LOCF

Learning Outcomes Based Curricular Framework

POs, PSOs and COs

POSTGRADUATE PROGRAMMES

M.A English	
PROGRAMME OUTCOMES	
PO 1:	Greatly enhance their foundational knowledge about the history, literature, gender, culture, race and other perspectives of comprehending human experience.
PO 2:	Independently enquire into the pre-existing knowledge sources and assess them.
PO 3:	Efficiently take up competitive exams, interviews and other similar situations to excel.
Po 4:	Design and undertake individual research which will contribute significantly to the future ideological and societal developments.
PO 5:	Analyze and articulate the range of position that challenges the prevailing social, political, economic, ontological and ethical framework.
PO 6:	Integrate various theories and methodologies with social and environmental consciousness
PROGRAMME SPECIFIC OUTCOMES	
PSO 1:	Create a social awareness in terms of society, culture, ethnicity, ecology and gender backgrounds of literature.
PSO 2:	Utilize the different critical approaches and demonstrate them in the prescribed texts.
PSO 3:	Develop skills of research through interpretation, critical thinking and clear writing.
PSO 4:	Compile their research by applying research methodology.
PSO 5:	Evaluate teaching-learning process through various teaching aids.
PSO 6:	Identify the significance of internationally acclaimed works through the writings of highly celebrated writers including translated versions.
PSO 7:	Recognize the significance of their social and professional responsibilities as citizens with integrity.
PSO 8:	Develop analytical, research-oriented and organizational skills

COURSE OUTCOMES:	
PH 121.1 - Paper I: British Literature I (Medieval Literature to Neoclassical Literature)	
CO 1:	Enabling the students to understand the beginnings of English Literature
CO 2:	To gain an in-depth knowledge about the age and authors
CO 3:	To gauge how the era began to formulate the notions of England and English
CO 4:	Express the socio-cultural and religious practices of British people during that period
PH 122.1 - Paper II: Literary Criticism	
CO 1:	introduce the students to the concept of Literary Criticism
CO 2:	To create a working knowledge of the different types of 'criticisms'
CO 3:	Understanding the 'establishing' of the canon
CO 4:	To be able to apply some criticism to the texts
PH 123.1 - Paper III: Research Methodology and Ethics	
CO 1:	To introduce the students to the basics of doing research
CO 2:	The paper will focus on how to use the correctly write and document the thesis
CO 3:	Give information various approaches to studying and doing research in literature
CO 4:	Will guide the students to do ethical and original research
PS 124.1 - Paper IV: Modern Indian Theatre	
CO 1:	To introduce the students to origins of theatre in in India
CO 2:	To help students to critically learn to evaluate and read plays
CO 3:	Understand the contributions made by the theaters to Indian art and culture
CO 4:	To be made familiar with the various techniques employed in plays
PS 125.1 - Paper V: Children's Literature	
CO 1:	Introduce the students to the genre as a serious academic activity
CO 2:	Highlight the way in how a children's text can be 'read'
CO 3:	Discuss the complexities of the genre, Children's Literature
CO 4:	Examine the role and popularity of the authors of these texts
PS 126.1- Paper VI: Linguistics and Semiotics	
CO 1:	equip the students with the various techniques of phonology, morphology,

	syntax
CO 2:	Understand and analyse the relationship between language and society
CO 3:	Analyse the nuances associated with study of semiotics
CO 4:	Practical experience in reading and analyzing signs
PS 127.1 - Paper VII: European Literature	
CO 1:	To help students read texts in the wider context of European history.
CO 2:	Contextualize the text and read it in relation to the immediate present.
CO 3:	Understand the contributions of the authors to European Art and Culture
CO 4:	Understand the nuances of various movements associated with European Literature
PS 128.1 - Paper VIII: Ecocriticism	
CO 1:	Introduce the students to the genre of Ecocriticism
CO 2:	Examine the relation between environment and humanity
CO 3:	Analyse the texts to enable a deeper understanding of the complexities of our environment and its protection
CO 4:	Understand related theoretical frameworks like ecofeminism, eco aesthetics, so on
PS 129.1 - Paper IX: Literature from Canada, Australia and New Zealand	
CO 1:	Understand the contribution of Canada, Australia and New Zealand to Literature in English
CO 2:	Master the major literary trends in these countries
CO 3:	Analyse the ethnic and cultural diversity present in these countries
CO 4:	Examine the art form of these place's Literature
II SEMESTER **PH 121.2 - Paper X British Literature II (The Romantics and the Victorians)**	
CO 1:	To introduce the Romantic and Victorian eras to the students
CO 2:	To critically analyse the texts of the authors of the time
CO 3:	To gauge the rise of industries and technology in the socio-cultural context
CO 4:	Comprehend Britain's growing domination around the world
PH 122.2 - Paper XI: Literary Theories	
CO 1:	Introduce the students to the concept of "Literary Theories"
CO 2:	Develop a thorough understanding of the texts prescribed for study
CO 3:	Enhance their critical skills by learning to read and interpret texts

CO 4:	Application of relevant theories to the concerned texts
PH 123.2 - Paper XII: Indian Writing in English I	
CO 1:	Understand the origins of the term, Indian Writing in English
CO 2:	Critically examine the writers in the early days of Indian Writing in English
CO 3:	Examine the term Indian and the nuances associated with it
CO 4:	Evaluate the role of English in the context of the Indian subcontinent
PS 124.2 - Paper XIII: Film Studies	
CO 1:	To learn and have a greater understanding on how to read and analyze film
CO 2:	To familiarize major film theories and movements
CO 3:	To understand major concerns in Indian Films
CO 4:	To study the cultures as represented in Kannada films on the region Dakshina Kannada
PS 125.2 - Paper XIV: Twentieth Century Asian and Middle Eastern Fiction	
CO 1:	Introduce the students to the canon fiction of Asia and the Middle East.
CO 2:	Examine the role played by these writers in the literary scenario of their country
CO 3:	Understand the individual countries culture and ideology
CO 4:	Understand the diversity of cultures, ideologies and beliefs that are present in the world.
PS 126.2 - Paper XV: Fantasy Literature	
CO 1:	Examine the origins of the, genre Fantasy Literature
CO 2:	Evaluate the role played by the authors in the development of the genre
CO 3:	Understand and evaluate the various worlds of fantasy
CO 4:	Understand and evaluate Fantasy as a serious academic pursuit
PS 127.2 - Paper XVI: Literature from Africa and the Caribbean Islands	
CO 1:	Introduce the students to the Literature from Africa and the Caribbean Islands
CO 2:	Evaluate the cultural diversities present in the texts prescribed for study
CO 3:	Understand the histories of these people
CO 4:	Examine the texts from the perspectives of colonisation and slavery
PO 128.2 -Paper XVII: CBCS – Reading Literature	
CO 1:	Introduce students to the various genres in literature
CO 2:	Evaluate the concept of the text, the work and the canon
CO 3:	Help students develop the basic skills in reading the texts

CO 4:	Employ Reading strategies to analyse the text
SEMESTER III **PH 121.3- Paper XVIII: British Literature III (Modernism to Postmodernism)**	
CO 1:	Introduction of the terms Modernism and Postmodernism
CO 2:	Evaluate the devastating histories of the time and its impact
CO 3:	Examine the rise of new movements in art
CO 4:	Evaluate the texts prescribed for study on the basis of the socio cultural circumstances
PH 122.3- Paper XIX: English Language Teaching	
CO 1:	Familiarize the learners with the basics of language teaching
CO 2:	Make the learners understand the basics of language learning
CO 3:	Help the students in learning how testing is done for English as a discipline
CO 4:	Make them understand the process of generating learning material
PH 123.3-Paper XX: American Literature I	
CO 1:	Identify and recognize the modes and motifs of American Literature
CO 2:	Compare, contrast and co-relate American literature with other national and regional literatures
CO 3:	Evaluate the history to understand the formation of the American State
CO 4:	Evaluate the texts to understand the essence of American Culture
PH 124.3-Paper XXI: Indian Writing in English II	
CO 1:	To understand the latter trends in Indian Writing in English
CO 2:	To examine the formation of India as an independent state
CO 3:	Evaluate the continued role played by the English in the Indian Subcontinent
CO 4:	Discuss the role played by the authors in the final development of the genre
PS 125.3-Paper XXII: Science Fiction	
CO 1:	Examine the origins of the, genre Science Fiction
CO 2:	Evaluate the role played by the authors in the development of the genre
CO 3:	Understand and evaluate the various worlds of Science Fiction
CO 4:	To evaluate the cultural nuances present in the science fiction world
PS 126.3- Paper XXIII: Folklore and Mythology	
CO 1:	Familiarize the students with the theories of folklore and myths
CO 2:	Introduce them to the inter-disciplinary nature of the study of folklore and myth

CO 3:	Examine the rendition of the original myths and the texts prescribed for study
CO 4:	Develop interpretative skills to analyse folktales and myths on their own
PO 127.3-Paper XXIV: CBCS – Interpreting Literature	
CO 1:	To understand some basic literary criticism concepts
CO 2:	To understand the application of criticism to select texts
CO 3:	The students will be able to interpret the text by themselves
CO 4:	To be able to apply some basic theory to the texts chosen
SEMESTER IV **PH 121.4 - Paper XXV: Postcolonialism**	
CO 1:	To make the students familiar with terms of colonial, postcolonial, neocolonial, so on
CO 2:	Make use of postcolonial critical concepts to analyse cultural and sociopolitical conditions
CO 3:	Critique the specific meanings of the postcolonial condition
CO 4:	Will be able to understand the dimensions of colonialism in the postcolonial world
PH 122.4 - Paper XXVI: Cultural Studies	
CO 1:	To make students familiar with the term, Culture and its nuances
CO 2:	Evaluate the role how culture is a social construct that needs to be analysed
CO 3:	Evaluate the role of hegemony, media, institutions, so on in creating culture
CO 4:	Analyse the texts from the perspective of Cultural Studies
PH 123.4- Paper XXVII: American Literature II	
CO 1:	To continue examine the growth of American Nation into a super power
CO 2:	To discuss the experiences of other ethnic groups in America
CO 3:	To evaluate the texts from the perspective of various theories
CO 4:	To evaluate modern day America as a melting pot
PH 124.4-Paper XXVII Project	
CO 1:	To produce a research project at the end of the academic year
CO 2:	To follow all rules related to academic and research writing
CO 3:	To produce quality research
CO 4:	To try to publish the work if possible
PS 125.4- Paper XXIX: Cultures of Dakshina Kannada in Translation	
CO 1:	To introduce the students to basic concepts in translation.

CO 2:	Highlight the rich tradition available in the regional literature of Dakshina Kannada
CO 3:	Enable students to form their own interpretations of the multihued culture of modern day India
CO 4:	Be able to perform some basic translation activities
PS 126.4- Paper XXX: Diaspora Literature	
CO 1:	To critically examine the term, Diaspora and Dispora theory
CO 2:	To examine the texts and understand the nuances of Diaspora
CO 3:	To evaluate the problems of the diaspora community
CO 4:	To understand the culture and needs of the diaspora community
PS 127.4- Paper XXXI: Gender Studies	
CO 1:	To critically examine the term, Gender
CO 2:	To evaluate the problems of the groups that forms the gender minority
CO 3:	To critically evaluate on the role of patriarchy in society
CO 4:	To examine the texts and understand the nuances of gender
PS 128.4-Paper XXXII: Literature from the Margins	
CO 1:	To critically examine the term, subaltern, hegemony, margins, so on
CO 2:	To examine the plight of the various oppressed classes around
CO 3:	To critically evaluate the role of hegemonic institutions in creating the marginalized
CO 4:	To examine the texts and understand the plight of the marginalized

M.A ECONOMICS	
PROGRAMME OUTCOMES	
PO 1:	Develop an understanding about various concepts and principles in Economics.
PO 2:	Be able describe the working of the economy both domestic and international.
PO 3:	Enable the students recognise the practical possibilities of economic theory in real life.
PO 4:	Analyze the various secrs and its performance in the development process.
PO 5:	Create awareness on the inter-linkages between the political system and economic theories.
PO 6:	Assess the impact of various policies on the welfare of the community.
PO 7:	Ensure the application of the economic theories facilitate sustainable human life.
PO 8:	Develop skills have an orientation do fruitful research in the discipline.
PROGRAMME SPECIFIC OUTCOMES	
PSO 1:	To prepare the students with a laborious and broad understanding of the fundamentals of economics with various aspects of consumer behaviour, demand analysis, production theory, costs, theory of traditional markets and equilibrium of the firm. This will enable the students to take decision in the context of market interdependence, complexity, uncertainty and informational asymmetry.
PSO 2:	To cover all major theories and models dealing with the issues pertaining to economic growth and development where the learners will be able to realize the nature of the deficiencies of developing nations, need for sustainable growth, reconstruction & development and to suggest policy measures to rectify them and also to explore new avenues of growth.
PSO 3:	The extremes of poverty and wealth will be adequately addressed through a comprehensive economic analysis of the public sector which empowers the student to understand and analyse public policies and problems with an insightful vision of fiscal institutions which underline budgetary policies in general and Indian experience in particular.
PSO 4:	To provide adequate knowledge of statistical techniques to analyse economic problems through the development of research skills includes, framing testable

	hypotheses, selection of precise statistical tests, locate appropriate data for testing hypotheses, reject/accept hypotheses correctly, evaluates results, and write up the research findings.
PSO 5:	o develop a vision to achieve a mission of attaining a sustainable society by applying theoretical and empirical analysis of sources of and solutions to environmental problems, with application to local pollution challenges and global environmental issues such as climate change.
PSO 6:	To make the students aware of the quantitative and the qualitative aspects and characteristics of the population through various demographic techniques, importance of population in economic development, various theories that explains the growth of population and research directions in the field of population studies in a country.
PSO 7:	To train the students on latest theoretical developments in macroeconomics for empirical analysis, integrate method and technique to evaluate policy measures, understanding developments in labour market and gauge the trade-off in the deployment of resources to alternative ends.
PSO 8:	To prepare the students to understand and respond to economic issues and forces of Globalisation, free flow of trade in goods, governance of services and capital and it's rapidly changing scope and nature in international business and trade.
COURSE OUTCOMES:	
PH 113.1 STATISTICAL TECHNIQUES FOR ECONOMIC ANALYSIS (60 hours)	
CO 1:	Students will be able to understand the use of economic analysis in addressing important issues of developing countries.
CO 2:	Understand how the presence of externalities could influence the growth process let us focus on learning by doing externality. There are a number of firms in the economy and each uses the same production technology with diminishing returns.
CO 3:	Understand the role of agriculture, industry, and trade in the development process of the less developed countries.
CO 4:	Understand the extent to which economic theories may be helpful in the design of development policies in the less developed countries.

CO 5:	Learners should understand the need for sustainable growth, reconstruction and development. As the inequalities of the past and present - especially the extremes of poverty and wealth - cannot be adequately addressed by conventional socio-economic policies alone, other innovations can also be explored.
CO 6:	Use theories (models) to analyse real and hypothetical economic circumstances and to derive policy solutions to the problems posed in these circumstances.
	PS 114.1 ENVIRONMENTAL ECONOMICS (50 hours)
CO 1:	Understand the relationship between environment and economic growth; how economic growth affects environment; how environment development programmes affect economic growth; the tradeoff.
CO 2:	create basic ideas of the cost of environmental growth and sustainable policy approach to prevent environmental degradation, green accounting, methods of environmental valuation, Environmental concerns, environmental education, environmental awareness, environmental laws, environmental hazards and economics of recycling.
CO 3:	Enable the student to focus on economic effects of environmental policies around the world. It is a science emphasis on natural resources and its efficient allocation, management with alternatives, and environmental indemnities like air, water soil pollution, solid waste management, and global warming etc.
CO 4:	Explain how something can be both "environmentally destructive" and "economically optimal"; and how something can be environmentally beneficial and economically suboptimal.
CO 5:	Helps to examine the relationship between the economy and the environment in the context many activities started by environmental economists, activists and nature lovers.
CO 6:	Identify factors to find solutions to environment problems that are relevant to protect the welfare of the people.
PS 115.1 PRINCIPLES OF BANKING (50 hours)	
CO 1:	The students 'will get the knowledge of the structure and role of banking in an

	economy.
CO 2:	To develop skills in students in understanding the functioning of various banking activities
CO 3:	Gain the up-to-date knowledge regarding the banking terminologies.
CO 4:	Categorize and analyze banker – customer relationship
CO 5:	Able to understand the payment and collection procedure of negotiable instruments
CO 6:	Able to understand the facilities available and utilization of the same at different circumstances.
	PS 116.1 ECONOMICS OF DEMOGRAPHY (50 hours)
CO 1:	Students are able to explore population changes over time; elements of demography; child survival and mortality; family and households and demographic change.
CO 2:	Understand the demography of social and economic inequality, role of women, urbanization, migration and fertility.
CO 3:	Examine world demographic patterns, synthesizing the data and issues surrounding the importance of population to public health.
CO 4:	Able to critically evaluate the issues related to demography.
CO 5:	Comprehend the basic concepts and definitions in demography and identify the various sources of data in demography.
CO 6:	Prepare the students for variety of challenging careers through innovation in teaching and research.
	PS 117.1 INDUSTRIAL ECONOMICS (50 hours)
CO 1:	**COURSE OUTCOME**
CO 2:	The student gets the skill of efficient and economic use of scarce resources.
CO 3:	Understand the various theories related to wages, labour, firm etc.
CO 4:	The student gets equipped with the knowledge and skill in effective decision making under uncertain market situations.
CO 5:	Understand the role of unions and its bargaining powers.
CO 6:	Critically evaluate the issues related to labour and firms.
	The student acquires skills in allocating scarce resources among alternative uses.

	PH 111.2: MACRO ECONOMIC ANALYSIS (60 hours)
CO 1:	Explain the functioning of various sectors of the economy.
CO 2:	Develop an understanding of the various theories related to macro variables.
CO 3:	Demonstrate an understanding of the macroeconomic implications of decisions made by diverse economic entities.
CO 4:	Able to comprehend the link of various sectors in an economy.
CO 5:	Integrate theoretical knowledge to evaluate policy measures
CO 6:	Analyse trade-off in the deployment of resources to alternative ends.
PH 112.2 MATHEMATICAL TECHNIQUES FOR ECONOMIC ANALYSIS (60 hours)	
CO 1:	To familiarize the students with the mathematical economics terminologies
CO 2:	Able to build models by expressing words in symbols, numbers and equations
CO 3:	Able to apply economic theory and methods to selected real world economic problems.
CO 4:	Able to demonstrate analytical and critical thinking skills and to apply and interpret quantitative, qualitative and graphical information in a problem-solving context.
CO 5:	To equip students with the flexibility and skills necessary to succeed in a constantly changing environment.
CO 6:	A new dimension of scientific, logical and critical thinking, which will assist the mind to solve personal, professional and social problems and guide the students to take wise decisions.
	PH 113.2 INTERNATIONAL ECONOMICS (60 hours)
CO 1:	Identify and analyse different theoretical models of international economics in light of 'real world' situations.
CO 2:	Understand major issues in international finance, be able to deal with them analytically, and identify possible resolutions for those issues.
CO 3:	Analyse the determinants, patterns and effects of international trade within a general equilibrium framework, where the interrelationships amongst product and factor markets in an economy are explicitly taken into consideration.
CO 4:	Distinguish between the efficiency implications and distributional consequences of trade and trade policy.

CO 5:	Discuss and explain specific policy issues such as 'environmentalism as protectionism'; international dumping; the choice of exchange rate regime; the desirability of free capital flows.
CO 6:	This course advances understanding of economics across business and the public sector with critical skills and competencies.
	PS 114.2 FINANCIAL INSTITUTIONS AND MARKETS (50 hours)
CO 1:	Outline the basics of Indian financial systems and its components
CO 2:	Provide students with an introduction to the theory and practice of financial instruments.
CO 3:	Explain financial institutions and how firms obtain funds in the financial markets.
CO 4:	Analyze and evaluate financial markets, how securities are traded, mutual funds, investment companies, and investor behavior.
CO 5:	Explain how the financial services component industries (insurance, banking, securities, real estate and financial planning) interact.
CO 6:	Understand the importance of the financial sector in directing the use of scarce capital and able to analyze the various financial sector reforms in India.
	PS 115.2 RESEARCH METHODLOGY AND ETHICS (50 hours)
CO 1:	Students can develop testable hypotheses, differentiate research design and/or statistics, evaluate aptness of research conclusions, and generalize them appropriately.
CO 2:	Students can design and conduct quantitative or qualitative research studies in laboratory or field settings. Students use research data to formulate or evaluate new research questions, using reason and persuasion in a logical argument.
CO 3:	Students can summarize and evaluate a body of research including primary literature, and can compare psychology's methods with other disciplines' methods.
CO 4:	Demonstrate a logical argument, analyse and interpret data and evaluate alternative perspectives on the basis of objective reasoning. Communicate and present complex arguments in oral and written form with clarity and succinctness.

CO 5:	More awareness on Intellectual property Rights and Patents.
CO 6:	Able to write original research articles following ethical guidelines and practices in conducting the research and publication of papers.
	PS 116.2 AGRICULTURAL ECONOMICS (50 hours)
	COURSE OUTCOME
CO 1:	Able to understand the theories of agricultural economics.
CO 2:	Gain knowledge in the importance of the primary sector in Indian economy.
CO 3:	Write texts in various forms, with an identified purpose, that respond to specific audience needs, incorporate research or existing knowledge, and use applicable documentation and appropriate conventions of format and structure.
CO 4:	Capable of using mathematical, computational, statistical or formal reasoning (including reasoning based on principles of logic) to solve problems, draw inferences and determine reasonableness.
CO 5:	Students will be able to identify an appropriate theoretical framework, a suitable analytical method, and undertake an informed empirical analysis.
CO 6:	Students will have a good general understanding of agricultural production functions, cost and profit functions, math programming models, and non-optimizing simulation models.
	PS 117.2 ECONOMICS OF HUMAN RESOURCE DEVELOPMENT (50 hours)
CO 1:	Knowledge of Industrial Organizational Behavior, Development, & Change Strategies: Given an organization's target for development or change, analyze organizational and work behavior in relation to the target, evaluate the need for and influences of change on the organization and organizational members, and apply appropriate models, theories, and principles to facilitate healthy change and development.
CO 2:	Competency in Diversity as it Applies to Industrial Organizational Practices: Analyze and evaluate how diversity influences industrial organizational issues, and develop change strategies that demonstrate an appreciation of how diversity influences individuals and groups within the organization.
CO 3:	Students may obtain frameworks and tools to effectively analyze and approach various organizational situations.

