and structure, of Algae.

165. Understand the life cycle pattern of Algae.

166. Understand the useful and harmful activities of Algae.

167. Understand the Biodiversity of Fungi

168. Know the Economic Importance of Fungi

169. Understand the morphological diversity of Bryophytes.

170. Understand the economic importance of the Bryophytes.

171. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.

172. Become aware of applications of different plants in various industries.

173. To highlight the potential of these studies to become an entrepreneur.

174. To equip the students with skills related to laboratory as well as industries based studies

175. Know importance and scope of plant physiology.

176. 2Understand the plants and plant cells in relation to water.

177. Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.

178. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.

179. Learn about the movement of sap and absorption of water in plant body

180. Understand the plant movements.

181. Know the scope and importance of the discipline.

182. Understand plant communities and ecological adaptations in plants.

183. Know the concept of methodology in taxonomy.

184. Learn about conservation of biodiversity, Non-conventional Energy and Pollution.

185. Discover botanical regions of India and vegetation types of Maharashtra.

186. Understand Bioremediation, Global warming and climate change.

187. On completion of the course, students are able to:

188. Gain knowledge about "Cell Science".

189. Understand Cell wall Plasma membrane, Cell organelles and cell division.

190. Learn the scope and importance of molecular biology.

191. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.

192. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

193. Understand the role plants in human welfare.

194. Gain knowledge about various plants of economic use.

195. Know importance of plants & plant products.

196. Understand the chemical contents of the plant products.

197. Know about the utility of plant resources.

198. Understand the diversity among Algae.

199. Know the systematic, morphology and structure, of Algae.

200. Understand the life cycle pattern of Algae.

201. Understand the useful and harmful activities of Algae.

202. Understand the Biodiversity of Fungi

203. Know the Economic Importance of Fungi

204. Understand the morphological diversity of Bryophytes.

205. Understand the economic importance of the Bryophytes.

206. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.

207. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.

208. Understand the various fossil genera representing different fossil groups.

209. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.

210. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

211. Know the details of Microscopy- Principles of light microscopy, electron microscopy (TEM and SEM).

212. Understand & perform Chromatography and cultural techniques in Botany.

213. Understand the methods used in Micrometry, Microtomy and Microphotography.

214. Learn and understand about mineral nutrition in plants.

215. Understand the growth and developmental processes in plants.

216. Know about Photosynthesis and Respiration in plants.

217. Understand the process of translocation of solutes in plants

218. Know the nitrogen metabolism and its importance.

219. Understand the properties of Monosaccharides, Oligosaccharides and Polysaccharides.

220. They will learn about the Significance of Carbohydrates.

221. Understand the Properties of saturated fatty acids, and unsaturated fatty acids.

222. Understand lipid metabolism in plants.

223. Understand the Beta Oxidation, Gluconeogenesis and its role in mobilization of fatty acids during germination.

224. They will learn about the Significance of lipids.

225. They will be able to understand Brief outline of biosynthesis of amino acid.

226. Understand the protein - structure and classification and protein biosynthesis in prokaryotes and eukaryotes.

227. They will learn about the nucleic acid metabolism.

228. Understand the diversity of Gymnosperms in India

229. Know the evolutionary trends and affinities of living gymnosperms with respect to external and internal features

230. Know the conceptual development of „taxonomy" and „systematics"

231. Understand the Phylogeny of angiosperms -A general account of the origin of Angiosperms.

232. Understand the general range of variations in the group of angiosperms.

233. Trace the history of development of systems of classification emphasizing angiospermic taxa.

234. To learn the wide activities in angiosperm and trends in classification.

235. Learn about the characters of biologically important families of angiosperms.

236. Know the floral variations in angiospermic families, their phylogeny and evolution.

237. Understand various rules, principles and recommendations of plant nomenclature produces in plant identification.

238. Understand major evolutionary trends in various parts of angiospermic plants

239. Know the methods of pollination and fertilization.

240. Know fertilization, endosperm and embryogeny.

241. Understand the scope & importance of Anatomy.

242. Know various tissue systems.

243. Understand the normal and anomalous secondary growth in plants and their causes.

244. Perform the techniques in anatomy.

245. With respect to recent knowledge students should know about the different tools in the taxonomy so as to relocate the phylogenetic position of plant or taxa.