CO 4:	Develop an organisational culture in which superior-subordinate relationships, teamwork and association among sub-units are solid and contribute to the proficient wellbeing, motivation and pride of employees.
CO 5:	Obtain or refine competences essential to achieve numerous roles connected with students current or anticipated impending roles.
CO 6:	The study of human resource development emphasis on efficiency of individuals as productivity in itself is an important organisational and personal goal.
	PO 118.2 BANKING AND FINANCE (40 hours)
CO 1:	To understand the Origin and the growth of the Indian Banking System.
CO 2:	To elucidate the broad functions of various types of banks
CO 3:	To evaluate the performance of the developmental banking institutions
CO 4:	Able to demonstrate an awareness of the current structure and regulation of the Indian financial services sector.
CO 5:	Discuss the impact of government policy and regulations on the banking sector.
CO 6:	To understand the working of development financial institutions in the development of rural sector, farmers, industries and financial market.
	PH 111.3: MONETARY ECONOMICS (60 hours)
CO 1:	Develops the skill to know the interdependence and complexity of the economic system.
CO 2:	Skill is developed to understand the monetary policy and its working in the system as a stabiliser.
CO 3:	Able to understand the various theory related to monetary economics.
CO 4:	Recognise the interrelation of the money and product market in the economy.
CO 5:	Understand the working of the monetary policies in the stabilization process.
CO 6:	Critically evaluate the policies related to stabilising the economy.
	PH 112.3 ECONOMETRICS (60 hours)
CO 1:	Able to explain the relation between economic theory and Econometrics.
CO 2:	Develop the capacity to understand the various tools in Econometrics.
CO 3:	Ability to understand the usefulness of econometric tools.
CO 4:	Skills developed to analyse economic problems using econometric tools.
CO 5:	Analyse the problems associated with econometric models.

CO 6:	Formulate econometric models in problem solving.
	PS 113.3 HEALTH ECONOMICS (50 hours)
CO 1:	Helps to analyse the importance of health as a major determinant of economic growth.
CO 2:	Gain a deeper understanding of evaluating and creating dynamic and flexible strategies for healthcare delivery.
CO 3:	Have competence to apply economic concepts and models to the fields of demand for health, demand for health services, demand for health insurance, provision of health insurance and provision of health care.
CO 4:	Be able to design public drives in preventive medicine and apply social marketing techniques, both addressing public will and individual behaviors.
CO 5:	Provide useful insights into the delivery of health care, it's economic evaluation that provides the bulk of health economists' work and is of most relevance to managers and practitioners.
CO 6:	The course helps to understand the increasing importance of precision medicine and real-world situation that impacting medical affairs professionals, medical science liaisons, and have to be able to have meaningful conversations with healthcare providers about health economics concepts. Comprehend the structures of marketing management in healthcare organisations, and the steps through which marketing helps an organisation to identify the needs of and focus on its customers.
	PS 114.3 LABOUR ECONOMICS (50 hours)
CO 1:	By the end of this course, students will be able to understand the basic theories of labour markets
CO 2:	Able to understand the labour market policy outcomes.
CO 3:	Able to analyse how theoretical understanding of the labour market and empirical approaches to the labour markets are related.
CO 4:	Able to identify the role of government policies in labour welfare.
CO 5:	Show understanding of commonly used data and methods in applied labour market research.
CO 6:	Demonstrate the ability to acquire and convey content in international scientific literature in the field of research.

	PS 115.3 DEVELOPMENT BANKING (50 hours)
CO 1:	understand the growth and structure of development banking Institutions in India
CO 2:	analyze the functions of modern banking financial services and its importance
CO 3:	enable the students get familiarized with Mutual Funds
CO 4:	acquaint the students in respect to the investment decisions related to Derivative market
CO 5:	understand the dynamics of capital market, money market and to learn the importance to be updated on the developments of the banking sector and practice the same.
CO 6:	Understanding the working of development financial institutions in the development of rural sector, farmers, industries and financial market.
	PS 116.3 ENERGY ECONOMICS (50 hours)
CO 1:	Understand basic economic concepts that underlay energy production and end use.
CO 2:	Describe the sources of energy and the scarcity associate with it.
CO 3:	Able to identify how local, regional, and global institutions affect energy markets and prices.
CO 4:	Apply the uses of energy resources efficiently in alternative uses.
CO 5:	Become familiar with historical and contemporary public policy issues related to energy globally.
CO 6:	Be able to apply this knowledge to analysis of specific energy industries and policy questions.
	PO 117.3 CONTEMPORARY INDIAN ECONOMY (40 hours)
CO 1:	Students are able to have a critical understanding of the Indian economy so that they may be able to engage meaningfully in debates regarding the country‘s economy
CO 2:	Understand the formulation of economic policies and its analysis.
CO 3:	Able to comprehend the broad contours like the status, issues and policies of the Indian economy at the aggregate as well as sectoral levels.
CO 4:	Describe the experiences in the pre as well as post reform years, keeping the colonial experience at the background.

CO 5:	Have a general understanding of the corporate, geo-political, cultural and social factors that define the Indian economic, cultural and technological landscape at the present time.
CO 6:	Critical understanding of the global policies influencing Indian economy.
	PH 111.4 PUBLIC ECONOMICS (60 hours)
CO 1:	Perform economic policy analysis by applying microeconomic principles and theories
CO 2:	Theoretical and practical expertise on a selected field of Public Economics and competence in applying advanced economic theory and methods in investigating issues concerning Public Economics.
CO 3:	Use models to describe economic phenomena; analyze and make predictions about the impact of government intervention and changing market conditions on consumer and producer behavior and well-being.
CO 4:	Employ economic theory, broadly defined, to provide an original analysis of current or historical events, to analyze social problems, and evaluate alternative public policy choices.
CO 5:	Be aware of the complex nature of public finance reform – the political dimension, change management, capacity development, the constraining dimension of functional linkage. Be able to question the nature of relevance of some popularly promoted public finance reforms – such as performance budgeting, budgeting by objectives, activity-based budgeting.
CO 6:	Understand the idea of sequencing in public finance reform and improvement, and that any sequencing must be adapted to the situation in any country; identify why sequencing is important because "things" take time and "things" should take time.
	PH 112.4: INDIAN ECONOMY (60 hours)
CO 1:	Students are able to have a critical understanding of the Indian economy so that they may be able to engage meaningfully in debates regarding the country‘s economy
CO 2:	Understand the formulation of economic policies and its analysis.
CO 3:	Able to comprehend the broad contours like the status, issues and policies of the Indian economy at the aggregate as well as sectoral levels.

CO 4:	Describe the experiences in the pre as well as post reform years, keeping the colonial experience at the background.
CO 5:	Have a general understanding of the corporate, geo-political, cultural and social factors that define the Indian economic, cultural and technological landscape at the present time.
CO 6:	Critical understanding of the global policies influencing Indian economy.
	PS 114.4 ECONOMICS OF INSURANCE (50 hours)
CO 1:	Understand the insurance terminology and contract features.
CO 2:	Understand the concept of insurance and its evolution
CO 3:	Evaluate client insurance and risk management needs.
CO 4:	Understand the different needs of customers on insurance products
CO 5:	Identify and explain features of private and public insurance available to meet each identified need.
CO 6:	Understand the business operations and market condition in Insurance Companies
PS 115. 4: OPERATIONS RESEARCH FOR ECONOMIC ANALYSIS (50 hours)	
CO 1:	Able to understand the usefulness of operations research in solving economic problems.
CO 2:	Describe the various techniques of operations research.
CO 3:	Students are equipped to use the tools like transportation table, assignment to analyse and solve problems relating to cost, marketing, production etc.
CO 4:	Be able to understand the characteristics of different types of decision-making environments and the appropriate decision making approaches and tools to be used in each type.
CO 5:	Able to prioritise the specific use of the techniques of operations research.
CO 6:	Be able to design new simple models.
PS 116.4 INTERNATIONAL FINANCE (50 hours)	
CO 1:	Familiarity with financial concepts and analytical techniques and introduce their application to international transactions.
CO 2:	Ability to relate concepts and knowledge in different areas which support the learner to solve problems and help to take decisions in complex as well as changing environments.

CO 3:	Provide an in-depth understanding of the process and techniques used to make international investment decisions.
CO 4:	Ability to analyse the causes of historical exchange rate movements and apply the models to solve the wide range of current issues in international finance.
CO 5:	Review the problems of dealing in foreign currency and the advantages and disadvantages of overseas funding.
CO 6:	Obtain a good working knowledge of the crucial questions adjacent to international capital flows, FDI, foreign exchange rate determination and exposure management, international capital markets and institutions, and develop an understanding of the working of the financial management of a multinational firm.
	PS 117.4 RURAL BANKING (50 hours)
CO 1:	Understand the working of banks in rural areas.
CO 2:	Students get the knowledge of the credit structure in the rural economy.
CO 3:	Helps to understand the various problems of the rural economy without adequate credit facility.
CO 4:	Students are able to grasp the importance of various sources of rural credit in the development of an economy.
CO 5:	Assess the role of rural economy in the development of a nation.
CO 6:	Analyse the usefulness of effective policy measure in improving rural credit.

MSC CORPORATE PSYCHOLOGY	
PROGRAM OUTCOMES	
PO 1:	Prepare human resource professionals /Corporate psychologists with a multidisciplinary approach to address legal, ethical and multicultural issues and challenges in the corporate.
PO 2:	Develop leadership skills and core competencies required to stay ahead in the corporate / industry
PO 3:	Develop employability skills to manage global human resources
PO 4:	Contribute to employee performance, organizational effectiveness through a scientist practitioner approach
PO 5:	Build organizations by focusing on people, process, products and profits.
PO 6:	Engage actively in socially responsible activities to promote health, harmony, human welfare and well- being in the society.
PO 7:	Adopt and Display values of ethics and integrity in their organizational practices reflecting the core values of Jesuit education.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Demonstrate the ability to think critically and scientifically about human behaviour and apply this knowledge specifically in the work context.
PSO 2:	**C**ompetence in understanding and developing scientific and need based interventions to enhance human resource in the corporate sector**.**
PSO 3:	Design, develop and conduct training programs to enhance human resource in Organizations.
PSO 4:	Assess, Design and Conduct need based research in the organizational context.
PSO 5:	Examine, explain, recognize, and address multi-cultural issues in the organizations using proven theories and models.
PSO 6:	Design, Construct and standardize psychometric tools applicable to workplace setting.
PSO 7:	Explore, integrate, assess, learn and apply the skills and knowledge in real time through Internship in organizations.
COURSE OUTCOMES	
PH 551.1 PSYCHOLOGICAL PROCESSES (Hard Core)	

CO 1:	Understand the basic psychological processes underlying behavior.
CO 2:	Knowledge of how information is organized, synthesized and integrated.
CO 3:	Identify and manage emotions both at intra and interpersonal level to enhance the qualityof relationship in personal and professional life
CO 4:	Apply the principles of learning to modify behaviour and enhance workplace productivity.
CO 5:	Recognize the subtle social forces at work like conformity, group influence, attitudinal and behavioural manifestations of social relations.
CO 6:	Analyze the dynamics of human behavior and individual differences in the work context.
CO 7:	Application of the psychological concepts to understand real time work place issues.
PH 552.1 PSYCHOLOGICAL ASSESSMENT (Hard Core)	
CO 1:	Understand the technical, ethical and legal foundations of psychological tests.
CO 2:	Compare the different methods of assessment and learn to use them effectively for the purpose of assessment.
CO 3:	Become aware of multicultural concerns related to testing, and integrate test scores into a meaningful communication in the form of a psychological report
CO 4:	Understand the basic statistical concepts which forms the basis for psychometric tool development
CO 5:	Competence to develop a Psychological tool
CO 6:	Critique psychometric instruments with respect to normative data provided in the technical manual
CO 7:	Competence to assess workplace behavior and write reports of psychological assessment following APA guidelines
PH 553.1 HUMAN RESOURCE MANAGEMENT (Hard Core)	
CO 1:	Understand the significance of Human Resource Management in growing competitive economy.
CO 2:	Use the tools and techniques of Human resource management in the selection and recruitment process
CO 3:	Explain the process of career development and succession planning
CO 4:	Analyze the methods of performance appraisal and errors in evaluation
CO 5:	Assess training needs and plan training programs
CO 6:	Explain and suggest relevant compensation methods in organizations
CO 7:	Apply principles of Psychology to enhance human resource in organizations

CPH 554 .1P PSYCHOMETRIC TESTING - I (Hard Core)	
CO 1:	Describe the history and process of test construction of different psychological tests
CO 2:	Familiarize with the various psychological constructs applicable to workplace set up
CO 3:	Measure components of personality and compare it with the normative data in the organizational context.
CO 4:	Apply test in the workplace context to determine the quality of work life balance, organizational climate, wellbeing tests, motivation, Emotional Intelligence and Job value
CO 5:	Administer psychological tests, analyze and write test reports.
CO 6:	Use psychometric tools to assess employees at different levels based on the need of the organizations.
PH 555.1P INTERPERSONAL SKILLS TRAINING - I (Hard Core)	
CO 1:	Have a positive attitude towards work and relationship
CO 2:	Articulate their thoughts verbally and in writing
CO 3:	Develop skill sets necessary for good interpersonal communication
CO 4:	Become reliable, responsible and empathetic leaders who will align with the organizational goals
CO 5:	Impart life skills training effectively in the organizations and social situations
CO 6:	Develop need-based modules for the corporate
CO 7:	Trained to be trainers
PS 556.1 ORGANIZATIONAL PSYCHOLOGY (Soft Core)	
CO 1:	Understand the complicated systems of individual and group psychological processes involved in the world of work
CO 2:	Connect and apply the basic principles of Industrial / Organizational Psychology to Personnel and Human Resource management within organizations
CO 3:	Adopt a scientist practitioner approach in organizations, design and conduct need based research.
CO 4:	Analyze the relevance of motivation theories and suggest interventions to enhance motivation in employees

CO 5:	Identify the cause of counterproductive behaviour and suggest strategies to promote productivebehaviour
CO 6:	Enhance worker wellbeing by identifying and addressing maladaptive behaviours at the workplace.
SEMESTER II	
PH 551.2 TRAINING AND DEVELOPMENT (Hard Core)	
CO 1:	Describe the importance and need of training and development in the organization and challenges associated with implementation of training programmes
CO 2:	Assess the training needs in the organization at different levels and explaining the process of training needs assessment
CO 3:	Learn the process of training design and analyse the effectiveness of various methods to deliver the training programme
CO 4:	Analyze the various methods of training evaluation and determine the cost and benefits of training to the organization
CO 5:	Knowledge of strategic training programme and assessing the requirement of different strategic training methods and management development programmes
CO 6:	Explain different models of training department and understand its implications in the future of training in the organization
CO 7:	Compare the benefits and limitations of inbuilt training program and outsourcing of training in the Organization
CO 8:	Design need-based training Programs
PH 552.2 CORPORATE CULTURE AND DIVERSITY (Hard Core)	
CO 1:	Understand the importance of culture in organizations
CO 2:	Connect the concept of culture with corporate firms and cross-cultural aspects
CO 3:	Identify and evaluate the underlying psychological processes involved in organizations in the changing cultural context
CO 4:	Analyze the mechanism of communication in cross cultural corporate setup and the impact of corporate culture upon organizational communication
CO 5:	Compare the global teams in connection with ethics in international context
CO 6:	**E**valuate the concept of foreign assignments and challenges.
CO 7:	Learn strategies to manage cultural diversity in organizations

PS 553.2 RESEARCH METHODOLOGY,ETHICS AND STATISTICS (Soft Core)	
CO 1:	Competent knowledge base in scientific thinking and Scientific method as a model for research
CO 2:	Strong theoretical foundations in quantitative and qualitative research methods.
CO 3:	Understand, describe and use the various traditions of research methodologies in organizational psychologyand engage in context based multidisciplinary research.
CO 4:	Competent in writing research proposal, design and conduct research
CO 5:	Analyses of data using advanced software and statistical tools.
CO 6:	Critically analyze the findings, Report the findings, and implement them.
PS 554.2 ORGANISATIONAL BEHAVIOUR (Soft Core)	
CO 1:	Manage and develop human resources at work.
CO 2:	Understand work place behavior through micro and macro perspectives in organizations.
CO 3:	Discuss strategies to manage the workforce to achieve greater results.
CO 4:	Assess the impact of power and politics on employee'sbehaviour at the workplace
CO 5:	Describe the various types of organizational structure and identify the limitations and strengths of different organizational structures
CO 6:	Develop the ability and skill to identify and modify conflict causing situations at the workplace and strategies of negotiation
PS 555.2 MANAGERIAL ECONOMICS (Soft Core)	
CO 1:	Understand Fundamentals of Economics and its relation to complex business realities
CO 2:	Associate the current economic phenomena with existing theory and contemporary economic issues.
CO 3:	Explain the cost of choices and trade-offs and demonstrate how changes in the determinants of supply and demand affect the equilibrium price and quantity of a good or service.
CO 4:	Enumerate short run and long run costs, associate economies and dis economies of scale to returns to scale.
CO 5:	Calculate and graphically illustrate the firms fixed, variable, averagemarginal and total cost, and determining the profit maximizing output level.
CO 6:	Apply the principle of macroeconomics in explaining the behavior of macro-

	economic variables at national as well as global level.
PS 556.2P PSYCHOMETRIC TESTING II (SOFT Core)	
CO 1:	Describe the history and process of test construction of different psychological tests
CO 2:	Familiarize with the various psychological constructs applicable to workplace set up
CO 3:	Apply test in the workplace context to determine motivation, leadership, strategic talent management, human resource development and job involvement.
CO 4:	Prepared to handle HR issues through simulation exercises in collective bargaining, in basket Exercises, leaderless group discussion.
CO 5:	Administer psychological tests, analyze and write test reports.
CO 6:	Use psychometric tools to assess employees at different levels based on the need of the organizations
PS 557.2P INTERPERSONAL SKILLS TRAINING LAB II (SOFT Core)	
CO 1:	CO 1 Have a positive attitude towards work and relationship
CO 2:	CO 2 Articulate their thoughts verbally and in writing
CO 3:	CO 3 Develop skill sets like assertiveness, conflict resolution, team building necessary for good interpersonal communication
CO 4:	CO 4 Become reliable, responsible and empathetic leaders who will align with the organizational goals
CO 5:	CO 5 Impart life skills training effectively in the organizations and social situations
CO 6:	CO 6 Develop need-based modules for the corporate
CO 7 :	Trained to be trainers
PO 558.2 BEHAVIOUR AND SOCIETY (Open Elective)	
CO 1:	Understand how people think, feel and act in the social context
CO 2:	Describe how individuals think about, influence and relate to one another
CO 3:	Analyse the outcome of social interactions on impression formation, attitude, prejudice, romantic attraction, friendship and aggression
CO 4:	Discuss and analyze the reasons for social conflicts and steps to alleviate conflicts

CO 5:	Assess the reasons for prosocialbehaviour and strategies to enhance helping behaviour
CO 6:	Apply the principles of social psychology to challenge prejudice, discrimination, stereotype attitudes and promote peace
SEMESTER III PH 551.3 CORPORATE LEADERSHIP (Hard Core)	
CO 1:	Understand leadership and various leadership processes
CO 2:	Learn various leadership models and their efficiency
CO 3:	Compare different leadership styles, theories, and business leaders
CO 4:	Analyze changing role of a leader and the relationships between leader – followers and leader - situations
CO 5:	Evaluate ethical leadership and its impact on society
CO 6:	Challenge Gender stereotypes and accept the role and contributions of women corporate leaders
CO 7:	Develop leadership abilities
PH 552.3 ORGANISATIONAL CHANGE AND DEVELOPMENT (Hard Core)	
CO 1:	Synthesize theories and models of organizational behaviour, organisational change and development and their critiques
CO 2:	Identify and describe the historical and contemporary transformations impacting the workplace and how those factors impact organizations and their work
CO 3:	Apply principles of systems thinking and relevant theories that are foundational to organizational change, current research concerning individuals, groups, and organizations to the process of change
CO 4:	Recognize common symptoms and reactions to change in the workplace and recommended interventions to address the reactions/resistance
CO 5:	Critique the range of change interventions in relation to their appropriateness to a range of research and evaluate critically the impact organisational change interventions at all levels of an organisation
CO 6:	Evaluate and assess an organizational change program & Develop an awareness of influencing and facilitating change
CO 7:	Design and plan the implementation of multiple OD interventions & enact human relations principles in the change process
CO 8:	Understanding the impact of technological interventions and the way it facilitates change
PS 553.3 CORPORATE REPORTING AND ACCOUNTABILITY (Soft Core)	
CO 1:	Understand the basics of accounting with practical experience.

CO 2:	Assess various financial statements and its applicability in corporate sector.
CO 3:	Analyze various Managerial accounting tools with practical knowledge.
CO 4:	Understand financial reporting and its relevance in corporate accountability.
CO 5:	Examine the various psychological factors influencing accounting scams with case analysis.
CO 6:	Assess corporate accountability with relevant financial and managerial accounting tools.
PS 554.3 CORPORATE ETHICS AND GOVERNANCE (Soft Core)	
CO 1:	CO 1Understand the basics of ethics, ethical dilemma and concepts of corporate
CO 2:	Governance.
CO 3:	CO 2 Discuss the role of ethics in different departments in corporate setup.
CO 4:	CO 3 Evaluate and develop CSR models and practice in professional lives.
CO 5:	CO 4 Discuss, analyze and apply the various models of governance
CO 6:	CO 5 Analyze corporate governance practice in India and internationally.
CO 7:	CO6Demonstrate the ability to apply the core principles of governance like accountability, responsibility and transparency.
PS 555.3 INDUSTRIAL RELATIONS AND LABOUR LAWS	
CO 1:	Understand the evolution and development of Industrial Relations and the history of enactments of Labour laws in India.
CO 2:	Describe the different roles of stake holders in Industrial Relations in India.
CO 3:	Explain the causes of industrial conflicts and the role of various stake holders in resolving industrial Conflicts
CO 4:	Aware of the statutory provisions for working conditions, health, and safety of workforce in India and provisions relating to the Trade unions, retrenchment, lay-offs, and lockouts
CO 5:	Prepare payroll and monitor social security measures.
PS 556.3 MARKET BEHAVIOUR AND ANALYSIS (soft core)	
CO 1:	Understand the behavior of consumers within the marketing system in a society
CO 2:	Analyze the underlying psychosocial processes involved in consumer behavior
CO 3:	Explain the different consumer decision making models, its uses and limitations.
CO 4:	Aware of ethical considerations while influencing the buyers' decisions to acquire things.
CO 5:	Understand and analyse brand personality image through personality theories
CO 6:	Apply the understanding of consumer decision making process to enhance sales

PS 557.3P CORPORATE COUNSELLING (Soft Core)	
CO 1:	Understand the need for Employee counselling and learn the working of employee Assistance Programs in organizations and its limitations
CO 2:	Develop core conditions and skills in counselling (both basic and advanced) by Practicing hypothetical case scenarios.
CO 3:	Compare and use different counselling models to suit the issues and the needs of the client
CO 4:	Use Transactional analysis and Rational emotive cognitive behaviour therapeutic techniques
CO 5:	Conduct counselling sessions independently, identify addictive behaviors and initiate the process of referrals for admission to hospitals and rehabilitation centers.
CO 6:	Conduct psycho education sessions to maintain psychological and social well-being of employees
CO 7:	Follow the ethical code of conduct of APA while conducting counselling sessions.
PS 558.3P CORPORATE SELECTION AND DEVELOPMENT (Soft Core)	
CO 1:	Understand the role of HR department/HR professional in the organization
CO 2:	Learn the HR cycle from Recruitment to exit interview
CO 3:	Compare the best HR practices and strategies applicable to different industries
CO 4:	Trained to recruit, retain and manage talent, as an entry level HR professional.
CO 5:	Apply the knowledge gained in the entire course to practical use. (HRM, Labour Laws, Organization Behaviour , Training and Development,
PO 559.3 BASIC COUNSELING SKILLS (Open Elective)	
CO 1:	Describe the difference between counselling and other forms of communication
CO 2:	Compare the application of different Psychological theories in counselling
CO 3:	Practice and adopt the skills required for better communication
CO 4:	Describe the stages involved in the process of counselling
CO 5:	Challenge and embrace universal human values for better interpersonal relations.
CO 6:	Incorporate Counselling skills in everyday interaction.
SEMESTER IV **DISSERTATION**	
CO 1:	Apply knowledge of psychological research in the field of human resource management

CO 2:	Develop research skills in organizational research
CO 3:	Competent to identify research problems in the field of corporate psychology
CO 4:	Conduct need based organizational research (Evidence based research)
CO 5:	Suggest research-based interventions to real time organizational issues.
INTERNSHIP	
CO 1:	Practical training enables the trainees to achieve high level of competency and skill to work in organizations
CO 2:	Develop an appreciation for the linkage between organization and its macro environm
CO 3:	On the job training exposure in HR practices in different types of organizations so as
CO 4:	to reduce the gap between theory and practice
CO 5:	Apply, evaluate and debate theory and practice of Psychological principles and Human resource Management in organizations
CO 6:	Job Ready and opportunity for employment.

MA JOURNALISM AND MASS COMMUNICATION	
PROGRAM OUTCOMES	
PO 1:	Demonstrate an understanding of Conceptual and Theoretical aspects of Journalism and Mass Communication.
PO 2:	Develop thoughts and idea for multiple formats including print, audio/visual and digital media.
PO 3:	Apply analytical and vertical thinking to formulate solutions to contemporary societal issues.
PO 4:	Inculcate a robust understanding of the practical aspects of writing skills, which forms the basis of all other media.
PO 5:	Acquire reporting and editing skills for print, audio/visual and digital platforms.
PO 6:	Demonstrate in-depth knowledge of emerging media platforms such as blogs, microblogs, business networking, digital video, digital photography, augmented / virtual reality.
PO 7:	Understand and apply concepts of professionalism, ethics and morality in various media platforms.
PO 8:	Acquire skills to understand and appreciate multicultural issues and evaluate social and ethical role of the media.
PO 9:	Create industry standards creative campaigns in advertising, public relations, digital media marketing, podcasting etc.
PO 10:	Analyse working of media and infotainment industries through research based studies and project work.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Improved communication and media production skills.
PSO 2:	Adequate theoretical and practical knowledge (technical and application oriented) to be employable in media industry.
PSO 3:	Ability to demonstrate social concerns, professional ethics and competence to aid in progress and development of the society.
PSO 4:	Awareness of environmental, developmental, women and gender related aspects of media industry and its impact on society.
PSO 5:	Ability to analyse, apply and evaluate latest technologies to solve problem in media industry and innovate sustainable solutions for future.
COURSE OUTCOMES	
I Semester	
THEORIES OF COMMUNICATION	
CO 1:	Trace the development of theoretical inquiry critically in the field of communication
CO 2:	Inculcate knowledge of basic theories in the various areas of study within the communication discipline
CO 3:	Recognize how communication theories apply outside of the classroom and in research

CO 4:	Analyse the effects mass media on socio-economic fabrics of a society
CO 5:	Students create their own models of communication
CORPORATE COMMUNICATION AND PUBLIC RELATIONS	
CO 1:	Understand and demonstrate the use of basic and advanced corporate communication techniques that today's business communication demands
CO 2:	Apply conceptual thinking in the area of corporate communication and public relations.
CO 3:	Create strategic corporate communication and public relations campaigns using effective research and development tools and techniques
ADVANCED REPORTING & EDITING	
CO 1:	Inculcate writing skills for media and other intellectual pursuits.
CO 2:	Demonstrate comprehensive knowledge of journalistic skill of reporting and editing
CO 3:	Develop critical and analytical skills while writing for and producing a newspaper
CO 4:	Daily analysis of newspaper coverage to understand the nuances of print media industry
DEVELOPMENT OF MEDIA	
CO 1:	Understand the nuances of communication and its development through multiple communication revolutions
CO 2:	Develop a comprehensive knowledge of media history in the, international, national and regional contexts.
CO 3:	Make media studies as a relevant filed of interest from the historical point of view.
CO 4:	Assess and evaluate the current trends and challenges faced by the Indian media
MEDIA LAW AND ETHICS	
CO 1:	Comprehension and upholding of constitutional values and principles for effective and authentic media profession.
CO 2:	Develop sincerity and credibility in media profession and inculcate ethical values in any field of media profession
CO 3:	Acquire comprehensive understanding of media laws and safe guard them in daily profession.
COMMUNICATION RESEARCH METHODS	
CO 1:	Inculcate the rigour of research techniques and methods at masters programme level
CO 2:	Evaluate and utilise statistical tools employed while conducting research
CO 3:	Demonstrate research acumen by creating research proposals and quasi

	research projects
CO 4:	Make research an enjoyable task and a multidisciplinary exercise
INTRODUCTION TO AUDIO VISUAL MEDIA	
CO 1:	Produce communications for different audiences and purposes through audio visual media using a variety of technologies
CO 2:	Plan and create in-depth, research-based broadcast pieces
CO 3:	Create and evaluate broadcast packages with the elements of sound, interviews, videography, and narration (written script)
FILM STUDIES	
CO 1:	Impart a fundamental understanding of film form and technique, including a knowledge of basic film terms.
CO 2:	Appreciate and utilize different methodological approaches to film
CO 3:	Analyse and write about film and incorporate appropriate film terminology and film scholarship into thewriting.
CO 4:	Apply narrative principles in students'film works.
DEVELOPMENT COMMUNICATION	
CO 1:	Understand development issues and programmes in India and make efforts in critically evaluating them
CO 2:	Comprehend the theories and models related to Development Communication.
CO 3:	Inculcate anoptimal sense of social responsibility as media professionals.
CO 4:	Develop media tools or messages to propagate sustainable development and social change.
BROADCAST AND COMMUNICATION (CBCS)	
CO 1:	Understand the basics of communication and broadcast media
CO 2:	Produce communications for different audiences and purposes through audio visual media using a variety of technologies
CO 3:	Comprehend and evaluate broadcast packages with the elements of sound, interviews, videography, and narration (written script)
TRAVEL JOURNALISM (CBCS)	
CO 1:	Explore and understand the concepts and importance of travel journalism

CO 2:	Develop technical skills in writing and photography for creating travel blogs
CO 3:	Understand travel and tourism trends in the contemporary world
CO 4:	Generate interest for tourism and cultural exposure in India
III SEMESTER	
TELEVISION PRODUCTION (SPECIALIZATION 1)	
CO 1:	Develop advanced skills and techniques in television production
CO 2:	Understand and equip the different stages of pre-production, production and post production in television industry
CO 3:	Expedite the role of crew and talents in television production through role-play and real life industry projects
DIGITAL JOURNALISM(SPECIALIZATION)	
CO 1:	Develop creative online content and create reliable platform for them
CO 2:	Learn to host and manage a full-fledged blog creating visibility and publicity of their contents
CO 3:	Evaluate and implement the web design principles and promote them on different digital platforms
DIGITAL MEDIA MARKETING (SPECIALIZATION 3)	
CO 1:	Understand how and why to use digital marketing for multiple goals within a larger marketing and/or media strategy
CO 2:	Evaluate and apply techniques to plan content marketing, develop content for different target audience, and measure its impact.
CO 3:	Develop knowledge of Google Analytics and other marketing analytics tools to help get started with website data analytics.
RADIO PRODUCTION (SPECIALISATION 4)	
CO 1:	Understand the functioning radio medium and produce relevant radio programmes.
CO 2:	Develop socially relevant radio programmes
CO 3:	Create recognizable presence of students on the campus based community radio- Sarang.
CO 4:	Analyse the functioning of different radio stations in the city and during the industrial tours and encourage students on job opportunities in radio programme production

KANNADA LANGUAGE PRESS (SPECIALISATION 5)	
CO 1:	Discover the relevant role played by journalism in Kannada and develop a taste for it
CO 2:	Create or produce and effective journalistic content and publish them on relevant platforms.
CO 3:	Inculcate the knowledge and journalism skills with the undergraduate students through peer learning.
MALYALAM LANGUGAE PRESS (SPECIALISATION 6)	
CO 1:	Discover the relevant role played by journalism in regional languages, especially in Malayalam and develop a taste for it.
CO 2:	Create or produce and effective journalistic content and publish them on relevant platforms.
CO 3:	Inculcate the knowledge and journalism skills with the regional undergraduate students through peer learning and critically analyse them.
CREATIVE STRATEGY & COMMUNICATION	
CO 1:	Inculcate knowledge about the theoretical foundations of creative strategy in advertising and marketing communications.
CO 2:	Exposure to the issues and concerns in creative strategy and research.
CO 3:	Identify and evaluate key concepts within the professional and academic fields of modern-day creative strategy and communication.
ADVERTISING AND MARKETING COMMUNICATION	
CO 1:	Inculcate a working knowledge and knowhow about marketing communications strategies and techniques
CO 2:	Develop marketing communication strategies along with planning and implementation
CO 3:	Evolve ability to solve real marketing communication problems by using scientific methods and procedures
ENVIRONMENT AND MEDIA	
CO 1:	Develop a comprehensive knowledge with regard to environment issues and programmes across the world.
CO 2:	Learn about environmentalists and get into environmental advocacy through different media fields.

CO 3:	Develop a keen eye for current environment trends and news and respond to them effectively
CO 4:	Organise environmental media campaigns on different media platforms.
FILM APPRECIATION (CBCS)	
CO 1:	Learn various components of film and film making and appreciate them from a critical point of view
CO 2:	Develop a hands on knowledge in writing film scripts and compare them with reviewed films
CO 3:	Identify different aspects of films like – mise-en-scene and film making techniques in pre production, production and post-production period.
GENDER AND MEDIA (CBCS)	
CO 1:	Learn various components of film and film making and appreciate them from a critical point of view
CO 2:	Develop a hands on knowledge in writing film scripts and compare them with reviewed films
CO 3:	Identify different aspects of films like – mise-en-scene and film making techniques in pre production, production and post-production period.
IV SEMESTER	
DISSERTATION	
CO 1:	Develop research interest and culture in respective field of study
CO 2:	Explore the social relevance and application of their respective subject
CO 3:	Inculcate knowledge and exposure area of study
CO 4:	Conduct in-depth study of a particular issue and explore solution to the societal problems through media research.
ONLINE BROADCASTING (SPECIALIZATION-1)	
CO 1:	Discover the research methods utilized in gathering data for developing and evaluating online broadcasting strategy
CO 2:	Evaluate and analyse audio and video techniques to enhance online productions.
CO 3:	Develop an awareness and appreciation of ethical pitfalls of online broadcasting.
MAGAZINE JOURNALISM (SPECIALIZATION)	

CO 1:	Identify and apply the principles of graphic design to magazines.
CO 2:	Develop a correlation between editorial content and visual presentation specific to magazines
CO 3:	Identify stories that lend themselves to different kind of presentations, including photos, audio, video and infographics.
INSTRUCTIONAL DESIGNING AND CONTENT WRITING (SPECIALIZATION 3)	
CO 1:	Evaluate various technology skills with application of learning theory to maximize the effectiveness of education.
CO 2:	Analyse diverse models of instructional design and content writing best practices
CO 3:	Create effective business and technical content through related content writing and techniques.
PROJECT	
CO 1:	Develop industry standard projects in the filed of student's chosen filed of specialization
CO 2:	Understand how to contribute to society's progress and development through practical implication of media concepts.
CO 3:	Inculcate crucial industry specific attitudes like project management, time management and stress management.
MEDIA AND CULTURE STUDIES	
CO 1:	Develop a critical perspective towards culture and hegemony.
CO 2:	Evaluate the relationship between power and media, which promotes cultural traits in society
CO 3:	Analyze the relationship between visual culture and global capitalism
CO 4:	Develop skills to carry out cultural analysis of media
POLITICAL COMMUNICATION	
CO 1:	Evaluate the key concepts and theories in political communication
CO 2:	Understand the fundamental strand of political communication science
CO 3:	Develop knowledge of practical aspects and paradigms of political communication science
CO 4:	Analyse mediatisation of politics in elections, campaigns and how media used to achieve policy goals.

MSW	
Programme Outcomes (PO)	
PO 1	Demonstrate professional knowledge of Social Work
PO 2	Demonstrate value based professionalism and volunteerism
PO 3	Demonstrate the skills to practice Professional Social Work
PO 4	Will demonstrate professional knowledge of Social Work
PO 5	Demonstrate value based professionalism and volunteerism
PO 6	Our graduates will demonstrate the skills to practice Professional Social Work
Programme Specific Outcomes (PSO):	
PSO 1	Gain understanding into the needs of individuals, families, groups and communities and design Social Work intervention strategies
PSO 2	Understand and analyze the structure and functions of various social, economic and political institutions
PSO 3	Understand the significance of methods of Social Work Profession
PSO 4	Acquire values and ethics of Social Work Profession
PSO 5	Develop concern and commitment for marginalized sections of the society
PSO 6	Internalize social justice, cultural pluralism and democratic participation while reaching out to marginalized
PSO 7	Develop skills of practicing methods of Social Work and addressing social problems at micro and macro levels
PSO 8	Develop skills of programme development, management and research
PSO 9	Develop skills of effective communication at various levels in their professional life
PSO 10	Gain understanding into the needs of individuals, families, groups and communities and design Social Work intervention strategies.
PSO 11	Understand and analyze the structure and functions of various social, economic and political institutions
PSO 12	Understand the significance of methods of Social Work Profession
PSO 13	Acquire values and ethics of Social Work Profession
PSO 14	Develop concern and commitment for marginalized sections of the society
PSO 15	Internalize social justice, cultural pluralism and democratic participation

	while reaching out to marginalized
PSO 16	Develop skills of practicing methods of Social Work and addressing social problems at micro and macro levels
PSO 17	Develop skills of programme development, management and research
PSO 18	Develop skills of effective communication at various levels in their professional life
SEMESTER I **PH201.1 - SOCIAL WORK: HISTORY AND IDEOLOGIES**	
CO 1	Understand the history and evolution of Social Work Profession both in India and in the West
CO 2	Differentiate between professional and voluntary Social Work
CO 3	Demonstrate the knowledge on methods of Social Work
CO 4	Recognize the trends in Social Work practice
Paper: PH 202.1 - CASE WORK PRACTICE	
CO 1	Acquire proficiency in basic concepts of Social Case Work practice
CO 2	Obtain effective qualities to establish harmonious relationship between the client and the society
CO 3	Critically analyze problems of individuals and families and various determinants for human problems
CO 4	Obtain therapeutic knowledge and skills to work in various settings
Paper: PH 203.1: GROUP WORK PRACTICE	
CO 1	Understand group work as a method of Social Work and its significance
CO 2	Display the knowledge on process, phases of group formation and will learn to identify and deal with the group dynamics
CO 3	Demonstrate skill of applying group work as a method of social work in social interventions
PH 204.1 CONCURRENT FIELDWORK PRACTICUM - I	
CO 1	Understand the functioning of social welfare agencies
CO 2	Understand and analyse various facilities available for people from Government, social institutions and voluntary organisations
CO 3	Learn the composition and needs of the community
PS 205.1: DYNAMICS OF HUMAN BEHAVIOUR	

CO 1	Acquire a clear understanding on the concepts of human behavior
CO 2	Gain a conceptual understanding into the various theories of development and its relevance.
CO 3	Analyse the changes throughout the life span stages and identify problems across these stages.
CO 4	Relate these developmental changes across the life span with real life situations.
SEMESTER II **PH 201.2 - COMMUNITY ORGANIZATION AND SOCIAL ACTION**	
CO 1	Understand community organization and social action as a method of Social Work
CO 2	Analyze the situation of subaltern groups and communities in our society
CO 3	Acquire skills of using participatory strategies of community development and social action
PH 202.2: SOCIAL WORK RESEARCH AND STATISTICS	
CO 1	Acquire knowledge of the scientific method of inquiry for the study of social phenomena
CO 2	Develop an understanding of the research process and basic research skills
CO 3	Demonstrate an understanding into the different methods of data collection and sampling.
CO 4	Gain knowledge of measures of central tendency, measures of dispersion, inferential statistics and its uses in Social work Research.
PH 203.2 CONCURRENT FIELDWORK PRACTICUM- II	
CO 1	Demonstrate the knowledge and skills of case work and group work practice and community organisation
CO 2	Acquire knowledge of research project and basic skills of research
CO 3	Learn the skills of liasoning between Government and people
PS 204.2: SOCIAL SCIENCES PERSPECTIVES FOR SOCIAL WORK	
CO 1	Understand the concepts, structure, institutions and processes of Indian Society.
CO 2	Demonstrate the knowledge on divergent perspectives and necessary skills for analyzing Indian Society.
CO 3	Develop critical insights on the social problems and challenges confronting Indian Society.

CO 4	Understand and analyze economic and political systems in India and society – economy –politics linkages.
PO 205.2 INDIAN SOCIAL PROBLEMS AND INTERVENTIONS	
CO 1	Develop insights into the problems faced by the vulnerable section of the society
CO 2	Analyse the impact of social issues on the individual and the community
CO 3	Demonstrate knowledge and skills to mitigate the problems at an initial level
CO 4	Understand the role of institutional services for the welfare of people
SEMESTER III	
PH 201.3: SOCIAL WELFARE ADMINISTRATION	
CO 1	Recognize the concept of social welfare and its relevance in modern India
CO 2	Analyse the role of social welfare services in societal well being
CO 3	Understand the functioning of social welfare Organisations
C O 4	Identify the key elements to manage an Organisation effectively
PS 2023.3: HUMAN RIGHTS PERSPECTIVES FOR SOCIAL WORK	
CO 1	Understand the concept of human rights and significant UN declarations on human rights
CO 2	Contextualise the violation of Human rights of the vulnerable and to apply Human Rights framework for their empowerment
CO 3	Demonstrate knowledge on the role of Social Work Profession in protecting human rights
PH 203.3b: CONCURRENT FIELDWORK PRACTICUM - III	
CO 1	Understand the functioning of a health setting
CO 2	Acquire skills in conducting case work (Medical /Psychiatric)
CO 3	Demonstrate skills of working with patient as well as family in the management of Patient
C O 4	Exhibit counselling skills and therapeutic treatment techniques to study and assess clients with psychological and socio-economic conditions
C O 5	Develop skills of planning and conducting health awareness programmes
C O 5	Demonstrate knowledge on documentation of interventions in health setting
PS 204.3b: COUNSELLING: THEORY AND PRACTICE	
CO 1	Understand the Holistic Concept of Counselling as a tool for help
CO 2	Recognize and synthesize attitudes and values that enhance investment of

	Self in the Counsellors' role
CO 3	Acquire knowledge and skills of using therapeutic approaches
C O 4	Articulate the role of a Counsellor as a professional in dealing with various issues of life and to work in different settings
PS 205.3b: PSYCHIATRIC SOCIAL WORK	
CO 1	Acquire knowledge on the concept of Mental disorders and Psychiatric Social work.
CO 2	Develop an understanding of the various classifications of Psychiatric disorders in children, adolescents and adults, their signs, symptoms, causes and Psycho social Interventions.
CO 3	Demonstrate knowledge and skills in the practice of Social work in Community Mental health and Rehabilitation.
C O 4	Gain knowledge on the legal provisions for Mental Health.
PH 203.3C: CONCURRENT FIELDWORK PRACTICUM-III	
CO 1	Exhibit skills of dealing with human resources for Organisational Development
CO 2	Understand the working conditions and mechanisms of Human Resource Development for employee welfare
PS 204.3c: HUMAN RESOURCE MANAGEMENT AND DEVELOPMENT	
CO 1	Describe and analyse the role of HR Department in an Organisation
CO 2	Recognize the need for employee development function
CO 3	Identify the challenges faced by the Human Resource professionals and understand ways to resolve it.
C O 4	Demonstrate knowledge and skills for people management
PS 205.3c: LABOUR LEGISLATIONS AND INDUSTRIAL RELATIONS	
CO 1	Understand various Labour legislations and Industrial Relations in India
CO 2	Interpret and apply relevant laws and acts in specific cases
CO 3	Critically reflect on issues, limitations and challenges confronting labor laws in India
C O 4	Gain Insights on labour problems and industrial relations in India and offer meaningful inputs for improvement of labour-industry relations
PO 206.3a - HUMAN RIGHTS AND SOCIAL DEFENCE (Open Elective)	

CO 1	Define and explain the concept of human rights and recognize the rights of various marginalized sections of society
CO 2	Apply human rights framework for understanding vulnerable groups
CO 3	Acquire competencies of using the legal provisions and social defence systems to protect the vulnerable
SEMESTER IV	
PS 201.4: PROJECT PLANNING AND MANAGEMENT	
CO 1	Acquire knowledge and skills to facilitate participatory project management
CO 2	Develop competency to facilitate process of participatory planning with varied groups.
CO 3	Imbibe values and attitudes that are essential for participatory projects for development
PH 202.4a: CONCURRENT FIELDWORK PRACTICUM-IV	
CO 1	Develop the skills of community organizer
CO 2	Learn the administrative tasks
CO 3	Inculcate professional values of community organizer
PS 203.4a: EDUCATION FOR DEVELOPMENT	
CO 1	Develop critical perspective on the system of formal as well as non-formal education.
CO 2	Acquire skills of designing educational programmes for varied groups of disadvantaged learners
CO 3	Develop Social Work strategies in the field of education.
PS 204.4a CORPORATE SOCIAL RESPONSIBILITY	
CO 1	Understand the concepts, need and functioning of CSR in India
CO 2	Analyze the CSR strategies of various corporate sectors of India
CO 3	Develop the skills and knowledge of managing CSR projects and socially responsible initiatives
PH 202.4b: CONCURRENT FIELDWORK PRACTICUM - IV	
CO 1	Understand the role of Psychiatric and Medical Social Worker in a health setting
CO 2	Acquire skills in conducting case assessment and diagnosis (Medical /Psychiatric)

CO 3	Specific Skills in working with patient as well as family in the management of patient
CO 4	Develop skills in planning and conducting health awareness programmes
CO 5	Demonstrate knowledge on documentation of interventions in health setting
CO 6	Exhibit knowledge on specific areas of Medical Social Work in health care settings
PS 203.4b: WORKING WITH CHILDREN AND FAMILIES	
CO 1	Gain understanding into the problems of children and adolescents and need for child welfare
CO 2	Demonstrate knowledge of various child welfare services, programmes, policies and legal provisions.
CO 3	Develop an understanding of the family life cycle stages, identify problems across these stages and Social work interventions.
CO 4	Gain insight into working with the changing families.
PS 204.4b: MEDICAL SOCIAL WORK	
CO 1	Demonstrate knowledge on communication strategies for promotion of health in prevention, care and management.
CO 2	Critically appraise policies, programmes and advocacy strategies of various national and inter-national organizations in the field of health and care services
CO 3	Articulate personal and professional values and promote skills required to perform as valued professionals in a multidisciplinary health settings
CO 4	Utilize community resources for purposes of consultation, collaboration, advocacy, referral, and networking on behalf of clients and families and reinforce the needs of clients.
PH 202.4C: CONCURRENT FIELDWORK PRACTICUM-IV	
CO 1	Acquire social work knowledge and professionalism in the areas of Human Resource Development
CO 2	Develop critical understanding on applicability of labour legislations in various organizational set- up
PS 203.4c: EMPLOYEE WELFARE IN INDIA	
CO 1	Demonstrate proficiency in the concept of Employee Welfare
CO 2	Relate the role of Human Resource professionals in development of employee

	conditions
CO 3	Propose and implement employee welfare programmes
CO 4	Interpret labour laws and apply provisions for employee/organisational development
	PS 204.4c: ORGANIZATIONAL BEHAVIOUR AND DEVELOPMENT
CO 1	Understand the concepts and foundations of organizational behaviour
CO 2	Develop capacity to analyze the motivations and implications of individual and group behaviour on organizations.
CO 3	Demonstrate knowledge on nature of organizational set up.
CO 4	Critically analyze the dynamics of organizational behaviour and to reflect on the essentials of organizational development
PS205.4 RESEARCH PROJECT	
CO 1	Understand the nature of social science research and its distinctive characteristics
CO 2	Understand the requirements and components of social science research
CO 3	Develop a critical perspective of the subject matter in the backdrop of review of literature
CO 4	Adopt appropriate plan and methodology for research, data collection and analysis relevant to research area and to organize research in accordance with the methodological requirements.