246. Understand the concept, principle and types of sterilization methods.

247. Know the concept and characteristics of antiseptic, disinfectant and their mode of action.

248. Know the cultivation methods of bacteria, yeast, fungi and virus.

249. Principle, working and applications of instruments viz, pH meters, spectrophotometer, centrifuge, viscometer, and laminar air flow.

250. Understand the Microbial Genetics and Recombination in Bacteria.

251. Know the terminologies in plant pathology.

252. Understand the scope and importance of Plant Pathology.

253. Know the prevention and control measures of plant diseases and its effect on economy of crops.

254. Understand the science of plant breeding.

255. To introduce the student with branch of plant breeding for the survival of human being from starvation.

256. To study the techniques of production of new superior crop verities.

257. Understand the modern strategies applied in Genetics and Plant Breeding to sequence and analyze genomes

258. Get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e. Mass selection, Pureline Selection and Clonal selection.

259. Know about exploitation of Heterosis, hybrid and variety development and their release through artificial hybridization.

260. Understand the role plants in human welfare.

261. Gain knowledge about various plants of economic use.

262. Know importance of plants & plant products.

263. Understand the chemical contents of the plant products.

264. Know about the utility of plant resources.

265. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.

266. Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication.

267. Understand the fundamentals of Recombinant DNA Technology.

268. Know about the Genetic Engineering.

269. Understand the principle and basic protocols for Plant Tissue Culture.

270. The concept of operon and its structure and regulation.

7) ZOOLOGY

PROGRAM OUTCOMES

PO-1.	Demonstrate, solve and an understanding of major concepts in all disciplines of Zoology.
PO-2	. Solve the problem and also think methodically, independently and draw a logical conclusion.
PO-3.	Understand the evolution, history of phylum.
PO-4.	Create an awareness of the impact of Zoology on the environment, society, and development outside the scientific community.
PO-5.	To study and understand the classification of whole phyla includes in Non chordates with the help of charts/models/pictures.
PO-6.	To inculcate the scientific temperament in the students and outside the scientific community.
PO-7.	Use modern techniques, decent equipments and Zoology software"s

PROGRAM SPECIFIC OUTCOMES

PSO-1.	Gain the knowledge of Zoology through theory and practical"s.
PSO-2.	Study and understand the DNA Recombinant technology.
PSO-3.	Understand the testing of hypothesis.

PSO-4.	Use modern Zoological tools, Models, Charts and Equipments.
PSO-5.	Know structure-activity relationship.
PSO-6.	Understand good laboratory practices and safety.
PSO-7.	Develop research oriented skills.
PSO-8.	Make aware and handle the sophisticated instruments/equipments.

COURSE COUTCOMES

CO-1 Understand the evolution, history of phylum.
CO-2 Understand about the Non Chordate animals.
CO-3 To study the external as well as internal characters of non chordates.
CO-4 To study the distinguishing characters of non chordates.
CO-5 Understand the economical importance of Molluscs

CO-6 Understand the various internal systems like Digestive system, nervous system with the help of charts.

CO-7 Understand the functions of Gemmules and spicules.
CO-8 Understand the economical importance of Molluscan shells.
CO-9. Understand the terms Histology and Physiology

CO-10. Understand the cell, tissue, organ, system and organisms.
CO-11. Study the derivatives of skin- horns, nails, hairs.
CO_12. Study and understand the terms- acidosis, alkalosis, asphexia, hypoxia, anoxia and cyanosis.
CO-13. Understand about the agencies responsible for Production of various products using biochemistry.
CO-14. Understand the term pH, Buffer.

CO-15. Understand the structure and function of carbohydrate, amino acids, proteins, and lipids.