M.Com	
PROGRAM OUTCOMES	
PO 1:	Apply knowledge of management theories and practices to solve contemporary and complex business problems.
PO 2:	Ability to lead themselves and others in the achievement of business goals through value basedleadership skills
PO 3:	Ability to analyse and communicate global, economic, financial, legal, and ethical aspects of business.
PO 4:	Understand the values of life-long learning.
PO 5:	Ability to work in a team of core competence or multidisciplinary teams.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Develop entrepreneurial skills through effective Industry Institute Interactions.
PSO 2:	Qualify in various competitive examinations related to career growth and succeed in procuring best opportunities in the corporate and academia
COURSE OUTCOMES	
Semester I	
PH 311.1 Accounting Theory and Practice	
CO 1:	Evaluate the notions & ideas of thought that have shaped a theoretical basis for accounting.
CO 2:	Examine the relationship between accounting theory and practice.
CO 3:	Examine the role of Conceptual framework in the standard setting process.
CO 4:	Apply critical thinking by identifying and analyzing accounting issues using relevant accounting frameworks.
CO 5:	Prepare Financial Statements in accordance with appropriate standards.
PH 312.1 Financial Management and Policy	
CO 1:	Demonstrate the applicability of the concept of Financial Management to understand the managerial Decisions and Corporate Capital Structure.
CO 2:	Familiarize with cost of capital and capital structure to support managerial decisions.
CO 3:	Apply the Leverage and EBIT EPS Analysis associate with Financial Data in the corporate.
CO 4:	Analyse the complexities associated with management of cost of funds in the capital Structure.
PH 313.1 Income Tax	
CO 1:	Acquire profound clarity on concepts pertaining to personal tax.

CO 2:	Understand relevance of investments to be made for better tax planning.
CO 3:	Recognize the modes of tax planning with respect to chosen occupation.
CO 4:	Inculcate decision making power in managing investments with regard to tax.
CO 5:	Decide on Investment gestation based on tax policies of the country.
PS 314.1Economic Environment and Policy	
CO 1:	Recognize the state of any given economy based on sovereign characteristics.
CO 2:	Identify the modes of channelizing capital into the economy.
CO 3:	Understand, analyze and recommend policies for better economic framework.
CO 4:	Conceptual clarity on legal rights of individuals as citizens of the country pertaining to business.
PS 315.1 Corporate Law, Ethics and Governance	
CO 1:	Acquaint with the knowledge of corporate law and its administration in India.
CO 2:	Recognize the inherent conflict of interest in many business decisions and Demonstrate an understanding of common ethical problems in businesses.
CO 3:	Demonstrate a critical appreciation of the growing importance of corporate social responsibility and how it relates to corporate strategy.
CO 4:	Critically evaluate the concepts and committees of corporate governance.
PS 316.1 - Quantitative Techniques for Decision Making	
CO 1:	Understand managerial decision-making processes in organizations and appreciate the use of various quantitative techniques in making decision;
CO 2:	Apply quantitative techniques to solve a variety of business problems
CO 3:	Comprehend the concept of a Transportation Model and develop the initial solution for the same.
PS 317.1 Working Capital Management	
CO 1:	Analyse working capital management policies and their impact on the firm's profitability, liquidity and operating flexibility.
CO 2:	Understand the importance of working capital management and its role in meeting the firm's strategic objectives and value creation.
Semester II **PH 311.2 Corporate Accounting and Reporting**	
CO 1:	Build a solid foundation in accounting and reporting requirements.
CO 2:	Develop comprehensive understanding of the advanced issues in accounting for assets, liabilities and owner's equity.
CO 3:	Account for a range of advanced financial accounting issues.

CO 4:	Prepare the accounts of companies undergoing amalgamation & external reconstruction.
CO 5:	Prepare consolidated accounts for a corporate group.
CO 6:	Analyse the various issues & problems related to published financial statements.
PH 312.2 Corporate Financing and Investment Decisions	
CO 1:	Calculate the yearly cash flows of different types of capital budgeting project and evaluate how the choice of depreciation method affects the cashflows
CO 2:	Apply several capital budgeting techniques appreciating the strengths and weaknesses of the different techniques
CO 3:	Understand how to incorporate risk and uncertainty into capital budgeting decisions
CO 4:	Assess the factors affecting international investment decisions and opportunities presented to an organisation
CO 5:	Evaluate alternative sources of financing options and investment opportunities and their suitability in particular circumstances
PS 313.2 Business Taxation	
CO 1:	Acquire conceptual clarity in the model of GST.
CO 2:	Have sound knowledge on technical jargons in relation to the tax system.
CO 3:	Understand the channel of working of dual GST system.
CO 4:	Make the best advantage of the tax prospects provided through GST regime.
CO 5:	Have profound knowledge on Customs Act and the modes of assessment.
PS 314.2 Business Statistics	
CO 1:	Understand data and draw inference from data
CO 2:	Calculate and interpret statistical values by using statistical tool (correlation & regression)
CO 3:	Demonstrate an ability to apply various statistical tool to solve business problems
PS 315.2 Research Methodology and Ethics	
CO 1:	Identify research output with philosophical base and greater relevance to the society
CO 2:	Undertake quality research with scientific methodology
CO 3:	Produce good Research Reports
CO 4:	Undertake original Research following ethical guidelines and practices in conducting the research and publication of papers.
PS 316.2 E-Business	
CO 1:	Able to understand concepts of E-Commerce and E- business

CO 2:	Analyze different types of portal technologies commonly used in the industry.
CO 3:	Integrate theoretical frameworks with business strategies
PO 318.2 Personal Finance and Investment Planning	
CO 1:	Identify the major types of investment alternatives.
CO 2:	Describe how safety, risk, income, growth, and liquidity affect your investment decisions.
CO 3:	Figure out the future value of money using future value charts.
Semester III	
PH 311.3 Equity Research and Security Market Operation	
CO 1:	Explore different avenues of investment.
CO 2:	Understand the elements of Equity Research & different approaches to Security Analysis.
CO 3:	Understand the securities market & the trading systems in the market.
PH 312.3 Mergers, Acquisitions and Corporate Restructuring	
CO 1:	Analyse the challenges associated with each phase of the M&A process from developing acquisition plans through post-closing integration.
CO 2:	Apply financial modelling tools to evaluate mergers and acquisitions.
CO 3:	Understand how to create corporate value by restructuring a company or by combining businesses.
CO 4:	Equip with the knowledge of selecting appropriate takeover tactics depending upon the types of anti-takeover defenses.
CO 5:	Understand the impact of the regulatory environment on the M&A deals.
PH 313.3 Investment Banking and Financial Services	
CO 1:	Identify distinguishing features of investment banks and their working.
CO 2:	Learn the process and procedure involved in public issue and other alternate capital raising technique and the hands-on partnership with investment banks for the same.
CO 3:	Learn the techniques on meeting the statutory requirements from the perspective of an investment bank along with segregation of their duties and responsibilities.
CO 4:	Be skeptical and have practical approach towards choices made on use of alternative financial services.
CO 5:	Understand the relevance of third-party validation for business integrity.
PS 314.3 Corporate Tax Planning	
CO 1:	Describe how the provisions in the corporate tax laws can be used for tax planning.
CO 2:	Obtain a profound outline on corporate tax laws.

CO 3:	State the use of deductions of expenses to reduce the taxable income.
PS 315.3 Contemporary Issues in Accounting	
CO 1:	Identify & evaluate the issues related to the regulation of external financial reporting.
CO 2:	Research & analyse complex Contemporary financial accounting issues and formulate well reasoned and coherent arguments and reach well considered conclusions in relation to those issues.
CO 3:	Critically evaluate contemporary external company reporting practices
PS 316.3 Insurance and Bank Management	
CO 1:	Understand the risks faced by banks and ways to overcome them.
CO 2:	Understand how to choose life insurance policies based on their need
PO 317.3 Entrepreneurial Development	
CO 1:	Understand the function of an entrepreneur in the successful, commercial application of innovations
CO 2:	Confirm an entrepreneurial business idea
CO 3:	Identify personal attributes that enable best use of entrepreneurial opportunities
CO 4:	Explore entrepreneurial, leadership and management styles.
Semester IV **PH 312.4 International Financial Management**	
CO 1:	Attain proficiency in the working and need of international financial management and the global monetary systems.
CO 2:	Prepare and analyse BOP of a country and strategies to mitigate deficit.
CO 3:	Learn to be a shrewd dealer in forex market and understand the pitfalls of the system to make the best advantage of the market scenarios.
CO 4:	Assess the relevant risks adjacent to forex dealings and strategize for optimal management.
CO 5:	Learn on latest currency introduction ,working capital management and alternative modes of finance in international business.
PH 313.4 Derivatives and Risk Management	
CO 1:	Have a discussion and explain in detail derivatives products such as options, futures, swaps and other derivative securities.
CO 2:	Understand the importance of risk management and be able to describe the main tools for managing risks
CO 3:	Develop theoretical valuation methods to price futures and options.
CO 4:	Develop strategies to profit from mispriced derivative assets and Hedge underlying positions using derivatives

CO 5:	Explain the binomial model and its extension in continuous time to the Black-Scholes model.
CO 6:	Understand the mechanics of interest rate and currency swaps
PH 314.4 Cost and Management Accounting	
CO 1:	Critically analyse & provide recommendations to improve the operations of organisations through the application of management accounting techniques.
CO 2:	Demonstrate mastery of Costing Systems, Cost Management Systems and Performance Measurement Systems.
CO 3:	Demonstrate the need for a balance between financial and non – financial information in decision making, control and performance evaluation applications of management accounting.
CO 4:	Evaluate the costs and benefits of different conventional and contemporary costing systems
PS 315.4 Portfolio Theory and Management	
CO 1:	Value Debt & Equity instruments.
CO 2:	Design & manage bond as well as equity portfolios in the real world.
CO 3:	Measure the Portfolio Performance.
CO 4:	Practically apply the investment ideas of Warren Buffet, Benjamin Graham, John Bogle and John Templeton to an equity investment strategy in the Indian context.
PS 316.4 Computer Applications in Business	
CO 1:	Explain the guiding principles of professional behavior in computing
CO 2:	Expertise in the marketing strategies involved in E-Business
CO 3:	Explain the concepts and terminology used in the operation of application systems in a business environment
PS 317.4 Marketing Management	
CO 1:	Interpret complex marketing issues and problems using relevant theories, concepts and methods.
CO 2:	Critically evaluate the marketing function and the role it plays in achieving organisational objectives.
CO 3:	Analyse external and internal marketing environment and identify and prioritise appropriate marketing strategies

M.Com (Finance and Analytics)	
PROGRAM OUTCOMES	
PO 1:	Apply knowledge of Accounting, Finance, Taxation and Business principles and concepts to complex business situation and problems
PO 2:	Reach to conclusions on problems using the principles of accounting, finance and analytical tools
PO 3:	Possess knowledge, skill and abilities so as to realize potential for employment and meet requirements of industry
PO 4:	Apply ethical principles and commits to professional ethics and norms of the practice in the field of accounting , finance and taxation
PO 5:	Develop a sense of inquiry and capability for asking relevant/appropriate questions, problematizing, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO 6:	Possess knowledge of the values and beliefs of multiple corporate cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Develop an understanding of the concepts, principles and provisions of income-tax law, goods and services tax law, and international taxation, and to apply such knowledge to make computations and address application oriented issues.
PSO 2:	Develop the capability to use ICT in a variety of learning situations, access and evaluate relevant information sources using Microsoft Excel, Tally Prime, SPSS and R for analysis of data
PSO 3:	Develop the ability to apply financial management theories and techniques in strategic decision making.
PSO 4:	Understand the financial services rendered by intermediaries and banks and their role and activities in the financial market in general and capital markets in particular and apply such knowledge to address issues in practical scenarios.

PSO 5:	Develop the ability to apply specific accounting standards and legislations to different transactions and events, in preparation and presentation of financial statements of various business entities.
PSO 6:	Develop skills of analysis, synthesis and evaluation in cost management to address challenges and issues which influence the management of performance and decision making within organisations.
COURSE OUTCOMES	
I Semester **PH 353.1 - Income tax**	
CO 1:	Summarize the basics of taxation and process of computing residential status.
CO 2:	Critically examine exemptions and Scope of total income
CO 3:	Calculate taxable income under different heads
CO 4:	Analyse Clubbing and Set off of losses
CO 5:	Calculate tax liability of Individuals along with deductions available.
Economic Analysis for Decision making	
CO 1:	Describe the nature and scope of managerial economics
CO 2:	Apply the micro and macroeconomicconcepts for analysing effective functioning of a Firm and Industry.
CO 3:	Examine demand and supply analysis and growth model of the firm.
CO 4:	Discuss the techniques of production function and cost analysis
CO 5:	Apply the pricing techniques to determine the price of factors of production in different market forms
CO 6:	Describe the business cycles in the open economy and its impact of the firm
Financial Statement Analysis	
CO 1:	Explain the Legal requirements of financial statements
CO 2:	Analyse the accounting concepts applicable to Balance Sheet and Income Statements
CO 3:	Demonstrate the Meaning of Ratio and Ratio Analysis and types
CO 4:	Preparation of Cash flow and Fund Flow Statement
CO 5:	Demonstrate advantages of consolidated financial statements; AS – 21;

	consolidation procedure
CO 6:	Discuss need for inflation accounting; limitations of historical accounting
Financial Management Policy	
CO 1:	Explain the role of finance in the business.
CO 2:	Analyse the different components of cost of capital and dividend Policy.
CO 3:	Study leverages and capital structure Theories.
CO 4:	Analyse the different components of cost of capital and dividend Policy.
CO 5:	Explain the concept financial planning and strategic financial planning
Working capital management	
CO 1:	Explain the concept , objectives and the components of working capital management
CO 2:	Demonstrate the different Working Capital needs of different types of business, Factors determining Working Capital requirements
CO 3:	Describe the basic principles of cash management and budgeting
CO 4:	Analyse the sources of working capital finance
CO 5:	Explain the sources and types of float
CO 6:	Explain the objectives of inventory management and objectives of inventory management techniques
CO 7:	Analyse the factors affecting the formulation of accounts receivable and accounts payable
EXCEL for Business and Finance	
CO 1:	Acquiring necessary technical, scientific as well as management, financial procedures to analyse and solve real world problems within their work domain.
CO 2:	Mastering the use of some of Excel's functions and build financial models for forecasting and to make projected financial statements.
CO 3:	Design and maintain large sets of Excel data in a list or table so as to apply modelling tools and techniques for valuation.
CO 4:	Equip students with various research analytical tools used in business researchwith necessary critical thinking skills using excel."
Business Statistics	
CO 1:	Learn about the applications of statistical tools and techniques in decision

	making.
CO 2:	Enhance the knowledge on descriptive and inferential statistics.
CO 3:	Emphasize the need for statistics and decision models in solving business problems
CO 4:	Acquire new skills on the application of statistical tools and techniques in Business decision-making, Popular Quantitative Tools used in Business, practical exposure on calculation of measures of average, correlation and regression
CO 5:	Develop an understanding of the theory of probability, rules of probability and probability distributions.
II Semester **PH 351.2 - Accounting for Managerial Decisions**	
CO 1:	Identify differences between various forms of accounting– Financial, Managerial and Cost and the role of a Management Accountant
CO 2:	Prepare different forms of budgetary statements
CO 3:	Explain the concept of zero base budgeting, life cycle budgeting, Kaizen budgeting and performance budgeting.
CO 4:	Analyse the cost and performance of the responsibility centres
CO 5:	Explain creative Accounting and Forensic Accounting along with the concepts of corporate frauds and the measures to prevent it.
CO 6:	Critically examine the concept of Economic Value added, market value added, value added statements and Carbon Credits.
Corporate Financing and Investment Decisions	
CO 1:	Analyse and evaluate capital projects under different situations using appropriate capital budgeting techniques
CO 2:	Identify the cash flow patterns
CO 3:	Evaluation of statistical and conventional techniques for risk analysis
CO 4:	Evaluate the investment decisions, risk and uncertainty
CO 5:	Analyse the techniques for risk analysis
CO 6:	Explain the financial instruments and bonds
Tally for Business Applications	
CO 1:	Creation of Company, Accounting Groups & Ledgers

CO 2:	Identify the documents, prepare payment voucher, modes of payment and update payment voucher
CO 3:	Prepare the customer purchase order, payment terms, delivery challan and sales journal.
CO 4:	Preparation of Trial Balance, Cash book, Purchase Book, Sales Book, Purchase returns book, Sales return book
CO 5:	Displaying of Subsidiary book, Record keeping, Trading Account &Profit & Loss A/C, Balance Sheet
Goods and Services Tax & Customs	
CO 1:	Compare the earlier indirect tax system and present indirect tax system
CO 2:	Explain the structure of GST, benefits of GST
CO 3:	Describe the functions, powers and structure of GST Council and GSTN
CO 4:	Describe the provisions ,types and procedures of Registration
CO 5:	Define basic concepts and terms under CGST Act and IGST Act
CO 6:	Explain importance and benefits of Input Tax Credit
Business Research Methods	
CO 1:	Formulate the research problem and apply the major research designs with required questionnaire
CO 2:	Understand various sampling techniques, data collection and fieldwork.
CO 3:	Analyse data using various techniques and to learn how to communicate the results and follow up.
CO 4:	Demonstrate knowledge of data analysis, interpretation and report writing
E-Business	
CO 1:	Summarise the fundamentals of entrepreneurship with its role in economic development and to motivate them towards E-business activities.
CO 2:	Use the concept of entrepreneurial leadership and stimulate them to think innovative as entrepreneurs to implement in E-business
CO 3:	Assess technologies and business points of view to show the business cases that are viable right now.
CO 4:	Develops an understanding of transacting electronically and emerging technology for the same
CO 5:	Design business entity in the light of the legal and regulatory

	framework in India.
Personal Finance and Investment Planning	
CO 1:	Describe the premise of financial planning and financial goals
CO 2:	Critically evaluate the investment instruments suitable for different financial goals in different time span
CO 3:	Analyse the behaviour of equity markets and money market with investment tactics
CO 4:	Construct the portfolio by using the ideas of great investors in equity investment
CO 5:	Apply appropriate financial instruments to manage individualsfinances.
Internship	
CO 1:	Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function/s;
CO 2:	Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course;
CO 3:	Demonstrate ideas to improve work effectiveness and efficiency by analysing challenges and considering viable options
CO 4:	Analyse career options by considering opportunities in company, sector, industry, professional and educational advancement
CO 5:	Use critical thinking and problem solving skills by analysing underlying issue/s to challenges;
CO 6:	Demonstrate appreciation and respect for diverse groups of professionals by engaging harmoniously with different company stakeholders
III Semester **PH 353.3 - Investment Banking and Financial Services**	
CO 1:	Explain the basic concepts and activities under investment banking and financial services
CO 2:	Compare and contrast commercial banking, investment banking and merchant banking
CO 3:	Evaluate the concepts under issue management and private equity
CO 4:	Analyse the importance and workings of Underwriting, leasing and

	forfaiting in real business operations.
CO 5:	Critically evaluate the importance and workings of credit rating institutions, depository systems and other financial institutions
PO 357.3 - Corporate Culture and Ethics	
CO 1:	Describe the nature and scope of ethics, contrast between the ethics and moral, personal ethics and professional/business ethics
CO 2:	Evaluate the conflict of interest and ethical dilemma and measures to mitigate unethical practices in various fields
CO 3:	Examine the impact of corporate culture on ethics.
CO 4:	Identify the ethical codes and value system in the work culture.
CO 5:	Analyse business ethics in the light of consumer and environment protection with real life examples of corporate social Responsibility and critically evaluate its different dimensions.
Corporate Tax Planning	
CO 1:	Identify the difference between Tax Evasion, Tax Planning and Tax Avoidance.
CO 2:	Analyse various deductions, rebates and reliefs to reduce the taxable income and tax liability of companies
CO 3:	Asses tax aspects of Transfer pricing
CO 4:	Discuss the application of Deductions and Collection of Tax at Source for Corporate
CO 5:	Summarize Double Taxation Avoidance Agreement.
CO 6:	Demonstrate tax planning in respect of corporate reorganization
Mergers, Acquisition and Corporate Restructuring	
CO 1:	Understand M&A with its different classifications, strategies, theories, synergy etc.
CO 2:	Conduct financial evaluation of M&A,Analyse the results after evaluation
CO 3:	valuation of various tangible and intangible assets
CO 4:	Evaluate different types of M&A, takeover and antitakeover strategies
CO 5:	Critically evaluate IPOs, M&As, Bankruptcy cases
Insurance and Risk Management	
CO 1:	Discuss the risk identification and measurement.

CO 2:	Describe the various concepts under insurance
CO 3:	Examine the operations of insurance companies
CO 4:	Analyse the concept of insurance premium and financial statements of insurance companies
CO 5:	Summarize the regulatory aspects of insurance
Data Analysis using SPSS	
CO 1:	Analyse any type of numerical data using SPSS with confidence
CO 2:	Develop an ability to independently analyse and treat data, plan and carry out new research work based on your research interest
CO 3:	Understand the research design and results presented in high quality by presenting results in a standard format
IV Semester **PS 355.4 - Financial Derivatives**	
CO 1:	Describe various concepts, types and terminologies used in financial derivatives.
CO 2:	Analyse valuation models for pricing the derivatives.
CO 3:	Construct the hedging strategies and arbitrage opportunities using Futures and Options.
CO 4:	Design financial swaps for risk management
CO 5:	Explain the concept of credit derivatives
Cost Analysis for Managerial Decisions	
CO 1:	Describe strategic cost analysis techniques and apply these techniques for performance evaluation and managing a profitable and competitive enterprise.
CO 2:	Explain the concept of target costing, life costing techniques, and Kaizen costing
CO 3:	Design a strategic decision using techniques in various spheres of organizational operations.
CO 4:	Identify price setting strategies and their implementation in terms of preparing of activity based budgets in comparison traditional budgets.
CO 5:	Explain the management of JIT system and decision making under constraints.