CO-16. Understand the concept Enzymes and also Vitamins and minerals.
CO-17. Understand the Principle role of Vitamins in metabolism and Deficiency diseases.
CO-18. Know the biotic and abiotic components of ecosystem.
CO-19.Food chain & food web in ecosystem.
CO-20.Understand diversity among various groups of animal kingdom.
CO-21.Understand Animal community & ecological adaptation in animals.
CO-22. Scope , importance and management of biodiversity
CO-23.To study and understand the scope and branches of Medical Zoology. CO-24. To aware the students for various parasites and diseases which spreads in human with the help of study of host-parasite relationship.
CO-25. To increase awareness for the health in students.
CO-26. Understand the various disease causing vectors like Mosquitoes. CO-27. To aware about the typhoid, cholera likes disease.

CO-28. Understand the importance of medical diagnostic and also understand the term forensic Entomology

CO-29. Understand the Scope of cell biology, because cell is the basic unit of life.

CO-30. Understand the Main distinguishing characters between plant cell and animal cell.

CO-31. To study and understand the whole cell organelles with their structure and function.

CO-32. Understand the cell cycle and know the importance of various cells in body of organisms.

CO-33. Understand the various applications of cells by using cell biology like study of various types of tumour.

CO-34.Understand the Animal cells and various cell organelles by using microphotographs.

CO-35.Understand the various Applications of Biotechnology.

CO-36. Study and Understand the Hybridoma technology as well as Enzyme biotechnology.

CO-37. Study and understand the DNA Recombinant technology.

CO-38. Understand the industrial and environmental biotechnology.

CO-39. Study and understand the Stem cell biotechnology.

CO- 40. Understand the Scope and Significance of Biotechnology.

CO-41.Understand the Importance of physiology and branches of it.

CO-42.Understand the terms-Osmosis, diffusion, pH and Buffer.

CO-43.Understand the Digestion and Excretion process, by studying the Organs of it

CO-44.Understand the process of Metabolism.

CO-45.Understand the term Detoxification.

CO-46.Understand the Circulatory system and Lymphatic system.

CO-47.Study the nervous system.

CO-48.Understand the Molecular biology and molecular biology.

CO-49.Understand the cell divisions and types of mutation.

CO-50.Understand the structure and function of the cells.

CO-51.Understand the term cell signalling.

CO-52.Aware the students for Cancer.

CO-53.Understand the Tools and Techniques in Molecular Biology.

CO- 54.Understand the term ELISA technique and DNA finger printing.

CO-55. To understand Origin of life with respect to prokyariotic and eukaryotic cells.

CO-56. Understand the evidences of organic evolution by anatomical embryological list, paleontological, physiological, genetics and molecular biology evidences.

CO-57. Understand theories of organic evolution, isolation, speciation.

CO-58. Understand geological time scale, methods and classification of animal distribution and factors affecting animal distribution.

CO-59.Understand the terms: Gametogenesis, Fertilization and early development.

CO- 60.Understand the Morphogenesis and Organogenesis in animals.

CO-61.Understand the Aging, Apoptosis and Senescence.

CO-62.Understand the fundamentals of agricultural, forest, medical and veterinary entomology.

CO-63.Understand, Morphology and Anatomy of Insects.

CO-64. Understand intra specific and inter specific relationships among insects.

CO-65. To understand significance of beneficial and harmful insects with reference to their habit and habitat, life cycle, diseases caused by them and their control measures.

16. STATISTICS

PROGRAM OUTCOMES

When the student joins college after school they are free to make their own choices which are very instrumental in changing their attitude towards life and society. It is very important to give them an appropriate and conducive environment to learn and grow. After completion of the degree apart from his/her specialty in the program of his/her choice the student learns a lot during their three year stay that makes them mature enough to take the right decisions at the right time. Students develop analytical thinking and good communication skills during classroom teaching (through projects/presentation/practical) and also as they participate in various activities both at departmental as well as college level.

Being a Central University, the student gets a chance to communicate with students of other states of India which makes them culturally sensitive and socially interactive.

As part of various departmental /college seminars and workshops he learns to respect and protect the environment. These programs also help in generating gender sensitization and building of ethical values to become a responsible citizen when he/she graduates from the college.