CO 6:	
PS 356.4 - Corporate Law, Ethics and Governance	
CO 1:	Evaluate the regulatory aspects and the broader procedural aspects involved in different types of companies covering the Companies Act 2013 and Rules there under.
CO 2:	Equip with framework provided for safe investments and companies surveillance by SEBI
CO 3:	Explain the accountability of corporates towards its stakeholders to create an integrated value framework for sustainability
CO 4:	Critically evaluate Corporate Social Responsibility with real life examples and its different dimensions.
CO 5:	Create a framework for effective corporate governance by understanding the role and responsibility of different stakeholders in large business corporations
R for Data Analysis	
CO 1:	Analyse the basics in R programming in terms of constructs, control statements, string functions
CO 2:	Organize, Import, review, manipulate and summarize data-sets in R
CO 3:	Utilize data-sets to create testable hypotheses and identify appropriate statistical tests
CO 4:	Evaluate R programming from a statistical perspective
Portfolio Theory and Management	
CO 1:	Describe the environment of investment and risk return framework.
CO 2:	Evaluate portfolios along with a deep understanding of Capital market theory and associated models.
CO 3:	Examine the equity investments using Portfolio Evaluation & Performance measures
CO 4:	Construct the portfolio by using the ideas of great investors in equity investment
International Financial Management	
CO 1:	Discuss the relevance and implications of global imbalances.

CO 2:	Explain the factors affecting exchange rates and the inter linkages among them
CO 3:	Analyse the evolution of the international monetary system both in terms of historical construct and its implications for the contemporary system
CO 4:	Preparation of BOP statements
CO 5:	Explain the currency exposure strategies
CO 6:	Demonstrate the objectives and explain the issues in international working capital management'
Business Analysis and Valuation	
CO 1:	Critically evaluate Business valuation and valuation process
CO 2:	Familiarize with the standard techniques of corporate valuation
CO 3:	Develop analytical skills relevant for corporate valuation and value based management
CO 4:	Analyse historical performance and estimate the relative valuation
Project	
CO 1:	Identify project characteristics and various stages of a project.
CO 2:	Build conceptual clarity about project organization and feasibility analysis
CO 3:	Summarize the techniques for Project planning, scheduling and Execution Control.
CO 4:	Compile the knowledge from various areas of learning related to the project topic
CO 5:	Organise in depth study of the particular issue to explore solution to the problems the society facing in the field of commerce and management

M.SC BIOCHEMISTRY	
PROGRAM OUTCOMES	
PO 1:	Comprehensive knowledge of Biochemistry with inter-disciplinary perspective of other branches of life sciences
PO 2:	Competence to use modern biochemical and molecular techniques to perform experiments to test scientific hypotheses, analyse data, trouble - shoot and draw conclusions from the experimental data in labs.
PO 3:	Ability to write research thesis, and present and defend their findings to scientific audiences at regional or national levels.
PO 4:	Capacity to work independently, while still promoting teamwork and collaboration skills.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	**Fundamental understanding of Biochemistry**, structure and function of biological molecule, mechanisms of biological processes and bioenergetics.
PSO 2:	Competence to understand theories and methods that can be used **to *link*Biochemistry to related subjects** such as biotechnology, molecular biology, genetics, pharmacology, immunology, genetic engineering and Biostatistics and informatics
PSO 3:	Ability to make quantitative measurements of parameters that are routinely encountered in **practical/ experimental biochemistry** and apply a range of techniques that are commonly used in biomoleculeanalysis.
PSO 4:	Ability to a**nalyse and interpret biochemical data** acquired from the experimental procedures and demonstrates analytical and problem-solving skills with regard to biochemical principles of life processes.
PSO 5:	Competence in **research and innovation** in Biochemistry and in related field of specialization and the ability to critically review scientific literature for development of new theories and testable hypothesis.
PSO 6:	**Basic professional skills** pertaining to biochemical analysis, and the ability to use these skills in specific areas such as technology development, industrial production and skills that are relevant to biochemistry-related jobs and employment opportunities
PSO 7:	Skill of **articulation of ideas, scientific writing**, authentic reporting, scientific conversation and writing, capacity for decision making with regard

	to scientific progress, personal development and career choice.
PSO 8:	**Entrepreneurial and social competence,** the ability to plan and manage projects in order to achieve objectives
PSO 9:	**Leadership and organizational skills**, ability to work independently, while still promoting team work and collaboration skills.
PSO 10:	Ability to **translate knowledge of biochemistry to address environment issues** including, waste disposal management, safety and security issues, nature conservation, sustainability development etc
PSO 11:	Relevant **generic and technical skills** including communication skills effective interaction with others, listening, speaking, observational skills, utilization of e-resources and ICT.
PSO 12:	Professional behavior withrespect to attribute like**ethical values**, **integrity, honesty,** and sense of responsibility
COURSE OUTCOMES	
PH. 511.1. BIOMOLECULES	
CO 1:	Explain the basic aspects of amino acids, peptides, organization of protein structure, carbohydrates, lipids and nucleic acids
CO 2:	Describe the structure - function relationship of proteins and nucleic acids.
CO 3:	State the role of various biomolecules in health and disease.
CO 4:	Interpret the different structures of biomolecules and their implications on different disease states.
CO 5:	Explain classification and properties of various biomolecules.
PH. 512.1 BIOCHEMICAL TECHNIQUES	
CO 1:	List the basic instruments used in analytical biochemistry and state their applications.
CO 2:	Explain the principles and applications of important techniques used in isolation, purification and characterization of various biomolecules.
CO 3:	Interpret the various molecular spectrum obtained from different spectral techniques.
CO 4:	Explain preparation and analysis of different samples biological samples to be subjected to various analytical techniques.

CO 5:	Gain technical competency in different advanced techniques with a comprehensive understanding of their principle, instrumentation and applications.
PH.513.1P BIOQUANTITATION	
CO 1:	Learn good laboratory practices and be able to prepare basics of solutions
CO 2:	Perform and explain the principle of colorimetric analysis of various biomolecules.
CO 3:	Interpret and present scientific and technical information derived from laboratory experiments.
PS. 514.1 ORGANIC AND PHYSICAL BIOCHEMISTRY	
CO 1:	Explain the basic concepts of different types of chemical bonds, that can be useful to understand the chemical nature of biomolecules.
CO 2:	Describe the thermodynamic parameters and their variations in homeostasis of cells and its biomolecules and their interaction with water.
CO 3:	Acquire knowledge about preparation of radioisotopes, their applications in studying the cellular metabolic processes.
CO 4:	Display skills in problem solving, critical thinking and analytical reasoning as applied to problems in organic and physical chemistry
PS. 515.1PHYSIOLOGY & NUTRITION	
CO 1:	Explain the functions of important physiological systems including the cardio-respiratory, reproductive renal, and metabolic systems
CO 2:	Explain the integration of the different organs in maintaining homeostasis
CO 3:	Discuss diseases, disorders, and conditions that result from a homeostatic imbalance
CO 4:	State the role of nutrients, caloric requirements and the deficiency disorders
PS. 516.1 GENERAL MICROBIOLOGY	
CO 1:	Acquire knowledge about the microorganisms around us, development of the discipline of Microbiology and the contributions made by prominent scientists in this field.
CO 2:	Differentiate between the useful and harmful microorganisms and explain the structure and functions of microscopic organisms
CO 3:	Explain s*terilization* of media and assessment of sterility.

CO 4:	Understand the importance of microorganisms as model systems in genetics and biochemistry.
PS.517.1P ANALYTICAL TECHNIQUES	
CO 1:	Get hands on training for different types of chromatographic techniques
CO 2:	Perform different types of electrophoretic techniques used to separate proteins and analyse the results.
CO 3:	Perform various extraction procedures used to extract different molecules from biological samples.
PS.518.1P EXPERIMENTAL MICROBIOLOGY	
CO 1:	Isolate microbes from provided samples and perform bacterial cultures in different media.
CO 2:	Perform routine microbiological practices such as sterilization, media preparation, maintenance of microbial culture, and staining.
CO 3:	Culture and screen microbes for antibiotic resistance.
II Semester **PH. 511.2 ENZYMOLOGY**	
CO 1:	Classify and explain the general properties of enzymes
CO 2:	Describe and use the equations of enzyme kinetics.
CO 3:	Describe the catalytic mechanisms of most well-characterized enzymes
CO 4:	Describe the mechanisms of enzyme regulation
CO 5:	Explain the applications of enzymes in diagnosis, monitoring, and therapy.
PH. 512.2 METABOLISM	
CO 1:	Describe the metabolism of carbohydrates, and its regulation
CO 2:	Describe the metabolism of lipids and its regulation
CO 3:	Explain the importance of high energy compounds, electron transport chain, and synthesis of ATP.
CO 4:	Explain the integration of carbohydrate and lipid metabolism
CO 5:	Correlate synthesis and breakdown of biomolecules with various metabolic disorders
PH.513.2P Practical Enzymology	
CO 1:	Demonstrate practical understanding of enzyme kinetics and its applications.

CO 2:	Demonstrate practical applications of monosubstrate and bisubstrate assays and an overall understanding of using various biochemical kinetic reactions for isolating and purifying specific analytes.
CO 3:	Isolate and purify enzymes using downstream processing
CO 4:	Conduct quantitative assay of clinically important enzymes
PS.514.2 RESEARCH METHODOLOGY AND ETHICS	
CO 1:	Demonstrate an understanding of research design, procedures of sampling, data collection, analysis and reporting.
CO 2:	Describe the appropriate statistical methods required for a particular research design and apply appropriate statistical methods for analyzing one or two variables..
CO 3:	Display an understanding of imperative issues in research ethics, like responsibility for research, scientific misconduct and ethical evaluation
CO 4:	Demonstrate awareness on Intellectual property rights and patents
PS. 515.2 BIOTECHNOLOGY	
CO 1:	Explain strain improvement methods, isolation of industrial important microorganisms, different types of fermentation process and different recovery process of the final product formed.
CO 2:	Demonstrate an understanding of animal cell culture, cell lines, application in tissue engineering and hybridoma technology.
CO 3:	Explain basic concepts od Plant Biotechnology and its applications in agriculture like micro-propagation, haploid plants, embryo culture, hybrids
CO 4:	Enlist the applications of microbiology in waste management, environmental pollution control.
PS. 516.2. NEUROBIOCHEMISTRY	
CO 1:	Demonstrate basic understanding of the nervous system and its functions.
CO 2:	Explain basic concepts of physiology and structure of nervous system
CO 3:	Describe the nature of neurotransmitters and its role in neuronal signal transmission
CO 4:	Demonstrate concrete understanding of neuronal processes that involves key aspects of learning and memory.

PS. 517.2P PRACTICAL BIOTECHNOLOGY	
CO 1:	Gain practical knowledge on tissue culture laboratory set-up, sterilization and media preparation
CO 2:	Perform animal and plant cell culture techniques
CO 3:	Perform toxicity and cell viability assays on animal tissues and conduct water quality testing
PS. 518.2P Experimental Neurobiochemistry	
CO 1:	Quantify and analyse the effect of drugs/toxins on brain tissue
CO 2:	Prepare tissue homogenates required for various biological assays and perform biochemical and histological assays to understand neuronal activity
CO 3:	Evaluate the behavioural changes that take place under conditions of stress and anxiety and apply the information obtained
PO.519.2. Biochemistry of Diseases (Open Elective I)	
CO 1:	Demonstrate an understanding of the mechanisms of diseases- cause, transmission, detection, treatment and prevention.
CO 2:	Understand general health check-ups, diagnosis and samples for disease analysis.
CO 3:	Relate to any existing or emerging infection as well as will learn about drug resistance and its mechanisms.
CO 4:	Acquire know-how to health research and develop new tools for their management.
PH. 511.3 MOLECULAR BIOLOGY	
CO 1:	Give an overview of the central dogma of life and the historical discoveries that led to our current understanding of molecular mechanisms of life
CO 2:	Describe the organization of prokaryotic and eukaryotic chromosome
CO 3:	Explain the processes of transcription/translation, posttranscriptional/ posttranslational modifications.
CO 4:	Differentiate *prokaryotic and eukaryotic* gene expression and regulation
CO 5:	Identify the stages of the cell cycle, and explain the important checkpoints that a cell passes through during the cell cycle
PH. 511.3 MOLECULAR BIOLOGY	

CO 1:	Give an overview of the central dogma of life and the historical discoveries that led to our current understanding of molecular mechanisms of life
CO 2:	Describe the organization of prokaryotic and eukaryotic chromosome
CO 3:	Explain the processes of transcription/translation, posttranscriptional/ posttranslational modifications.
CO 4:	Differentiate *prokaryotic and eukaryotic* gene expression and regulation
CO 5:	Identify the stages of the cell cycle, and explain the important checkpoints that a cell passes through during the cell cycle
PH. 512.3 NITROGEN METABOLISM & PLANT BIOCHEMISTRY	
CO 1:	Discuss nitrogen metabolism and general mechanisms of amino acid metabolism.
CO 2:	Describe pathways of degradation of proteins, purines and pyrimidines and Inborn errors of amino acid degradation
CO 3:	Identify important metabolites in plants and animals that are important to understand the significance of various metabolic pathways.
CO 4:	Explain the process of photosynthesis; metabolism of photo assimilates and the role of plant hormones.
CO 5:	Discuss photobiology and stress physiology in plants
PH.513.3P Metabolism and Clinical Biochemistry	
CO 1:	Demonstrate ability to perform experiments to estimate metabolic parameters.
CO 2:	Perform microscopic & chemical analysis of Blood & urine
CO 3:	Analyse and interpret clinical and biochemical changes taking place in blood and urine under normal and pathological conditions.
CO 4:	Identify the normal and abnormal constituents present in urine samples and quantify them.
PH.514.3P CELL & MOLECULAR BIOLOGY	
CO 1:	Evaluate and apply knowledge of modern techniques in cellular biology for observation and identification of tissues and cells
CO 2:	Extract DNA, RNA and perform their analysis at molecular level.
CO 3:	Learn the different phases of cell division using molecular techniques.

CO 4:	Handle, maintain Drosophila melanogaster and perform experiments related to the model organism
PS.515.3 CELLULAR BIOCHEMISTRY	
CO 1:	Outline the structure of various cellular organelles and describe the relationship between various cellular structures and their corresponding functions.
CO 2:	Describe the structure and properties of biological membranes and the processes of transport across cell membranes.
CO 3:	Discuss the general principles of cell communication and cell signaling.
CO 4:	Describe various cellular signal transduction pathways, specifically muscle contraction.
PS. 516.3. CLINICAL BIOCHEMISTRY	
CO 1:	Understand the basic concepts and principles of Clinical Biochemistry, detail on the collection, preservation and storage of biological samples
CO 2:	Explain principles of laboratory automation and quality control in a clinical laboratory
CO 3:	Describe the different biochemical tests carried out in blood and urine for the diagnosis and prognosis of various disease conditions.
CO 4:	Clinically assess the laboratory indicators of physiologic conditions and diseases
PO.517.3 EVOLUTION AND ECOLOGY	
CO 1:	Discuss the scientific *theory of evolution and* explain the points of the Modern Synthesis of evolutionary theory.
CO 2:	Demonstrate broad-based knowledge of the fundamentals of Ecology, and Evolution and the relationships among these disciplines
CO 3:	Describe the principal interactions between different species and how they affect the respective species.
CO 4:	Discuss the biogeochemical cycles, pollution, natural resource conservation and management
PH.511.4 IMMUNOLOGY	
CO 1:	Define central immunological concepts and demonstrate basic knowledge of immunological processes at a cellular and molecular level.

CO 2:	Describe the cells and organs involve in immune response and compare and contrast innate and adaptive immunity
CO 3:	Elaborate on the concept of antigen, immunoglobulins and apply basic techniques for identifying antigen-antibody interactions.
CO 4:	Outline key events in antigen presentation, and the cell-mediated and humoral immune responses.
CO 5:	Explain the basis of immunological tolerance, autoimmunity, hypersensitive reactions, cancer immunology and principles governing vaccination.
PH. 512.4. GENETICS	
CO 1:	Describe basic concepts of classical Genetics, Mendelian inheritance, extrachromosomal inheritance, sex-linked inheritance and population genetics
CO 2:	Elaborate on the concept of gene, genome organization, linkage and genetic mapping and recombination.
CO 3:	Discuss the different organisms used as models for studies in genetics
CO 4:	Comparing and contrasting different mutation and DNA repair mechanisms and relate variations in chromosome structure and number to phenotypic variation.
CO 5:	Describe the relationship between cell cycle and cancer and summarize the mechanism of transformation of cells
PH.513.4 PROJECT WORK	
CO 1:	Demonstrate and understanding on the scope of research in their assigned dissertation research topic, troubleshoot, and successfully outline the aims and objectives for subsequent dissertation work.
CO 2:	Critically review literature, find gaps in research, select a research problem/ test hypothesis and design experiments.
CO 3:	Perform experiments, collect data, draw conclusions and interpret the results and discuss the work in the light of work previously done by other researchers.
CO 4:	Communicate in oral and written form by integrating data and interpretation and relate to the concept of ethics in research
PS.514.4 GENETIC ENGINEERING AND BIOINFORMATICS	
CO 1:	Acquire knowledge about the advances in modification, and recombination of DNA or other nucleic acid molecules to modify an organism.

CO 2:	Enlist the vectors used in *genetic engineering* and discus their application
CO 3:	Discuss tools and techniques of genetic engineering like transformation, hybridization, transcriptome analysis, sequencing and more.
CO 4:	Describe and use the biological databases, perform structured query, data retrieval and analyse and discuss the results
PS.514.2 CLINICAL TOXICOLOGY	
CO 1:	Describe the general principles of clinical toxicology and discuss factors that influence toxicity.
CO 2:	Explain the basics of pharmacodynamics, pharmacokinetics and PK/PD correlation.
CO 3:	Recognize system-specific and organ-specific toxic effects and discuss metabolism of toxicants
CO 4:	Describe pharmacological actions, uses & adverse effects of drugs
PS. 516.4-FOOD BIOCHEMISTRY	
CO 1:	Discuss the concept of food and nutrition
CO 2:	Enlist macro- and micronutrients, their sources and functions in the human body.
CO 3:	Explain the concept of nutraceuticals and their role in treatment and prevention of various disease conditions
CO 4:	Discuss the biochemical changes caused by microorganisms in context of fermented food and food spoilage
PS.517.4P Experiments in Genetic Engineering and Bioinformatics	
CO 1:	Learn to use tools and techniques in genetic engineering
CO 2:	Demonstrate and explain transformation techniques and selection of transformants
CO 3:	Perform biological database search, retrieve data and analyse the data employing various bioinformatics tools
PS.518.4P EXPERIMENTS IN FOOD SCIENCE	
CO 1:	Explain principles behind analytical techniques associated with food.
CO 2:	Perform various food analysis techniques and interpret the results
CO 3:	Identify the biochemical component of various foods and assess the nutritive value of food sample.

M.SC BIOTECHNOLOGY	
PROGRAM OUTCOMES	
PO 1:	Provide state-of-the-art knowledge and skills in the field of Biotechnology.
PO 2:	Generate manpower trained in Biotechnology suited to meet the needs of the industry and academia.
PO 3:	Train students to pursue committed research in the field of Biotechnology.
PO 4:	Train students for practical oriented project work.
PO 5:	Have a positive impact on human and animal health, agriculture and environment in the region.
PO 6:	Have 100 % placement for all the students who take up this course.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	In-depth knowledge of Biotechnology with inter-disciplinary perspective of other branches of life sciences.
PSO 2:	Develop an ability to solve, analyze and interpret data generated from experiments done in project work or practical courses.
PSO 3:	Competence for research and innovation in Biotechnology as a skilled experimentalist.
PSO 4:	Analytical and problem-solving skills with regard to biochemical principles of life processes and technologies for combating human diseases.
PSO 5:	Critical thinking about the concepts in Biotechnology and ability to critically review scientific literature for development of new theories and testable hypothesis.
PSO 6:	Capacity for decision making with regard to scientific progress personal development and career choice.
PSO 7:	Ability to work independently, while still promoting team work and collaboration skills.
PSO 8:	Oratory (public speaking), scientific conversation and writing skills.
PSO 9:	Leadership and organizational skills.
PSO 10:	Execute their professional roles in society as biotechnology professionals, employers and employees in various industries, regulators, researchers, educators and managers.
PSO 11:	Demonstration of integrity, honesty, ethical behaviour and sense of responsibility.
PSO 12:	Appreciation of diversity in scientific community and responsibility towards society and nation.
PSO 13 :	Environmental awareness vis-à-vis bio-waste generation, disposal and management and safety and security issues.