PROGRAM SPECIFIC OUTCOMES

Statistics is the language of the uncertainties riddled modern information age. This program is a compact combination of detailed courses of Statistics and adequate amount of courses on Computer Science, Mathematics and Operations research to complement and offer diversification after the completion of program. The thrust of the program is to provide a platform for pursuing higher studies leading to post-graduate or doctorate degrees. Along with this students are equipped with skill enhancement courses like Research methodology, Statistical packages and R language. Apart from this there is a range of Generic electives courses in Economics, Commerce, Computer Science etc. which students choose as per their interest and aptitude. This enhances theoretical rigor with technical skills which prepare students to become globally competitive to enter into a promising professional life even after graduation.

This program offers a range of traditional avenues in academics, Govt. Service, IAS, Indian Statistical/ Economic Services, Industries, Commerce, Investment Banking, Banks and Insurance Sectors, CSO and NSSO, Research Personnel/Investigator in Govt. organizations such as NCAER, IAMR, ICMR, Statistical and Economic Bureau & various PSUs., Market Research, Actuarial Sciences, Biostatistics, Demography etc. It also provides an array of non-traditional employment avenues ranging from Stock Brokers Analyst, Sports Analyst, Poll Analyst, Business Analyst, Financial Analyst, Content Analyst etc.

COURSE OUTCOMES

Descriptive Statistics

The learning objectives include summarizing the data and to obtain its salient features from the vast mass of original data.

After completing this course, the students should have developed a clear understanding of

- Concepts of statistical population and sample, variables and attributes.

- Tabular and graphical representation of data based on variables.
- 'Conditions for the consistency' and criteria for the independence of data based on attributes.
- Measures of central tendency, Dispersion, Skewness and Kurtosis.
- Moments and their use in studying various characteristics of data.
- Different approaches to the theory of probability.
- Important theorems on probability and their use in solving problem
- Concept of correlation, various correlation coefficients- Pearson's correlation coefficient, Spearman's rank correlation coefficient, partial correlation coefficient and Multiple correlation coefficient.
- Concept of Principle of least squares for curve fitting and regression lines.

Calculus

Calculus is versatile and Valuable tool for the statistics. Calculus being used in statistics involves integrating over sections of a probability distribution. The content of this paper involves differential calculation, integral calculus and solution of different differential equations which are extremely prevalent in more advanced statistical application.

Probability and Probability Distributions

A probability distribution is a statistical model that shows the possible outcomes of a particular event or course of action as well as the statistical likelihood of each event. Probability distribution functions are quite important and widely used in actuarial science (insurance), engineering, physics, evolutionary biology, computer science and even social sciences such as psychiatry, economics and even medical trials.

Algebra

Algebra is one of the most important courses in the field of statistical computing. The course serves as a building block that will enable students to learn more advanced techniques that will help them to solve problems more quickly and easily.

After completing course, students should have developed a clear understanding of:

- Theory of equations
- Properties of matrices and determinants
- Linear equations
- Rank of a matrix
- Generalized inverse
- Characteristics roots and vectors
- Quadratic forms

. The students will be conversant for their potential studies of Markov chain & stochastic process, Multivariate analysis, Regression analysis, Design of Experiments.

Sampling Distribution

4. To understand the concept of sampling distributions and their applications in statistical

inference.

5. To understand the process of hypothesis testing and its significance
6. Importance of Standard Error and to draw conclusions using p-value

Survey Sampling and Indian Official Statistics

Survey Sampling provides the tolls/ techniques for selecting a sample of elements from a target population keeping in mind the objectives and nature of population. Most of the research work is done through Sample Survey. The students are able to know about Indian Official Statistical System.

After completing the course, students should have developed clear understanding of:

- Basic concepts of survey sampling
- Principles of survey sampling and main steps involved in selecting a sample
- Simple random sampling
- Stratified random sampling
- Systematic sampling
- Ratio and Regression method of estimation
- Cluster sampling (equal cluster size)
- Concepts of sub sampling
- Indian Official Statistical System

Mathematical Analysis

Numerical Analysis:

Theory of finite differences deals with the changes that take place in the value of the dependent variable due to finite changes in the independent variable.

On completion of the course, students should have achieved the following

1) Mathematical Operators (Forward and Backward difference operators , Shift Operator ,Central difference operator ,Derivative)
2) Approximating a given set of data by a function using interpolation formula.
3) Newton Gregory interpolation formula (forward and backward) for arguments at equal intervals
4) Newton's Divided difference interpolation formula and Lagrange's interpolation formula(for unequal intervals)
5) Central Difference interpolation formula(Gauss and Sterling's)
6) Representation of a polynomial in factorial Notation
7) Numerical Quadrature using the interpolation formula(Trapezoidal Rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ quadrature formula
8) Solution of Difference equations

Real Analysis:

Students will have the knowledge of basic properties of the field of real numbers, the knowledge of the series of real numbers and convergence, Bolzano –Weirstrass theorem, Cauchy criteria, the knowledge of real functions-limits of functions and their properties, notion of continuous functions and their properties and the differentiability of real functions and related theorems

Statistical Inference

Statistical inference: Drawing conclusions about the whole population on the basis of a sample.

Statistical inference is the process of deducing properties of an underlying probability distribution by analysis of data. Inferential statistical analysis infers properties about a population, this includes testing hypotheses and deriving estimates.

Linear Models

The learning objectives includes developing a clear understanding of the fundamental concepts of linear models and a range of associated skills allowing the students to work effectively with them. The linear models are useful both in the planning stages of research and in the analysis of resulting data. The combination of theory and applications will prepare students to explore the course & more correctly interpret the output from linear model computer package.

After completing the course students should have developed clear understanding of:

- Basic concepts of linear models. Theory and estimation of linear models
- Gauss Markov Theorem and its use

- Fitting of these models, derivation of confidence interval, testing the hypothesis and interpretation of results
- Simple and multiple linear regression models and their applications
- Distribution of Quadratic Forms
- Techniques of analysis of variance and covariance for fixed effect models
- Concepts of residuals and outliers.

Stochastic Processes and Queuing Theory

After completing this course, students should have developed a clear understanding of

9) The fundamental concepts of stochastic processes
10) Tools needed to analyze stochastic processes
11) Markov chains
12) Stability of Markov chains
13) Poisson process and its variations
14) Queuing systems
15) Random walk and ruin theory

16) To identify the real life applications of stochastic processes

Statistical Computing Using C/C++ Programming

4. In this course students learn to write code in C to do statistical computing and its role in problem solving. C is a powerful, structured programming language widely used in all areas of study.

5. Student will understand basic data structures and develop logics which will help them to create well-structured programs using C language. It develops the analytical as well as logical thinking of the student.

6. It also opens the adaptability to learn any other programming language and using computer languages/software as a tool to analyze data statistically.

Design of Experiments

DOE is a tool to develop an experimentation strategy that maximizes learning using a minimum of resources. Extensively used by engineers and scientists involved in the improvement of manufacturing processes to maximize yield and decrease variability. It is widely used in many fields with broad application across all the natural and social sciences, to name a few: Biostatistics, Agriculture, Marketing, Software engineering. Industry etc. After completing Course in DOE students should have developed a clear understanding of:

- The fundamental concepts of design of experiments.
- Introduction to planning valid and economical experiments within given resources.
- Completely randomized design.
- Randomized block design.
- Latin square design.
- Balanced incomplete block design.
- Full and confounded factorial designs with two and three levels.
- Fractional factorial designs with two levels.

Multivariate Analysis and Nonparametric Methods

The learning objectives include:

4) Study of theoretical concepts of Bi variant Normal and Multivariate Normal Distributions along with their properties.

5) Analyze multivariate data.

6) Application of Wald's SPRT and Non-Parametric methods of testing of hypothesis

On completion of the course, students should have achieved the following

6) The understanding of basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution.
7) Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
8) Classification method namely Discriminate Analysis.
9) Application of Wald's SPRT for testing simple null hypothesis vs simple alternative hypothesis along with the study of the O.C. function and the ASN function for various underlying continuous and discrete distributions.
10) Testing of hypothesis using Non-Parametric tests like Median test, Runs test, U test, Kruskal Wallis test etc. and ability to use them judiciously for the testing of given data.

Discipline Specific Elective Papers

Students of this course are taught to understand and predict the changes in economy. Areas of learning include:

1 Profit of experience.
2 Safety from future
3 Utility Studies
4 Sales Forecasting
5 Budgetary Analysis
6 Stock Market Analysis
7 Yield projections
8 Economic Forecasting
9 Census Analysis
10 Risk Analysis & Evaluation of changes.