COURSE OUTCOMES	
I Semester	
PH 501.1BIOCHEMISTRY AND METABOLISM	
CO 1:	Delineate structure, function and interrelationships of various biomolecules and consequences of deviation from the normal.
CO 2:	Translate the importance of biological macromolecules and their role in living systems.
CO 3:	Execute a particular metabolic pathway involved in carbohydrate, lipid, amino acid and nucleic acid metabolism, their interconnections.
CO 4:	Evaluate information relevant to concepts on cellular regulation of different metabolic pathways.
PH 502.1 MICROBIOLOGY	
CO 1:	Apply the principles in classifying microbial systems and know their beneficial and harmful effects.
CO 2:	Employ various cultivation methods starting from screening to preservation of the desired microbe.
CO 3:	Understand the major virus groups with their elementary features that is responsible for causing the most dreaded diseases.
CO 4:	Appreciate the microbial diversity and their interactions, and design suitable strategies to tackle unsustainable agricultural and environmental practices.
PH 503.1 CELL AND MOLECULAR BIOLOGY	
CO 1:	Describe the organization of macromolecules on membranes and cellular processes.
CO 2:	Differentiate the various cell signaling pathways.
CO 3:	Illustrate regulation of gene expression in eukaryotes.
CO 4 :	Take up research in the field of cell and molecular biology.
PH 504.1 P BIOCHEMISTRY & METABOLISM PRACTICALS	
CO 1:	Apply knowledge of biochemistry and metabolism in various cellular functions, and the application of research involved in various biochemical processes.
CO 2:	Investigate and analyse the unknown carbohydrate or amino acid compound present in the given sample qualitatively.
CO 3:	Demonstrate a proficiency in developing relevant biochemical questions, carrying out laboratory investigations to answer those questions, and critically analyzing, interpreting, and presenting the results of their

	experiments.
CO 4:	Construct the standard curve, analyse the data and interpret the results.
PH 505.1 P	**MICROBIOLOGY PRACTICALS**
CO 1:	Evaluate the various physical and chemical growth requirements of bacteria and equip various methods of bacterial growth measurement.
CO 2:	Execute microbial techniques for the isolation of pure cultures of bacteria.
CO 3:	Master staining procedures, aseptic techniques and be able to perform routine culture handling tasks safely and effectively.
CO 4:	Comprehend the various methods for identification of unknown microorganisms.
PH 506.1 P	**CELL AND MOLECULAR BIOLOGY PRACTICALS**
CO 1:	Assess membrane transport.
CO 2:	Prepare of slides.
CO 3:	Differentiate cell divisions.
CO 4 :	Isolate macromolecules and perform qualitative and quantitative assays.
PS 507.1	**MOLECULAR AND HUMAN GENETICS**
CO 1:	Discuss the chromosomal mechanisms of sex determination and dosage compensation.
CO 2:	Demonstrate the ability to distinguish between a normal and an abnormal karyotype and the underlying causes of genetic disorders at the molecular level.
CO 3:	Categorize the different methods available for genetic testing and for the treatment and management of genetic disorders.
CO 4:	Construct pedigrees and analyse the patterns of inheritance in the families.
PS 508.1	**IMMUNOLOGY**
CO 1:	Describe which cell types and organs present in the immune response.
CO 2:	Apply basic techniques for identifying antigen-antibody interactions.
CO 3:	Exemplify the adverse effect of immune system including Allergy, hypersensitivity and autoimmunity.
	Elucidate the reasons for immunization and aware of different vaccination.
PS 509.1	**DEVELOPMENTAL BIOLOGY**
CO 1:	Describe the main stages of development common to most multicellular organisms.
CO 2:	Demonstrate the cellular behaviors that lead to morphological change

	during development.
CO 3:	Illustrate how gene activation plays a role in differentiation.
CO 4:	Apply the knowledge gained in the field of research.
PS 510.1P	**MOLECULAR AND HUMAN GENETICS PRACTICALS**
CO 1:	Describe the salient features of *Drosophila melanogaster.*
CO 2:	Apply the basic technique of separation of the eye pigments of *D. melanogaster* by chromatographic technique.
CO 3:	Analyze the different types of syndrome and their karyotype.
CO 4:	Elaborate the knowledge on sex determination and chromosomal aberrations.
PS 511.1P	**IMMUNOLOGY PRACTICALS**
CO 1:	Staining, Identify various immune cells and enumerate them.
CO 2:	Competently perform antigen-antibody interaction for diagnostic test.
CO 3:	Analyze the components of human sera by performing agarose gel electrophoresis.
CO 4:	Blood Donation and its Procedure, product packing , separation of blood products and labeling.
PS 512.1P	**DEVELOPMENTAL BIOLOGY PRACTICALS**
CO 1:	Know the importance of model organisms in developmental biology.
CO 2:	Distinguish between the stages of development of different organisms.
CO 3:	Develop practical skills in isolation and staining.
CO 4:	Apply the knowledge in contribution towards research.
SEMESTER II	
PH 501.2 GENETIC ENGINEERING	
CO 1:	Demonstrate the ability to design recombinant molecules.
CO 2:	Design forward and reverse primer to amplify a gene of interest.
CO 3:	Explain transcriptomic analysis and major RNA-Seq platforms.
CO 4:	Apply learned knowledge to their future research.
PH 502.2	**ENZYMOLOGY**
CO 1:	Describe thestructure, functions and the mechanisms of action of enzymes.
CO 2:	Demonstratethe kinetics of enzyme catalyzed reactions and regulatory proc esses.
CO 3:	Explain the different immobilization techniques and industrial and clinical

	scope of enzymes.
CO 4:	Apply the principles of enzyme inhibitions in clinical research.
PH 503.2 P	**GENETIC ENGINEERING PRACTICALS**
CO 1:	Isolate and purify genomic DNA/RNA.
CO 2:	Demonstrate restriction digestion and ligation experiment.
CO 3:	Standardize a PCR protocol for amplification of a specific target gene.
CO 4:	Obtain a thorough knowledge in genetic engineering methods practiced in research.
PH 504.2 P	**ENZYMOLOGY PRACTICALS**
CO 1:	Design the experiments related to isolation and purification of enzymes.
CO 2:	Apply and extend their knowledge and understanding of enzyme catalysis in research.
CO 3:	Develop accuracy skills in enzyme assays.
CO 4:	Construct the standard curve, critically analyse the data and interpret the results.
PS 505.2	**RESEARCH METHODOLOGY, ETHICS AND SCIENTIFICCOMMUNICATION**
CO 1:	Explain the differences between research methodologies.
CO 2:	Design a small research project with appropriate research method.
CO 3:	Apply correct ways of referencing to and citing from scientific literature.
CO 4:	Analyze, contrast, compare and criticize scientific literature and write a research report/ thesis.
PS 506.2	**ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY**
CO 1:	Discuss the principle and instrumentation of HPTLC, HPLC, GC for identification, and characterization of compounds.
CO 2:	Apply the principles and theory of UV-Vis spectroscopy, MS (MALDI-TOF and LC-MS/MS), NMR and XRD for the identification and characterization of organic compounds.
CO 3:	Select an appropriate method of centrifugation or electrophoresis for the separation and identification of analyte molecule by applying the theory and principle of carious methods of centrifugation and electrophoresis.
CO 4:	Explain the application of radioisotopes in biology and Instrumentation of Geiger-Muller counter and Solid, Liquid scintillation counters and autoradiography for detection of radio activity.

PS 507.2	**MULTIOMICS**
CO 1:	Gain knowledge of various computational tools and methods in bioinformatics.
CO 2:	Discern the crucial concepts and techniques applied in genomics, transcriptomics and proteomics.
CO 3:	Understand the importance of genomics, proteomics, metabolomics and their applications in various applied areas of biology.
CO 4:	Formulate and assess experimental design for solving theoretical and experimental problems in Genomics, Proteomics and metabolomics.
PS 508.2	**BIOSAFETY AND BIOETHICS**
CO 1:	Evaluate biosafety and bioethics in the context of modern biotechnology.
CO 2:	Describe the standard operating procedures for biotechnology research and assign Biosafety levels.
CO 3:	Appraise the relevance of different international agreements and protocols for biosafety.
CO 4:	Develop the skills to think critically about risks and risk mitigation strategies needed in their own scientific environment.
PS 509.2 P	**RESEARCH METHODOLOGY AND SCIENTIFIC COMMUNICATION PRACTICALS**
CO 1:	Explain key research designs and techniques.
CO 2:	Identify various sources of information for literature review.
CO 3:	Read, comprehend, and explain research articles in their academic discipline.
CO 4:	Collect, analyze and represent their data and write a research report/ thesis.
PS 510.2 P	**ANALYTICAL TECHNIQUES IN BIOTECHNOLOGY PRACTICALS**
CO 1:	Perform the identification and characterization of various biomolecules using UV Vis spectroscopy, AAS and flame photometry.
CO 2:	Demonstrate the strengths, limitations and use of various chromatographic techniques including paper, TLC, gel filtration and HPLC for the analysis of various biomolecules.
CO 3:	Interpret and analyse the result obtained from various colorimetric assays of protein by plotting a standard curve.
CO 4:	Examine the topography, morphology and composition of various samples by creating the 3D images using SEM.
PS 511.2 P	**MULTIOMICS PRACTICALS**

CO 1:	Search the nucleotide sequence data of the given species using NCBI / EMBL / DDBJ.
CO 2:	Search the protein sequence of the species using PIR and Swissprot / UniProt.
CO 3:	Find the structure of protein using PDB. ¬ View the 3D structure of a protein using RASMOL software.
CO 4:	Carry out the multiple sequence alignment of the proteins with Clustal OMEGA. ¬ Search the database of proteins / nucleic acids using BLAST program
PS 512.2P	**BIOSAFETY AND BIOETHICS PRACTICAL**
CO 1:	Demonstrate good laboratory procedures and practices.
CO 2:	Examine the design of confinement facilities at different Biosafety levels.
CO 3:	Apply the risk analysis framework to their own or their peers' scientific activities.
CO 4:	Develop a research career in the relevant area, to handle various situations he/she encounters, with adequate caution and care.
OPEN ELECTIVE	
PO 513.2	**QUALITY ASSURANCE AND QUALITY IN PRODUCT DEVELOPMENT**
CO 1:	Apply quality tools for quality management and main guidelines & requirements of GMP thus contributing to the organization when it comes to understanding industry standards.
CO 2:	Learn and adopt quickly in a GMP environment.
CO 3:	Integrate the principles of the GMP quality system and quality control and the important procedures when dealing with complaints and recalls.
CO 4:	Justify the requirements for good documentation practice and complete appropriate documents in compliance with regulatory guidelines.
PO 514.2	**RECENT TRENDS IN BIOTECHNOLOGY**
CO 1:	Demonstrate deep understanding of various methods for gene transfer, gene therapy and *in vitro* fertilisation of animals.
CO 2:	Discuss and analyze scientific questions related to transgenic plants, role of microbes in industry and agriculture.
CO 3:	Learn and implement the techniques used in molecular diagnostics.
CO 4:	Discover the development of biosensor technology in Healthcare, Food technology and Environmental monitoring.
SEMESTER – III	

PH 501.3ANIMALBIOTECHNOLOGY	
CO 1:	Perform aseptic techniques and good laboratory practices.
CO 2:	Describe the bioprocess technology for economically important products.
CO 3:	Apply the knowledge for improvement of farm animals.
CO 4:	Take up animal based biological research /relevant biotech industry.
PH 502.3	**PLANT BIOTECHNOLOGY**
CO 1:	Understand the organization of plant genome and intergenomic interaction.
CO 2:	Appraise various methods of marker assistant selection in plant breeding.
CO 3:	Describe various genes used in plant transformation and the role of transgenic plants in human welfare.
CO 4:	Translate the concepts in future studies and debate on the issue related to GMOs and evaluate its significances
PH 503.3P ANIMAL BIOTECHNOLOGY PRACTICAL	
CO 1:	Apply Good Laboratory practices and asepticteчniques.
CO 2:	Initiate primary explant culture and maintain cell lines.
CO 3:	Isolate cells from tissues.
CO 4:	Determine cytotoxicity and growth kinetics.
PH 504.3P	**PLANT BIOTECHNOLOGY PRACTICALS**
CO 1:	Apply Good Laboratory practices and aseptic techniques.
CO 2:	Prepare the media and other reagents, Initiate primary cell culture, Estimate the viability of cells as well as cell concentration.
CO 3:	Perform identification of correct stage of anther for haploid culture and establishand the establishment of secondary embryogenic tissues.
CO 4:	Apply knowledge for large scale clonal propagation of plants through various micropropagation techniques.
PS 505.3	**INDUSTRIAL BIOTECHNOLOGY**
CO 1:	Explain the screening, strain improvement and design of fermentation media.
CO 2:	Assess the conditions for efficient and sustainable design of bioprocesses.
CO 3:	Integrate scientific and technological knowledge on the use of bioprocesses for industrial products on the cell and process level.
CO 4:	Analyze the processes and their application in healthcare, agriculture, energy and the environment.
PS 506.3ENVIRONMENTAL BIOTECHNOLOGY	
CO 1:	Explain and appreciate the concepts of ecology.

CO 2:	Critically examine biodiversity and human linkages, and appreciate the need for biodiversity conservation and contribute to the developmental pathways and policy framework.
CO 3:	Relate an environmental issue with its cause and take an initiative in solving them.
CO 4:	Investigate and develop new biological technologies to mitigate environmental problems.
PS 507.3PLANT BREEDING AND SEED TECHNOLOGY	
CO 1:	Demonstrate an understanding of the automation in plant micropropagation.
CO 2:	Determine the most appropriate method for the breeding of self, cross pollinated and vegetatively propagated crop plants.
CO 3:	Develop a management plan to eliminate pathogens from plant parts and produce Tissue Culture raised plants with Export potentials.
CO 4:	Apply various acts and guidelines in production of certified seeds and plant breeding.
PS 508.3MARINE BIOTECHNOLOGY	
CO 1:	Comprehend the uses of seaweeds and their products.
CO 2:	Develop the methods of identification of therapeutic agents from several marine species.
CO 3:	Understand the marine fish hatchery, Shrimp hatchery and farming techniques.
CO 4:	Use biotechnological principles for feed formulation and its manufacturing.
PS 509.3 PINDUSTRIAL BIOTECHNOLOGY PRACTICALS	
CO 1:	Execute various selective isolation, replica plating, growth kinetics and the role of various factors affecting the process of microbial growth.
CO 2:	Purify proteins by using various proteins including centrifugation, precipitation, dialysis and ion exchange chromatography.
CO 3:	Evaluate different pathways followed in or by the microbes involved in production of these bio-chemicals. Method of manipulating these pathways to get desired yield.
CO 4:	Demonstrate proficiency in methodologies and equipment employed.
PS 510.3 PENVIRONMENTAL BIOTECHNOLOGY PRACTICALS	
CO 1:	Execute scientific collection and preservation of samples.
CO 2:	Perform the analytical tests aimed at establishing the concentration of pollutants in a water sample.
CO 3:	Examine the water quality by microbiological tests.

CO 4:	Demonstrate proficiency in methodologies and equipment employed for the analysis of samples.
PS 511.3 PPLANT BREEDING AND SEED TECHNOLOGY PRACTICALS	
CO 1:	Demonstrate various layering, grafting and budding techniques.
CO 2:	Perform the genetic analysis of variation in plants.
CO 3:	Design and perform plant hybridization experiments.
CO 4:	Produce synthetic seeds, perform the cryopreservation and evaluate the viability of the seeds.
PS 512.3 PMARINE BIOTECHNOLOGY PRACTICALS	
CO 1:	Understand the techniques and applications of fisheries and aquaculture.
CO 2:	Identify therapeutic agents from marine species.
CO 3:	Contribute feed formulation and its manufacturing.
CO 4:	Become entrepreneur in ornamental fish farming.
PO 513.3 CLINICAL DRUG DEVELOPMENT AND IPR	
CO 1:	Demonstrate an understanding of the steps involved in the drug discovery and design process.
CO 2:	Demonstrate an understanding of the importance of strict quality control and regulation in the drug development process, and an awareness of GMP, GLP and GDoP.
CO 3:	Design and manage various essential documents for the conduct of a clinical trial.
CO 4:	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyze the social impact of intellectual property law and policy.
PO 514.3 BIOREMEDIATION TECHNIQUES	
CO 1:	Describe the concept and applications of bioremediation.
CO 2:	Evaluate the manipulation of prokaryotic and eukaryotic cells in culture, and to apply specific cellular and molecular techniques.
CO 3:	Appraise when each bioremediation strategy would be most applicable, based on the polluted site characteristics.
CO 4:	Develop a new and suitable technique to clean-up the environmental contaminants using the knowledge in bioremediation techniques.
IV SEMESTER	
PH 501.4 FOOD BIOTECHNOLOGY	
CO 1:	Explain the importance of food laws, acts, quality control and sensory evaluations.
CO 2:	Describe the factors affecting growth of microorganisms.
CO 3:	Apply the knowledge of processing and preservation techniques in

	increasing the shelf life of food products.
CO 4:	Produce different oriental and traditional fermented foods.
PH 502.4 MOLECULAR DIAGNOSTIS AND IMMUNOTECHNIQUES	
CO 1:	Design PCR based diagnostic method for infectious diseases.
CO 2:	Understand genomics, proteomics and metabolomics that could be employed in early diagnosis and prognosis of human diseases.
CO 3:	Use this knowledge in the processes of antibody engineering, vaccine development, immunization and cancer therapy.
CO 4:	Apply techniques of molecular biology/immunology in research work/pharma industries and other relevant biotech industries.
PH 504.4P FOOD BIOTECHNOLOGY PRACTICALS	
CO 1:	Explain the different microorganisms associated with food and evaluate the microbial estimation in food.
CO 2:	Identify and control adulterants in various foods and evaluate food quality.
CO 3:	Apply the technique of growing mushrooms as an alternative food product.
CO 4:	Comprehend the knowledge of wine production and launch a startup.
PH 505.4P MOLECULAR DIAGNOSTIS AND IMMUNOTECHNIQUES PRACTICALS	
CO 1:	Design and conduct PCR based experiments for disease diagnostics.
CO 2:	Perform nested PCR experiments for identification of a microorganism.
CO 3:	Demonstrate Real Time PCR.
CO 4:	Perform various immunotechniques like ELISA, western blotting.
PS 506.4 CLINICAL RESEARCH, IPR AND PATENTS	
CO 1:	Demonstrate an understanding of the steps involved in the drug discovery and design process.
CO 2:	Demonstrate an understanding of the importance of strict quality control and regulation in the drug development process, and an awareness of GMP, GLP and GDoP.
CO 3:	Design and manage various essential documents for the conduct of a clinical trial.
CO 4:	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems and analyze the social impact of

	intellectual property law and policy.
PS 507.4	**STEM CELL TECHNOLOGY AND REGENERATIVE MEDICINE**
CO 1:	Demonstrate knowledge of different types of stem cells and their specific characteristics, sources of stem cells, their isolation and characterization.
CO 2:	Understand the clinical need for stem cell therapy and tissue engineering in regenerative medicine.
CO 3:	Understand the innovation and technological progress of stem cell research in recent years.
CO 4:	Lead a professional career in stem cell technology and cell/tissue engineering in a wide range of health care establishments.
PS 508.4BIO-ENTREPRENEURSHIP	
CO 1:	Prepare business plan for biotechnology entrepreneurship.
CO 2:	Address the market challenges for a new enterprise.
CO 3:	Assess the global market scenario of their product.
CO 4:	Manage technology transfer for new biotechnology product and launch a startup.

M.SC FOOD SCIENCE	
PROGRAM OUTCOMES	
PO 1:	Scientific Knowledge: Knowledge on the fundamentals of food science and nutrition, food chemistry and biochemical changes during processing and preservation, nutraceuticals, also students will be able to understand and apply sensory evaluation of food.
PO 2:	Design/development of solutions: Design solutions for complex food engineering problems or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. Students will also develop an ability to work in modern tools and equipment's to analyze food composition, identify microorganism responsible for food spoilage.
PO 3:	Problem analysis: Understand the principles behind analytical techniques used in evaluating the biochemical properties of food; they will be above to identify the microorganism responsible for food spoilage and the methods to control the food spoilage.
PO 4:	Modern tool usage: Demonstrate knowledge in various engineering properties of food and its application in food industry, concept of mass balance and energy balance, unit operations in food processing, conventional and advanced methods of food preservation, methods of packing, post-harvest practices so as to develop food products and develop device for food industry.
PO 5:	Skill development and application: Develop specific skill based on their interest in bakery and confectionery, meat, poultry and fish processing, food fermentation, dairy processing. Students will also be able to apply the principles of Hazard Analysis and Critical Control Points (HACCP) to ensure safe food processing, Students will also have knowledge in regulations governing the manufacture and sales of the food products.
PO 6:	Research capabilities and Project management: Demonstrate the ability to apply knowledge through critical thinking, inquiry, analysis, and communication to produce scholarly and creative works in the form of an original oral scientific presentation, master's thesis/report, scientific manuscript for wide publication; participate as a member and leader in a

	team in order to manage multidisciplinary projects.
PO 7:	Ethics: Demonstrate awareness of their responsibilities (professional integrity, ethical behavior, etc.) and commit to the highest standards of academic and professional integrity and ethical values.
PO 8:	Environment and sustainability: Comprehend the impact food technologies and food waste processing solutions in societal and environmental contexts and promulgate the knowledge to strategize various approaches for sustainable development.
PO 9:	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings which are basic qualities for a Food technologist.
PO 10:	Interpersonal Skills: Listening and effective speaking on food science problem with the small, medium and large-scale food business operators and with the society at large. For instance, ability to comprehend and published effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11:	Life-long learning: Identify the need for and be prepared to engage in independent and life-long learning in the most extensive context of methods and technological advancement in the field of food science and technology.
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	To inculcate technical writing and communicating ability for effective documentation and presentations and develop strong research aptitude through research work to enable the students to opt for higher levels of learning in the field of Food science and Technology.
PSO 2:	To acquaint and equip students with professional and intellectual integrity, ethics of research and scholarship, impact of research outcomes on professional practices and responsibilities to contribute positively in the sustainable development of society.
PSO 3:	To enable the students to get engaged in lifelong learning independently with the vigor and zeal and become capable to start-up their own businesses.

COURSE OUTCOMES	
I Semester	
PH 591.1 Food Chemistry	
CO 1:	Know the chemistry underlying the properties and reactions of various food components
CO 2:	Have sufficient knowledge of food chemistry to control reactions in foods.
CO 3:	Know the major chemical reactions that limit shelf life of foods.
CO 4:	Use the laboratory techniques common to basic and applied food chemistry.
CO 5:	Know the principles behind analytical techniques associated with food.
PH 592.1Principles of Food Processing and Preservation	
CO 1:	Describe the source and variability of raw food material and their impact on food processing operations.
CO 2:	Explain the spoilage and deterioration mechanisms in foods and methods to control deterioration and spoilage.
CO 3:	Describe the unit operations required to produce a given food product.
CO 4:	Explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.
PH 593.1Fruits and Vegetables Processing Technology	
CO 1:	Better understanding of the concepts of physiological characteristics of fruits and vegetables.
CO 2:	Better insight about fruit losses during storage and ways to prevent it.
CO 3:	Thorough Knowledge and understandings of the specific processing technologies used for different foods and the various products derived from these materials.
CO 4:	The students acquire insight into specific product and process related factors in the processing of fruits and vegetables.
PS 596.1Processing of Milk and Dairy Products	
CO 1:	Understand the processes related to storage, processing and distribution of milk and milk products.
CO 2:	Perceive the different properties of milk and milk products and apprehend the thermal processing of milk.