The 'Operations Research' is not only confined to any specific agency like defense services but today it is widely used in all industrial organizations. It can be used to find the best solution to any problem be it simple or complex. It is useful in every field of human activities. Thus, it attempts to resolve the conflicts of interest among the components of organization in a way that is best for the organization as a whole. Main fields where OR is extensively used are:

5. National Planning and Budgeting
6. Defense Services
7. Industrial Establishment and Private Sector Units
8. Research & Development and Engineering

Econometrics deals with the measurement of economic relationships. It is an integration of economics, mathematical economics and statistics with an objective to provide numerical values to the parameters of economic relationships. It may be pointed out that the econometric methods can be used in other areas like engineering sciences, biological sciences, medical sciences, geosciences, agricultural sciences etc. In simple words, whenever there is a need of finding the stochastic relationship in mathematical format, the econometric methods and tools help.

After completing this course, students should have developed a clear understanding of:

- The fundamental concepts of econometrics.
- Specification of the model.
- Multiple Linear Regression.
- Multi collinearity.
- Hetero scedasticity.
- Autocorrelation.
- Autoregressive and Lag models
- Use of Dummy Variables
- Specification Errors

Students learn to handle censored data, techniques and tools to obtain survival probability and knowledge of clinical drug trials. After completion they can work in health industry.

In this course students learn about Probability, Tools Needed for Option Pricing: Wiener process, stochastic integration, and stochastic differential equations; Pricing Derivatives: Arbitrage relations and perfect financial markets, pricing futures, put-call parity for European options, relationship between strike price and option price; Stochastic Models in Finance; Continuous time-process-geometric Brownian motion; Ito's lemma, Black-Scholes formula for European options; Hedging portfolios: Delta, Gamma and Theta hedging; Binomial Model for European options: Cox-Ross-Rubinstein approach to option pricing and discrete dividends

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BANKI AUTONOMOUS COLLEGE,
BANKI ,CUTTACK, Odisha-754008

PROGRAM OUTCOMES(POs), PROGRAM SPECIFIC OUTCOMES(PSO) AND COURSE OUTCOMES(COs)

COMMERCE FACULTY

B.Com. Honours Programme

A) PROGRAM OUTCOME

PO1	This program could provide Industries, Banking Sectors, Insurance Companies, Financing companies, Transport Agencies, Warehousing etc., well trained professionals to meet the requirements
PO2	After completing graduation, students can get skills regarding various aspects like Marketing Manager, Selling Manager, over all Administration abilities of the Company
PO3	Capability of the students to make decisions at personal & professional level will increase after completion of this course.
PO4	Students can independently start up their own Business.
PO5	Students can get thorough knowledge of finance and commerce
PO6	The knowledge of different specializations in Accounting, costing, banking and finance with the practical exposure helps the students to stand in organization.

B) Program Specific Outcome

Statements of Programme Specific Outcomes (PSOs)

By the end of the programme, the student will be able to

PS O1	Understand the basic concepts of the commerce, management, accounting & economics.
PS O2	Analyse relationship among commerce, trade industry, services, management and administration.
PS O3	Perform all accounting activities and can handle type of business very well.

PS O4	Understand application of knowledge of commerce in business service sector industry, marketing, finance entrepreneurship development etc.
PS O5	Develop communication skills and computer awareness and rules of income tax act.
PSO6	Think about commercial and professional way or point of view.
PS O7	Understanding legal issue/ law relating to banking and insurance sector.
PS O8	Self employment confidences develop.
PS O9	Students will prove themselves in different professional exams like C.A. , C S, CMA, MPSC, UPSC. As well as other coerces
PS O10	Students will gain thorough systematic and subject skills within various disciplines of finance, auditing and taxation, accounting, management, communication, computer.
PS O11	The students will acquire the knowledge, skill in different areas of communication, decision making, innovations and problem solving in day to day business activities.
PS O12	Students can also get the practical skills to work as accountant, audit assistant, tax consultant, and computer operator. As well as other financial supporting services.
PS O13	Students will be able to do their higher education and can make research in the field of finance and commerce.
PS O14	Students will learn relevant Advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in business.

C) Statements of Course Outcomes (COs)

CO1	FINANCIAL ACCOUNTING: ✓ To enable the students to learn principles and concepts of Accountancy. ✓ Students are enabled with the Knowledge in the practical applications of accounting. ✓ To enable the students to learn the basic concepts of Partnership Accounting, and allied aspects of accounting. ✓ The student will get thorough knowledge on the accounting practice prevailing in partnership firms and other allied aspects. ✓ To find out the technical expertise in maintaining the books of accounts. ✓ To encourage the students about maintaining the books of accounts for further reference..

CO2	BUSINESS LAW: ✓ The student will well verse in basic provisions regarding legal frame work governing the business world. ✓ To know the students with the basic concepts, terms & provisions of Mercantile and Business Laws. ✓ To develop the awareness among the students regarding these laws affecting trade business, and commerce
CO3	COST ACCOUNTING: ✓ To acquaint the students with basic concepts used in cost accounting, various methods involved in cost ascertainment. To understand Basic Cost concepts, Elements of cost and cost sheet. ✓ Providing knowledge about difference between financial accounting and cost accounting. ✓ Ascertainment of Material and Labor Cost. ✓ Student's Capability to apply theoretical knowledge in practical situation will be increased
CO4	CORPORATE LAWS: ✓ The objective of the course is to impart basic knowledge of the provisions of the Companies Act, 2013 and the Depositories Act, 1996. To impart students with the knowledge of fundamentals of Company Law and provisions of the Companies Act of 2013. ✓ To apprise the students of new concepts involving in company law regime. ✓ To acquaint the students with the duties and responsibilities of Key Managerial Personnel.Case studies involving issues in corporate laws are required to be discussed.
CO5	CORPORATE ACCOUNTING ✓ This course aims to enlighten the students on the accounting procedures followed by the Companies. ✓ Student's skills about accounting standards will be developed. ✓ To make aware the students about the valuation of shares. ✓ To impart knowledge about holding company accounts, amalgamation, absorption and reconstruction of company.
CO6	**INCOME TAX LAW AND PRACTICE** ✓ To provide basic knowledge and equip students with the application of principles and provisions of Income Tax Act 1961. ✓ To give knowledge about preparation & Submission of Income Tax Return, Advance Tax, and Tax deducted at Source, Tax Collection Authorities under the Income Tax Act, 1961.

CO7	MANAGEMENT PRINCIPLES &APPLICATIONS ✓ The objective of the course is to provide the student with an understanding of basic management concepts, principles and practices. ✓ To understand the concept & functions and importance of management and its application. ✓ To make the student understand principles, functions and

CO8	**GST & INDIRECT TAX** To equip students with the principles and provisions of Goods and Services Tax (GST), which is, implemented from 2017 under the notion of One Nation, One Tax and One Market and to acquaint students with basic provisions of GST Law and basic working knowledge. To instill the Salient features of CGST Act, SGST Act (Odisha State), IGST Act. To acquaint the students on the procedure relating to levy of, collection and exemption from,tax: (CGST & SGST)- **meaning and scope of 'supply' under GST law**,
CO9	**FUNDAMENTALS OF DATA MANAGEMENT** To make students familiar with computer environment & operating systems To introduce students with accounting packages like tally. To develop skill and knowledge among students in applications of internet in education of commerce.
CO10	MANAGEMENT ACCOUNTING ✓To acquaint the students with basic concepts of management accounting, and basic understanding of tools and techniques used for managerial decision making. ✓After the completion of this paper, the students will be able to have confidence in managing cost issues and also to keep a check on cost control and taking managerial decisions.
CO11	**COMPUTERIZED ACCOUNTING & E-FILING OF TAX RETURNS** ✓ To make students familiar with computer environment ✓ To make students familiar with operating systems. ✓ To make students aware of accounting packages like tally. ✓ To develop skill among students in applications of internet in commerce education ✓ To educate students with the networking and different languages of computer.