CO 3:	Grasp the technology of fat rich dairy products and Comprehend the technology of condensed milk, dried milk, cheese, yoghurt and indigenous products will be understood.
CO 4:	Have knowledge regarding hygiene and sanitation practices in the milk and milk products industry.
PS 597.1 Waste Management and Environmental Sustainability	
CO 1:	Learn physical/chemical/biological characteristics of and the evaluation technique form various industrial waste water.
CO 2:	Understand the theory, engineering application, and design technique for the industrial wastewater treatment unit processes.
CO 3:	Design various environmental structures like water treatment plants, waste water treatment systems and air pollution control equipment's.
CO 4:	Know solid waste remedial measures and their importance and Undertake projects related to solid waste management.
CO 5:	Make decision based on the environmental consequences of proposed actions and promote environmentally sound and sustainable development by identifying appropriate measures.
CO 6:	A sound understanding of the principal environmental policy issues confronting managers in diverse geographical and culture situations.
CO 7:	A range of relevant practical skills, particularly in the fields of impact assessment, audit and law.
PH 591.2 Food Process Engineering and Instrumentation	
CO 1:	Comprehend the recent advancement in the major cereal grains quality and processing aspects.
CO 2:	Understand the mechanism underlying the interaction of various flour components and their role in end use quality.
CO 3:	Grasp the basic and advanced milling methods for wheat, rice, maize.
CO 4:	Know about by-product utilization of various grains.
PS 595.2 Spices and Plantation Crops Technology	
CO 1:	Students will understand practical knowledge on specialized production techniques of vegetables and spices.
CO 2:	Students understand will Importance of vegetables & spices in human

	nutrition improved and national economy.
CO 3:	Students will be acquainted with the knowledge of profitable crop Production technology.
CO 4:	To understand the scientific cultivation methods of plantation crops like coconut, arecanut, cashew, tea, coffee & rubber.
CO 5:	To know more about origin, area, climate, soil, improved varieties and cultivation practices such as time and methods of sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting and yield.
CBCS -ELECTIVE PAPER PO598.2 Essentials of Food Science	
CO 1:	Understand the history and evolution of food processing
CO 2:	Acquire knowledge of the structure, composition, nutritional quality and post-harvest changes in various plant foods.
CO 3:	Understand the structure and composition of various animal foods.
THIRD SEMESTER PH 591.3 Food Microbiology	
CO 1:	Learn the fundamentals of food microbiology.
CO 2:	Identify the novel methods for detection of immunological components.
CO 3:	Acquire the knowledge on various criteria for microbiological assessments in various food products.
PH 592.3 Nutraceuticals and Functional Foods in Human Health	
CO 1:	Acquire knowledge on various bio molecules showing health benefits.
CO 2:	Understand various physiological and biochemical aspects of life threatening and chronic diseases.
CO 3:	Apply their knowledge regarding extraction, isolation, characterization and application of nutraceuticals in food industries.
CO 4:	Identify various aspects about safety, quality and toxicology of food products including, nutraceutical and functional foods.
CBCS -ELECTIVE PAPER PO 595.3 Basics of Food Safety and Labelling	
CO 1:	Understand the concept of food safety, types of hazards and their control

	measures.
CO 2:	Identify and prevent potential sources of food contamination and comprehend the need of hygiene and sanitation for ensuring food safety.
CO 3:	Understand National and International Food Safety Laws and Regulations.
CO 4:	Practical knowledge to detect and quantify microorganisms from various routes of contamination of food.
CO 5:	Understand various areas of Food Safety & Quality Assurance.
CO 6:	Grasp knowledge of the quality assessments of food products.
CO 7:	Comprehend food quality managements systems.
CO 8:	Apprehend the Indian and International food laws.
CO 9:	Conceive the concept of adulteration in food products.
FOURTH SEMESTER **PH 591.4 Meat, Fish, and Poultry Processing Technology**	
CO 1:	Understand the need and importance of livestock, egg and poultry industry
CO 2:	Understand the structure, composition and nutritional quality of animal products.
CO 3:	Understand the concept and methods of processing and preservation of animal foods.
CO 4:	Understand the technology behind preparation of various animal food products and byproduct utilization
CO 5:	Understand egg production practices and egg preservation methods
CO 6:	Understand factors affecting egg quality and measures of egg quality.
PH 592.4 Food Packaging	
CO 1:	Comprehend the overview of the scientific and technical aspects of food packaging
CO 2:	Understand packaging machinery, systems, testing
CO 3:	An insight to food packaging laws and regulations
CO 4:	An understanding of packaging requirement and packaging designing of food.
CO 5:	Comprehend advance knowledge on the properties and production of various packaging materials and effect of various indicators used in supply chain management to indicate the food quality
CO 6:	Understand various types of scavengers and emitters for improving the food shelf life.

CO 7:	Learn about consumer response about new packaging systems and safety and legislative requirements
CO 8:	Acquaint about food-package interaction between package-flavour, gas storage systems for food storage, recycling and use of green plastics for reducing the pollution and their effect on food quality.
PH 593.4 Food Biotechnology	
CO 1:	Students shall become aware of fundamentals of food biotechnology, genetics and also gain basic knowledge of cell culture technology.
CO 2:	Have developed an understanding of the application of biotechnology in animal, plant and food production.
CO 3:	Have acquired practical skills in using nucleic acids sequences and bioinformatics data on computers.
CO 4:	Be able to recommend appropriate measures to solve technical problems
PS 595.4 Food Safety and Quality Control	
CO 1:	Understand, use and apply the knowledge, skills of quality management in food processing.
CO 2:	Understand and critically evaluate the presence of contaminants in food quality assurance.
CO 3:	Understand the chemical, technological and toxicological aspects of food additives in food preservation.
CO 4:	Understand the concept of food safety, types of hazards and their control measures
CO 4:	Comprehend the need of hygiene and sanitation for ensuring food safety

M.Sc Chemistry	
PROGRAM OUTCOMES	
PO 1:	Inculcate critical thinking to carry out scientific investigation objectively in industry and academia by following scientific approach to knowledge development.
PO 2:	Equip the student with necessary skills to analyse scientific problems, formulate hypothesis, evaluate and validate results, and draw conclusions from the data obtained
PO 3:	Equip the student with the knowledge for clear understanding of the subject related concepts to lead them for interdisciplinary and trans disciplinary research
PO 4:	Induce the sense of professional and ethical responsibility and enhance the cross cultural competency
PO 5:	Demonstrate an understanding of major concepts in all disciplines of chemistry
PO 6:	Get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	To acquire basic knowledge of the analytical chemistry of important techniques that will provide the basis for their industrial production methods.
PSO 2:	To provide an adequate mastery of analytical methods used for the determination of commercial/domestic raw materials and finished product quality.
PSO 3:	To Able to carry out independent research through application of spectroscopic knowledge which in turn facilitates the submission of project/research article.
PSO 4:	Able to successfully prepare for the competitive examinations like CSIR-NET, GATE and State Level eligibility test for Lectureship
PSO 5:	Develop strong analytical skills and strong background in the Chemical sciences to join Chemical and Pharmaceutical industry
COURSE OUTCOMES	
I Semester	
PH 581.1 : INORGANIC CHEMISTRY	
CO 1:	Describe the types of bonds and molecular shape of compounds with emphasis on VSEPR, VB and MO theory of complexes.
CO 2:	Explain the chemistry of acids, bases, non-aqueous solvents and the concepts of hard and soft acids and bases

CO 3:	Discuss the properties of the non-transition elements like C, B and Si and and their frameworks
CO 4:	Illustrate the properties of Nitrogen, Phosphorus, Sulphur and noble gas compounds.
PH 582.1 : ORGANIC CHEMISTRY	
CO 1:	Explain the basic concepts of organic chemistry
CO 2:	Explain the reaction intermediates and mechanisms.
CO 3:	Demonstrate the importance of conformation and stereochemistry in understanding the reactivity and stability of organic molecules
CO 4:	Detail the synthesis and stereochemistry of carbohydrate
PH 583.1 : PHYSICAL CHEMISTRY	
CO 1:	Understand the basic concepts of thermodynamics and its applications.
CO 2:	Gather the knowledge about chemical kinetics and its applications
CO 3:	Familiarize with the various concepts in heterogeneous catalysis.
CO 4:	Detail the study of the principle and applications of electrochemistry
PS 584.1 : PRINCIPLES OF ANALYTICAL CHEMISTRY & SEPARATION TECHNIQUES	
CO 1:	Gain a domain knowledge about various sampling techniques and errors.
CO 2:	Evoke the fundamental concepts in different titration techniques
CO 3:	Understand the principle of different chromatography techniques and apply that knowledge for the separation and purification of different samples
PS 585.1 BIOORGANIC CHEMISTRY	
CO 1:	Understand the chemical principles of living cells, their biomolecules and biocatalytic reactions.
CO 2:	Study the basic principles of nucleic acid chemistry.
CO 3:	Explain the structure determination, synthesis and classification of biomolecules like vitamins and lipids
PS 586.1 RESEARCH METHODOLY	
CO 1:	Evaluate Research output with philosophical base and greater relevance to the society
CO 2:	Identify the parameters of Quality research with scientific methodology
CO 3:	Understand the concepts Original Research, ethical guidelines and practices in conducting the research and publication of papers.
CO 4:	Create awareness on Intellectual property Rights and Patents.
PS 587.1P : INORGANIC CHEMISTRY PRACTICALS – I	
CO 1:	Estimate the quantity and quality of different compounds and metal ions using gravimetry, volumetry and complexometric techniques.

PS 588.1P : ORGANIC CHEMISTRY PRACTICALS - I	
CO 1:	Carry out multi-step organic synthesis Purify the synthesized organic compounds
PS 589.1P : PHYSICAL CHEMISTRY PRACTICALS – I	
CO 1:	Carry out experiments related to viscometry, Polarimetry, Refractometry, Conductometry, Potentiometry and pH metry.
CO 2:	Determine the Ka of various acids by different electroanalytical techniques.
SECOND SEMESTER	
PH 581.2: ADVANCED INORGANIC CHEMISTRY	
CO 1:	Understand the Chemistry of d block elements, Lanthanides and Actinides and explain the magnetic and electronic properties of them
CO 2:	Describe the VB and MO theory of complexes and electronic and bonding reactivities of transition metals
CO 3:	Describe the basic concepts of organometallic chemistry and their bonding patterns especially with unsaturated ligands
CO 4:	Explain the spectral and magnetic properties of metal complexes
PH 582.2: ADVANCED ORGANIC CHEMISTRY	
CO 1:	Describe the mechanisms of different types organic reactions.
CO 2:	Understand the chemistry of radical reactions and its applications.
CO 3:	Understand the mechanism of additions to various Carbon based multiple bonds
CO 4:	Achieve skills in constructing homo/heterocyclic rings of significant molecules
PH 583.2: ADVANCED PHYSICAL CHEMISTRY	
CO 1:	Gather the knowledge in the Quantum Chemistry and its application
CO 2:	Explain the approximation methods in quantum mechanics
CO 3:	Describe the quantum mechanical explanation of chemical bonding
CO 4:	Explain the relationship between microscopic properties of molecules with macroscopic thermodynamic observables
PS 584.2: MOLECULAR SYMMETRY AND MOLECULAR SPECTROSCOPY	
CO 1:	Apply the principles of group theory in chemical bonding.
CO 2:	Define aspects of specific spectroscopic techniques, applications of molecular symmetry in Microwave and Vibrational spectroscopy
CO 3:	Define aspects of specific spectroscopic techniques, applications of molecular symmetry in Rotational and Raman spectroscopy
PS 585.2 : CHEMISTRY OF BIOMOLECULES	
CO 1:	Explain the structure and role of biomolecules like peptide, proteins and lipids

CO 2:	Understand the chemical principles of living cells, their biomolecules and biocatalytic reactions.
CO 3:	Detail the synthesis and stereochemistry of carbohydrate
PS 586.2P : INORGANIC CHEMISTRY PRACTICALS – II	
CO 1:	Estimate binary mixtures of metallic ions in solution
CO 2:	Analyse the presence of inorganic salts qualitatively
PS 587.2P : ORGANIC CHEMISTRY PRACTICALS – II	
CO 1:	Separate and analyse the binary mixture of Organic Compounds
PS 588.2P : PHYSICAL CHEMISTRY PRACTICALS – II	
CO 1:	Determine cryoscopic constants, dissociation constants and various other physical properties of compounds
CO 2:	Carry out kinetic experiments to determine the order, rate of various chemical reactions.
PO 589.2- ANALYTICAL TECHNIQUES	
CO 1:	Gain a domain knowledge about biomolecules and the chemistry related to it
CO 2:	Understand different electro-analytical techniques
CO 3:	Understand the chemistry of Polymers
THIRD SEMESTER	
PH 581.3 :ORGANOMETALLIC, BIOINORGANIC AND COORDINATION CHEMISTRY	
CO 1:	Describe the basic concepts, synthesis, reaction chemistry of organometallic compounds and the structure and bonding patterns.
CO 2:	Detail the mechanism of different organometallic reactions and catalysis and their application as industrial catalysts.
CO 3:	Understand the role and interaction of Metal ions in biological systems.
CO 4 :	Understand the nomenclature, metal-ligand reactions and their mechanism and identify the bonding, structure, and reactivity of selected coordination complexes.
PH 582.3: ELECTROCHEMISTRY AND THERMO-ANALYTICAL METHODS	
CO 1:	Detail the structure of electrode-electrolyte interface with various models such as Helmholtz - Perrin, Gouy - Chapman and Stern model of electrical double layers.
CO 2:	Describe the physical principles of Photo electrochemistry and its classification.
CO 3:	Understand the basic principles of corrosion science.
CO 4 :	Describe the methods of corrosion protection and explain the principles of corrosion protection.
PS 583.3: MOLECULAR SPECTROSCOPY	
CO 1:	Gather knowledge about various spectroscopic techniques such as IR, NMR, UV and Mass spectroscopy analysis.

CO 2:	Understand theory and application to mass spectrometry, ultraviolet and visible spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectroscopy.
CO 3:	Apply NMR, IR, MS, UV-Vis spectroscopic techniques in solving structure of organic molecules
PS 584.3 : MEDICINAL CHEMISTRY	
CO 1:	Explain the mechanism of drug action and drug designing.
CO 2:	Understand the classification, structure and mechanism of action of drugs.
CO 3:	Develop an understanding on various CNS depressants
PS 586.3P: COMPUTERS FOR CHEMISTS	
CO 1:	Understand about the different operating systems and softwares
PS 585.3P: INORGANIC CHEMISTRY PRACTICALS – III	
CO 1:	Estimate binary mixtures of metallic ions in solution
CO 2:	Detects the presence of certain types of ions in water.
PS 586.3P ORGANIC CHEMISTRY PRACTICALS – III	
CO 1:	Separate and perform systematic qualitative analysis of binary mixtures of organic compounds containing both mono and bifunctional groups and preparation of suitable derivatives.
PS 587.3P : PHYSICAL CHEMISTRY PRACTICALS – III	
CO 1:	Carry out experiments related to Polarography, Conductometry and Potentiometry.
CO 2:	Verify some laws of electrochemistry.
PO588.3 BIO-INORGANIC CHEMISTRY, GREEN CHEMISTRY AND ENVIRONMENTAL CHEMISTRY	
CO 1:	Understand the role and interaction of Metal ions in biological systems.
CO 2:	Understand the principle and importance of green chemistry.
CO 3:	Identify environmental problems related to pollution
CO 4 :	Identify and utilize eco- friendly methods to protect environment
CO 5:	Understand and apply green chemical methods to solve the problems related to environmental pollution.
FOURTH SEMESTER	
PH 581.4: ORGANIC SYNTHETIC METHODS	
CO 1:	Understand and apply the various reagents in organic synthesis and design organic synthetic reactions.
CO 2:	Describe the applications of oxidation and reduction techniques in organic syntheses.

CO 3:	Prefer suitable reagent for important reactions/building appropriate bonds.
CO 4 :	Understand the principles and applications of protecting groups in chemistry
PH 582.4 : RADIATION AND PHOTOCHEMISTRY	
CO 1:	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications
CO 2:	Acquire the knowledge of nucleus, nuclear reaction, radioactive techniques and application of radioisotopes.
CO 3:	Describe the methods of measurements and kinetics of photochemical reactions
CO 4 :	Discuss the principle of absorption and emission of radiation and explain the mechanism of Jablonski diagram
CO 3:	Get training on using subject specific softwares.
CO 4 :	Get a hands-on experience to use the relevant softwares
PH 583.4: CHEMISTRY OF POLYMERS AND NATURAL PRODUCTS	
CO 1:	Understand preparation methods, property uses of some industrially important polymers.
CO 2:	Describe the morphology, structure thermal, physical, and mechanical properties of polymers.
CO 3:	Gather knowledge about the classification, isolation techniques, understand the various synthetic approaches in Natural Products synthesis structural elucidation of natural products.
CO 4 :	Explain the basics and applications of concerted reactions and pericyclic reactions. Develop an in-depth knowledge of the basics and applications with mechanistic understanding in concerted reactions apply those in the synthesis of organic compounds.
PH 584.4P ORGANIC CHEMISTRY PRACTICALS – IV	
CO 1:	Detail the various organic reactions and their synthetic procedures.
CO 2:	Analyze the separation processes of various organic compound mixtures and their quality checking processes
PH 585.4P : INORGANIC CHEMISTRY PRACTICALS – IV	
CO 1:	Estimate binary mixtures of metallic ions in solution.
CO 2:	Study structure of the prepared complexes using conductance and magnetic susceptibility measurements, recording the electronic and infrared spectra
PS 587.4 : SOLID STATE AND NANO CHEMISTRY	
CO 1:	Understand the theory of diffraction techniques
CO 2:	ain a domain knowledge about crystal systems and defects
CO 3:	Understand the importance and basic concepts of Nano chemistry

M.Sc Analytical Chemistry	
PROGRAM OUTCOMES	
PO 1:	Inculcate critical thinking to carry out scientific investigation objectively in industry and academia by following scientific approach to knowledge development.
PO 2:	Equip the student with necessary skills to analyse scientific problems, formulate hypothesis, evaluate and validate results, and draw conclusions from the data obtained
PO 3:	Equip the student with the knowledge for clear understanding of the subject related concepts to lead them for interdisciplinary and trans disciplinary research
PO 4:	Induce the sense of professional and ethical responsibility and enhance the cross cultural competency
PO 5:	Demonstrate an understanding of major concepts in all disciplines of chemistry
PO 6:	Get an awareness of the impact of chemistry on the environment, society, and other cultures outside the scientific community
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Apply advanced concepts of organic, analytical, physical and inorganic chemistry to solve complex problems of industry and academia
PSO 2:	Design experiments, analyse and interpret data to provide solutions to various industrial glitches by working in the pure, inter and multi-disciplinary areas of chemical sciences.
PSO 3:	Able to independently carry out research / investigation to solve practical problems and write / present a substantial technical report/document.
PSO 4:	Able to successfully prepare for the competitive examinations like CSIR-NET, GATE and State Level eligibility test for Lectureship
PSO 5:	Develop strong analytical skills and strong background in the Chemical sciences to join Chemical and Pharmaceutical industry
COURSE OUTCOMES	
I Semester	
PH 541.1 : INORGANIC CHEMISTRY	
CO 1:	Describe the types of bonds and molecular shape of compounds with emphasis on VSEPR, VB and MO theory of complexes.
CO 2:	Explain the chemistry of acids, bases, non-aqueous solvents and the concepts of hard and soft acids and bases
CO 3:	Discuss the properties of the non-transition elements like C, B and Si and and their frameworks
CO 4:	Illustrate the properties of Nitrogen, Phosphorus, Sulphur and noble gas compounds.
PH 542.1 : ORGANIC CHEMISTRY	

CO 1:	Explain the basic concepts of organic chemistry
CO 2:	Explain the reaction intermediates and mechanisms.
CO 3:	Demonstrate the importance of conformation and stereochemistry in understanding the reactivity and stability of organic molecules
CO 4:	Detail the synthesis and stereochemistry of carbohydrate
PH 543.1 : PHYSICAL CHEMISTRY	
CO 1:	Understand the basic concepts of thermodynamics and its applications.
CO 2:	Gather the knowledge about chemical kinetics and its applications
CO 3:	Familiarize with the various concepts in heterogeneous catalysis.
CO 4:	Detail the study of the principle and applications of electrochemistry
PS 544.1 : PRINCIPLES OF ANALYTICAL CHEMISTRY & SEPARATION TECHNIQUES	
CO 1:	Gain a domain knowledge about various sampling techniques and errors.
CO 2:	Evoke the fundamental concepts in different titration techniques
CO 3:	Understand the principle of different chromatography techniques and apply that knowledge for the separation and purification of different samples
PS 545.1 BIOORGANIC CHEMISTRY	
CO 1:	Understand the chemical principles of living cells, their biomolecules and biocatalytic reactions.
CO 2:	Study the basic principles of nucleic acid chemistry.
CO 3:	Explain the structure determination, synthesis and classification of biomolecules like vitamins and lipids
PS 546.1 RESEARCH METHODOLY	
CO 1:	Evaluate Research output with philosophical base and greater relevance to the society
CO 2:	Identify the parameters of Quality research with scientific methodology
CO 3:	Understand the concepts Original Research, ethical guidelines and practices in conducting the research and publication of papers.
CO 4:	Create awareness on Intellectual property Rights and Patents.
PS 547.1P : INORGANIC CHEMISTRY PRACTICALS – I	
CO 1:	Estimate the quantity and quality of different compounds and metal ions using gravimetry, volumetry and complexometric techniques.
PS 548.1P : ORGANIC CHEMISTRY PRACTICALS - I	
CO 1:	Carry out multi-step organic synthesis Purify the synthesized organic compounds
PS 549.1P : PHYSICAL CHEMISTRY PRACTICALS – I	

CO 1:	Carry out experiments related to viscometry, Polarimetry, Refractometry, Conductometry, Potentiometry and pH metry.
CO 2:	Determine the Ka of various acids by different electroanalytical techniques.
SECOND SEMESTER	
PH 541.2: ADVANCED INORGANIC CHEMISTRY	
CO 1:	Understand the Chemistry of d block elements, Lanthanides and Actinides and explain the magnetic and electronic properties of them
CO 2:	Describe the VB and MO theory of complexes and electronic and bonding reactivities of transition metals
CO 3:	Describe the basic concepts of organometallic chemistry and their bonding patterns especially with unsaturated ligands
CO 4:	Explain the spectral and magnetic properties of metal complexes
PH 542.2: ADVANCED ORGANIC CHEMISTRY	
CO 1:	Describe the mechanisms of different types organic reactions.
CO 2:	Understand the chemistry of radical reactions and its applications.
CO 3:	Understand the mechanism of additions to various Carbon based multiple bonds
CO 4:	Achieve skills in constructing homo/heterocyclic rings of significant molecules
PH 543.2: ADVANCED PHYSICAL CHEMISTRY	
CO 1:	Gather the knowledge in the Quantum Chemistry and its application
CO 2:	Explain the approximation methods in quantum mechanics
CO 3:	Describe the quantum mechanical explanation of chemical bonding
CO 4:	Explain the relationship between microscopic properties of molecules with macroscopic thermodynamic observables
PS 544.2: MOLECULAR SYMMETRY AND MOLECULAR SPECTROSCOPY	
CO 1:	Apply the principles of group theory in chemical bonding.
CO 2:	Define aspects of specific spectroscopic techniques, applications of molecular symmetry in Microwave and Vibrational spectroscopy
CO 3:	Define aspects of specific spectroscopic techniques, applications of molecular symmetry in Rotational and Raman spectroscopy
PS 545.2 : CHEMISTRY OF BIOMOLECULES	
CO 1:	Explain the structure and role of biomolecules like peptide, proteins and lipids
CO 2:	Understand the chemical principles of living cells, their biomolecules and biocatalytic reactions.

CO 3:	Detail the synthesis and stereochemistry of carbohydrate
PS 546.2P : INORGANIC CHEMISTRY PRACTICALS – II	
CO 1:	Estimate binary mixtures of metallic ions in solution
CO 2:	Analyse the presence of inorganic salts qualitatively
PS 547.2P : ORGANIC CHEMISTRY PRACTICALS – II	
CO 1:	Separate and analyse the binary mixture of Organic Compounds
PS 548.2P : PHYSICAL CHEMISTRY PRACTICALS – II	
CO 1:	Determine cryoscopic constants, dissociation constants and various other physical properties of compounds
CO 2:	Carry out kinetic experiments to determine the order, rate of various chemical reactions.
PO 549.2- ANALYTICAL TECHNIQUES	
CO 1:	Gain a domain knowledge about biomolecules and the chemistry related to it
CO 2:	Understand different electro-analytical techniques
CO 3:	Understand the chemistry of Polymers
THIRD SEMESTER	
PH 541.3 :ORGANOMETALLIC, BIOINORGANIC AND COORDINATION CHEMISTRY	
CO 1:	Describe the basic concepts, synthesis, reaction chemistry of organometallic compounds and the structure and bonding patterns.
CO 2:	Detail the mechanism of different organometallic reactions and catalysis and their application as industrial catalysts.
CO 3:	Understand the role and interaction of Metal ions in biological systems.
CO 4 :	Understand the nomenclature, metal-ligand reactions and their mechanism and identify the bonding, structure, and reactivity of selected coordination complexes.
PH 542.3: ELECTROANALYTICAL RADIOCHEMICAL AND THERMOANALYTICAL TECHNIQUES	
CO 1:	Describe the principles of electrochemistry and applications of electromotive force.
CO 2:	Explain the principles of irreversible thermodynamics and bioenergetics
CO 3:	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications.
CO 4 :	Understand and apply various electro-analytical techniques in qualitative and quantitative analysis.