CO12	**FUNDAMENTALS OF FINANCIAL MANAGEMENT** ✓ To familiar the students with the fundamentals of banking and thorough knowledge of Financial operations. ✓ To build up the capability of students for knowing Business Finance concepts and operations. ✓ To make the students aware of business finance tools and practices. ✓ To make understandable to the students regarding the new concepts introduced in the business finance system.
CO13	**AUDITING AND CORPORATE GOVERNANCE** ✓ At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities. ✓ Students will be versed in the fundamental concepts of Auditing and different aspects of tax. ✓ At the end of the paper student will have detail knowledge about principles and techniques of audit in accordance with current legal requirement and as per the guidelines of different statutory authorities.
CO14	BUSINESS MATHEMATICS ✓ To use and understand useful functions in business as well as the concept of EMI. ✓ To understand the different concept of population and sample and to make students familiar with Calculation of various types of averages and variation. ✓ To learn the applications of matrices in business. ✓ To understand the students to solve LPP to maximize the profit and to minimize the cost. ✓ To use regression analysis to estimate the relationship between two variables and to use frequency distribution to make decision. ✓ To understand the techniques and concept of different types of index numbers.

CO15	**DSE –1:Financial Markets, Institutions, & Services** ✓ This course enables the students, the practical knowledge and the tactics in the Financial market. ✓ To study and critically analyze the basic concepts and trends in Financial Institutions. ✓ To aware of the recent changes in the field of financial market.
CO16	**DSE-2:MERCHANT BANKING AND FINANCIAL SERVICES** ✓ Enable the students with Financial Markets and its various segments. ✓ To give the students and understanding of the operations and developments in financial markets in India. ✓ To acquaint them to gain an insight into the functioning and role of financial institutions in the Indian Economy. ✓ To enlighten the students' knowledge on Banking Regulation Acts. ✓ To give a thorough knowledge on Indian Banking System and Acts pertaining to it. ✓ To provide understanding of nature, importance, of banking sector. ✓ To know the structure of finance related areas.
CO17	**DSE – 3:Fundamentals of Corporate Tax Planning** ✓To provide a conceptual idea about the various provisions of tax planning related to corporate sector. ✓After completion of this paper, students will be able to help tax consultants in tax planning, assessment and filing income tax returns of corporate sector, thereby they can get themselves self-employed.
CO18	**DSE-4:Business Research Methods and Project Work** ✓This course aims at providing the general understanding of business research and the methods of business research. The course will impart learning about how to collect, analyze, present and interpret data. ✓After completion of this paper, the students will be able to assess and apply a range of research method on a practical project.

CO14	GE-1: MICRO ECONOMICS ✓ To provide students knowledge of Micro Economic concepts and inculcate an analytical approach to the subject matter. ✓ To arouse the students interest by showing the relevance and use of various economic theories. ✓ To apply economic reasoning to solve business problems.
CO19	GE-2:**Macro & Indian Economy** ✓ To familiarize the students with the basic concept of Macro Economics and its application. ✓ To aware students about Gross National Product (GNP), Net National Product (NNP) ,Income at Factor cost or National Income at Factor Prices,Per Capita Income , Personal Income (PI) ,Disposable Income etc. ✓ To Study the relationship among broad aggregates. ✓ To apply economic reasoning to solve the problems of the economy.
CO20	GE-3: **Business Statistics** ✓The objective of this course is to familiarize students with the basic statistical toolsused for managerial decision-making. ✓To equip the Students with the knowledge of using different statistical tools very much required in the decision making process in any business as well as business research.
CO21	GE-4 :Principles of Marketing ✓The objective of this course is to provide basic knowledge of concepts, principles, tools and techniques of marketing. ✓ After the completion of this paper, the students will able to identify marketing components and fit them in the value chain along with the various marketing strategies.
	SEC-1 :COMMUNICATIVE ENGLISH ✓ To offer relevant and practically helpful pieces of prose and poetry to students so that they not only get to know the beauty and

	communicative power of English but also its practical application ✓ To expose students to a variety of topics that dominates the contemporary socio-economic and cultural life. To make the students aware about the business communication. ✓ To understand the process and importance of communication. ✓ To develop awareness regarding new trends in business communication, various media of communication and communication devices. ✓ To extend business communication skills through the application and exercises

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