PS 543.3: MOLECULAR SPECTROSCOPY	
CO 1:	Gather knowledge about various spectroscopic techniques such as IR, NMR, UV and Mass spectroscopy analysis.
CO 2:	Understand theory and application to mass spectrometry, ultraviolet and visible spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectroscopy.
CO 3:	Apply NMR, IR, MS, UV-Vis spectroscopic techniques in solving structure of organic molecules
PS 544.3 : MEDICINAL CHEMISTRY	
CO 1:	Explain the mechanism of drug action and drug designing.
CO 2:	Understand the classification, structure and mechanism of action of drugs.
CO 3:	Develop an understanding on various CNS depressants
PS 546.3P: COMPUTERS FOR CHEMISTS	
CO 1:	Understand about the different operating systems and softwares
CO 2:	Get training on using subject specific softwares
CO 3:	Get a hands-on experience to use the relevant softwares
PS 545.3P: ANALYTICAL CHEMISTRY PRACTICALS – I	
CO 1:	Analyze the common and rare cations in a mixture by different titration techniques.
CO 2:	Handle spectrophotometry for various determinations
PS 546.3P ANALYTICAL CHEMISTRY PRACTICALS – II	
CO 1:	Have clear understanding of different analytical instruments.
CO 2:	Apply chromatographic techniques as analytical tool in chemistry.
PO547.3 OPTICAL METHODS OF ANALYSIS	
CO 1:	Understand the basic principles, working and application of atomic absorption spectroscopy
CO 2:	Will be able to describe the physical principles of photochemistry and explain the methods of fluorescence spectroscopy.
CO 3:	To learn and analyze the optical properties of solids using various instrumentation techniques.
FOURTH SEMESTER	

PH 541.4: ORGANIC SYNTHETIC METHODS	
CO 1:	Understand and apply the various reagents in organic synthesis and design organic synthetic reactions.
CO 2:	Describe the applications of oxidation and reduction techniques in organic syntheses.
CO 3:	Prefer suitable reagent for important reactions/building appropriate bonds.
CO 4 :	Understand the principles and applications of protecting groups in chemistry
PH 542.4: SPECTROSCOPIC METHODS OF ANALYSIS	
CO 1:	Learn the fundamental principles of instrumental measurements,
CO 2:	Develop and understand the basic principles and application of Electron spin resonance (ESR) spectroscopy, Photoelectron, NQR and Mossbauer spectroscopy for the structural elucidation of compounds.
CO 3:	Understand the underlying principle of different biophysical methods and will be able to describe the physical principles of photochemistry
PH 543.4: CHEMISTRY OF POLYMERS AND NATURAL PRODUCTS	
CO 1:	Understand preparation methods, property uses of some industrially important polymers.
CO 2:	Describe the morphology, structure thermal, physical, and mechanical properties of polymers.
CO 3:	Gather knowledge about the classification, isolation techniques, understand the various synthetic approaches in Natural Products synthesis structural elucidation of natural products.
CO 4 :	Explain the basics and applications of concerted reactions and pericyclic reactions. Develop an in-depth knowledge of the basics and applications with mechanistic understanding in concerted reactions apply those in the synthesis of organic compounds.
PH 544.4P ANALYTICAL CHEMISTRY PRACTICALS – III	
CO 1:	Understand of different analytical instruments.
CO 2:	Experimental verification of fundamental concept

CO 3:	Application of spectroscopic techniques as analytical tool in chemistry
PH 546.4 : APPLIED ANALYSIS AND AUTOMATION	
CO 1:	To be able to determine the reaction rates
CO 2:	Be able to describe the chemical and biochemical properties of major food constituents, poisonous materials and have an overview of the automated systems
CO 3:	An ability to ensure the quality of production processes within the field of chemistry so as to guarantee effective output.
PS 547.4 : RADIATION AND PHOTOCHEMISTRY	
CO 1:	Demonstrate a systematic understanding of the key aspects of nuclear chemistry and their analytical applications
CO 2:	Acquire the knowledge of nucleus, nuclear reaction, radioactive techniques and application of radioisotopes.
CO 3:	Describe the methods of measurements and kinetics of photochemical reactions
CO 34:	Discuss the principle of absorption and emission of radiation and explain the mechanism of Jablonski diagram

M.Sc Mathematics	
PROGRAM OUTCOMES	
PO 1:	Understand the fundamental axioms in Mathematics and develop problem solving skills.
PO 2:	Develop analytical thinking and logical reasoning.
PO 3:	Pursue careers in academia, industry and the other areas of Mathematics.
PO 4:	Apply knowledge of Mathematics in all fields of learning including higher research and its extensions.
PO 5:	Crack lectureship and fellowship exams approved by UGC like CSIR-NET, KSET, GATE etc.\
PROGRAM SPECIFIC OUTCOMES	
PSO 1:	Understand formal mathematical definitions, concepts and apply them to prove statements in Analysis
PSO 2:	Develop problem solving skills using Matrix Theory in Linear Algebra and will be able to apply in other fields.
PSO 3:	Understand the concepts of groups, rings, fields and other algebraic structures.
PSO 4:	Understand the importance and applications of Operations Research to find solutions to real life problems.
PSO 5:	Understand various properties of topological spaces and be able to prove Lindelof's theorem, Urysohn's Lemma, Tietze Extension theorem, etc.
PSO 6:	Understand the concept of Graphs and its wide range of applications in physical, biological, social and information systems
PSO 7:	Learn techniques of Complex Analysis, describe domains and compute limits in the complex plane, use the Cauchy-Riemann equations to obtain the derivative of complex functions, evaluate integrals using Residue theorem.
PSO 8:	Apply the fundamental concepts of Numerical Analysis, Ordinary Differential Equations and Partial Differential Equations
PSO 9:	Understand the fundamental applications of Functional Analysis and the concepts associated with the dual of a linear space.
PSO 10:	To solve problems using FOSS and prepare documents using Latex software which will be very useful for their research programs

COURSE OUTCOMES	
I Semester	
CO 1:	Identify the concept of Normal groups and Quotients groups.
CO 2:	Investigate symmetry using group theory.
CO 3:	Analyze Permutation groups and counting principle.
CO 4:	Perform computations in symmetric groups
CO 5:	Explain Sylow theorem and its applications.
CO 5:	Provide information on ideals and Quotient rings, Field of Quotient of an integral domai
PH 562.1 Linear Algebra I	
CO 1:	gain knowledge of theory of matrices, and their operations solve linear system of equations
CO 2:	learn the concepts of subspace, basis, linear independence, dimension of vector spaces and linear transformations
CO 3:	understand the concept of Eigen values, eigen vectors
CO 4:	understand the concept of diagonalization of matrices solve system of differential equations using matrix theory and compute matrix exponentials
CO 5:	gain knowledge of theory of matrices, and their operations solve linear system of equations
CO 1:	Understand basic properties of $\mathbb{R}$, such as its characterization as a complete ordered field, Archimedean Property, density of $\mathbb{Q}$, countability and uncountability of sets.
CO 2:	Classify and explain open and closed sets, limit points, compactness, connectedness etc. in a metric space.
CO 3:	Use the definitions of convergence as they apply to sequences and series.
CO 4:	Determine the continuity of functions in metric spaces
CO 5:	Find the derivative of functions defined on subsets of the real line**.**
CO 6:	Understand the differentiation of vector valued functions
PS 564.1 Graph Theory	
CO 1:	Write precise and accurate mathematical definitions of basics concepts in

	graph theory.
CO 2:	Study the properties of trees and connectivity.
CO 3:	Apply results to identify both Eulerian graphs and Hamiltonian graphs.
CO 4:	Understand the concepts Planarity including Euler identity.
CO 5:	Discuss and understand the importance of Coloring.
CO 6:	Understand and apply various proof techniques in proving theorems in graph theory.
PS 565.1 Fluid Mechanics	
CO 1:	the types of fluid flows, and understand the basic laws
CO 2:	the principles and phenomena in the area of fluid mechanics
CO 3:	derive Euler's equation of Motion and deduce Bernoulli's equations
CO 4:	to solve problems related to kinematics and dynamics of fluids, losses in a flow system, flow
CO 5:	through pipes and flow past immersed bodies
PS 566.1 Operations Research	
CO 1:	Define and formulate linear programming problems and appreciate their limitations.
CO 2:	Solve linear programming problems using appropriate techniques and interpret the results obtained.
CO 3:	Explain the primal-dual relationship.
CO 4:	Develop mathematical skills to analyse and solve transportation and assignment models arising from a wide range of applications.
CO 5:	Understand the concept of game theory and learn its applications in different social situations.
PS 567.1Ordinary Differential Equations	
CO 1:	Use the Wronskian to determine if a set of functions is linearly independent, construct a second solution to a second order differential equation by reduction of order.
CO 2:	Find the complete solution of a homogeneous differential equation with constant coefficients by examining the characteristic equation and its roots.
CO 3:	Find the complete solution of a nonhom ogeneous differential equation with constant coefficients by the method of undetermined coefficients and by the method of variation
CO 4:	of parameters.
CO 5:	Solve basic application problems described by second order linear differential equations with constant coefficients.
CO 6:	Identify ordinary and singular points and find power series solutions about ordinary points and singular points.

II Semester PH 561.2 Algebra II	
CO 1:	Understand the notion of irreducibility, primes and unique factorization
CO 2:	Derive and apply Gauss Lemma, Eisenstein criterion for irreducibility of polynomials. Understand the concept of Factorization and ideal theory in the polynomial ring, the structure of Primitive polynomials
CO 3:	Explain the concepts of Field extensions and characterization of finite normal extensions as splitting fields
CO 4:	Understand the structure and construction of finite fields
CO 5:	Analyze splitting fields, Galois extensions and Galois groups
PS 562.2 Research Methodology and Ethics	
CO 1:	Understand the meaning of quality research with scientific methodology
CO 2:	Produce of good Research Reports
CO 3:	Understand original Research following ethical guidelines and practices in conducting the research and publication of papers.
CO 4:	Get awareness on Intellectual property Rights and Patents.
PH 563.2 Real Analysis II	
CO 1:	Understand the definition of integrals and their properties
CO 2:	Determine the Riemann-Stieltjesintegrability of a bounded function and prove a selection of theorems concerning integration
CO 3:	Recognize the difference between pointwise and uniform convergence of sequences and series of functions.
CO 4:	Illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability and integrability.
CO 5:	Evaluate improper integrals
CO 6:	To gain knowledge on functions of several variables -The contraction principle, inverse function theorem and implicit function theorem.
PS 564.2 Linear Algebra II	
CO 1:	Understand the concept of bilinear forms on vector spaces
CO 2:	Derive spectral theorems for various types of operators on vector spaces
CO 3:	Explain the theory of modules
CO 4:	Apply the theory in diagonalization of matrices over rings
PS 565.2 Lattice Theory	
CO 1:	Understand the concept of Partially ordered sets and Their Properties.
CO 2:	Identify Lattices as posets and as Algebraic Structures and explain the theory of lattices in general.
CO 3:	Explain the concept of Complete Lattices and understand their properties.

CO 4:	Explain the concept of Modular and Distributive Lattices.
PO 566.2 Basic Tools in Mathematics (OE)	
CO 1:	know about the number system, countability and uncountability of sets
CO 2:	use the definitions of convergence as they apply to sequences and series
CO 3:	Determine the limits, continuity and differentiability of functions defined on subsets of the real line.
CO 4:	know about optimization of functions of one variable
CO 5:	solve system of linear equations using Matrix theory
CO 6:	compute eigen values and eigen vectors
PS 567.2P Computational Lab -1 (using FOSS and Problem working)	
CO 1:	understand the usefulness of FOSS in Mathematical computations
CO 2:	solve problems in matrix theory using FOSS
CO 3:	do computations with algebraic structures such as groups, rings and fields with the aid of FOSS
CO 4:	test the continuity, differentiability of functions and evaluate limits
III Semester **PH 561.3 Complex Analysis I**	
CO 1:	Represent complex numbers algebraically and geometrically
CO 2:	Define and analyze limits and continuity for complex functions.
CO 3:	Apply the concept and consequences of analyticity and the Cauchy-Riemann equations
CO 4:	Apply the Cauchy integral theorem in its various versions, and the Cauchy integral formula
CO 5:	To classify singularities and poles
PH 562.3 Topology	
CO 1:	Define a topology , a basis for a toplogy and various types of topologies
CO 2:	To construct topological spaces from metric spaces.
CO 3:	Gains knowledge on general properties of neighborhoods, open sets, closed sets, basis and sub-basis.
CO 4:	Apply the properties of open sets, closed sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems.
CO 5:	Understand the concepts and properties of compact and connected topological spaces.
CO 6:	Gain knowledge on the concepts of countable spaces and separable spaces.
PH 563.3 Numerical Analysis with Computational Lab	
CO 1:	Apply appropriate algorithms to solve selected problems, both manually and by writing computer programs.

CO 2:	Compare different algorithms with respect to accuracy and efficiency of solution.
CO 3:	Analyze the errors obtained in the numerical solution of problems.
CO 4:	Demonstrate the use of interpolation methods to find intermediate values in given graphical and/or tabulated data.
CO 5:	Using appropriate numerical methods, determine approximate solutions for problems of differentiation and integration.
CO 6:	Using appropriate numerical methods**,** determine approximate solutions to ordinary differential equations.
PS 564.3 Commutative Algebra	
CO 1:	basic definitions concerning elements in rings, classes of rings, and ideals in commutative rings.
CO 2:	constructions of rings of fractions and modules of fractions, localization at prime ideals
CO 3:	the concept of Noetherian rings and Hilbert basis theorem.
CO 4:	The primary decomposition of ideals in Noetherian rings.
PS 565.3 Multivariate Calculus and Geometry	
CO 1:	account for important theorems and concepts in multivariate analysis.
CO 2:	account for the most common multivariate methods.
CO 3:	explain the geometry of curves on $\mathbb{R}^3$.
CO 4:	explain the geometry of surfaces on $\mathbb{R}^3$.
PS 566.3 Probability Theory	
CO 1:	Develop problem-solving techniques needed to accurately calculate probabilities
CO 2:	Apply problem-solving techniques to solving real-world events.
CO 3:	Understand the properties of discrete and continuous random variables with their joint, marginal, and conditional distributions
CO 4:	Apply selected probability distributions to solve problems.
PO 567.3 Differential Equations and Applications (OE)	
CO 1:	Find solution of first order and second order ordinary differential equations using different methods.
CO 2:	Apply different techniques to solve differential equations in Applied Mathematics.
CO 3:	Find solution of first order and second order partial differential equations using different methods.
CO 4:	Find solution of wave equation and Heat equation.
IV Semester **PH 561.4 Measure Theory and Integration**	

CO 1:	give a more rigorous introduction to the theory of measure.
CO 2:	Understand the notions of measurable sets and functions
CO 3:	develop the ideas of Lebesgue integration and its properties.
CO 4:	Identify measurable functions.
CO 5:	construct the Lebesgue integral and understand properties of the Lebesgue integral.
CO 6:	Learn inequalities in L^p Spaces,signed measures and their derivatives
PH 562.4 Complex Analysis II	
CO 1:	To understand and apply results on analytic, harmonic and entire functions.
CO 2:	Gain knowledge on simply connected and multiply connected regions
CO 3:	Represent functions as Taylor, power and Laurent series,
CO 4:	Classify singularities andpoles, find residues
CO 5:	Evaluate complex integrals using the residue theorem.
PS 564.4 Functional Analysis	
CO 1:	Explain the fundamental concepts of functional analysis.
CO 2:	Understand the definitions of linear functional and prove theorems such as the Hahn- Banach theorem, Open Mapping theorem and Uniform Boundedness Principle.
CO 3:	Define linear operators, self-adjoint, isometric and unitary operators on Hilbert spaces
CO 4:	Explain the concept of the spectrum of a bounded linear operator
PS 565.4 Partial Differential Equations	
CO 1:	Study surfaces and curves in three-dimension space.
CO 2:	Classify partial differential equations and transform into canonical form
CO 3:	Solve linear partial differential equations of both first and second order
CO 4:	Analyze the origin of first order partial differential equations and solving them using Charpit's method
CO 5:	Apply partial derivative equation techniques to predict the behavior of certain phenomena.
PS 566.4 Algebraic Number Theory	
CO 1:	Define and interpret the concepts of congruence, and use the theory of congruences in applications.
CO 2:	Prove and apply properties of multiplicative functions such as the Euler phi-function and of quadratic residues.
CO 3:	Apply the Law of Quadratic Reciprocity and other methods to classify numbers as quadratic residues, and quadratic non-residues

CO 4:	To study the number theoretic applications of unique factorization and solving some Diophantine equations Factorization of ideals in Dedekind domains
PS 567.4 Cryptography	
CO 1:	Have knowledge on fundamentals of number theory.
CO 2:	Understand the operations with congruences, linear and non-linear congruenceequations.
CO 3:	Understand basics of Cryptography and Network Security.
CO 4:	Be able to secure a message over insecure channel by various means.
CO 5:	Learn about how to maintain the Confidentiality, Integrity and Availability of data.
CO 6:	Understand various protocols for network security to protect against the threatsin the networks.
PS 568.4 Distribution Theory	
CO 1:	Demonstrate the random variables and its functions
CO 2:	Infer the expectations for random variable functions and generating functions.
CO 3:	Demonstrate various discrete and continuous distributions and their usage
CO 4:	Study Marginal and conditional distributions.
CO 5:	The Poisson Distribution and The Gamma and Chi-square distributions to solve problems.
CO 6:	Study the t & F distributions and their applications.
PS 569.4P Computational Lab -2 using FOSS and Problem Working	
CO 1:	understand the usefulness of FOSS in Mathematical computations
CO 2:	solve differential equations using FOSS
CO 3:	classify second order PDE's
CO 4:	Solve problems in complex analysis eff3ectively using FOSS

M.Sc Physics	
Programme Outcomes	
PO 1	Acquire (i) a fundamental/systematic or coherent understanding of the academic field of Physics, its different learning areas and applications in basic Physics like Quantum Mechanics, Astrophysics, Materials Science, Nuclear and Particle Physics, Condensed Matter Physics, Atomic and Molecular Physics, Mathematical Physics, Analytical Dynamics, Space Sciences, and its relevance with related disciplinary areas/subjects like Chemistry, Mathematics, Life Sciences, Environmental Sciences, Atmospheric Physics, Computer Sciences, Information Technology; (ii) procedural knowledge that creates different types of professionals related to the disciplinary/subject area of Physics, including professionals engaged in research and development, teaching and government/public service; (iii)skills in areas related to one's specialization area within the disciplinary/subject area and the current and emerging developments in the field of Physics.
PO 2	Demonstrate the ability to use skills in Physics and its related areas of technology for formulating and tackling Physics-related problems, and identifying and applying appropriate physical principles and methodologies to solve a wide range of problems associated with Physics.
PO 3	Recognize the importance of mathematical modelling, simulation and computing, and the role of approximation and mathematical approaches to describe the physical world.
PO 4	Plan and execute Physics-related experiments or investigations, analyze and interpret data/information collected using appropriate methods, including the use of appropriate software such as programming languages and purpose-written packages, and report accurately the findings of the experiment/investigations while relating the conclusions/findings to relevant theories of Physics.
PO 5	Demonstrate relevant generic skills and global competencies such as (i) problem-solving skills that are required to solve different types of

	Physics-related problems with well-defined solutions, and tackle open-ended problems that belong to the disciplinary area boundaries; (ii) investigative skills, including skills of independent investigation of Physics-related issues and problems; (iii) communication skills involving the ability to listen carefully, to read texts and research papers analytically and to present complex information in a concise manner to different groups/audiences of technical or popular nature; (iv) analytical skills involving paying attention to detail and ability to construct logical arguments using correct technical language related to Physics and ability to translate them with popular language when needed; (v) ICT skills;personal skills such as the ability to work both independently and in a group.
PO 6	Demonstrate professional behaviour such as I. being objective, unbiased and truthful in all aspects of work and avoiding unethical, irrational behavior such as fabricating, falsifying or misrepresenting data or committing plagiarism; II. the ability to identify the potential ethical issues in work-related situations; III. appreciation of intellectual property, environmental and sustainability issues andPromoting safe learning and working environment.
Programme Specific Outcomes	
PSO 1	Fundamentalunderstanding of the field
PSO 2	Application of basic Physics concepts
PSO 3	Linkages with related disciplines
PSO 4	Procedural knowledge for professionalsubjects
PSO 5	Skills in related field of specialization
PSO 6	Ability to useinPhysics problem
PSO 7	Skills in Mathematicalmodelling
PSO 8	Skills in performing analysis and interpretation of data
PSO 9	Develop investigativeSkills
PSO 10	Skills inproblem solving in Physics and related discipline
PSO 11	Develop technicalcommunication skills

PSO 12	Developing analytical skills and popularcommunication
PSO 13	Developing ICT skills
PSO 14	Demonstrate professional behaviour with respect to attributes like objectivity,ethical values, self reading, etc.

Course Outcomes	
PH 571.1 Mathematical Physics I	
C O 1	To review the knowledge of vectors and scalar quantities.
C O 2	To learn the concepts of vector calculus such as divergence, curl, line integrals, surface integrals, volume integrals.
C O 3	To study fundamental theorems like The Green's theorem, Stokes' theorem and their applications in Physics.
C O 4	To learn the concepts of curvilinear coordinates and to learn the concepts of vector calculus in curvilinear coordinates.
C O 5	To learn the basic properties of matrices and to study the properties of special types of matrices like Hermitian, Unitary and Orthogonal matrices.
C O 6	To study similarity and unitary transformations, concept of eigenvalues and eigenfunctions, Cayley-Hamilton's Theorem and Diagonalization of matrices.
C O 7	To learn basic definitions of tensors and transformation laws of coordinates. Different types of tensors and algebra of tensors including quotient law.
C O 8	To learn about first and second order partial differential equations, their classification.
C O 9	To solve special equations like Heat equation, Laplace's equation, Poisson's equation.
C O 10	To learn to solve a differential equation using the method of power series.
C O 11	To learn different special functions like Legendre polynomials, Bessel's function, Laguerre polynomials and Hermite's polynomials and to study orthogonality conditions and different recurrence relations of these functions.
PH 572.1 Classical Mechanics	
C O 1	Define and understand the basic concepts related to single particle and a system of particles
C O 2	Describe the motion of a mechanical system using Lagrange and Hamilton formalism.

C O 3	Understand the principles of collisions and learn about the concept of centre of mass and laboratory coordinate system
C O 4	Acquire the basic knowledge of the Phase space and Phase trajectory
C O 5	Learn about the canonical transformation
C O 6	Learn about the concept of two body problem
C O 7	Learn the conservation theorems
C O 8	Acquire the knowledge about equation of the orbit and orbit's classification
C O 9	Learn the Kepler's laws of planetary motion
C O 10	Learn the general description and the concept of Scattering
C O 11	Learn the dynamics of the rigid body
C O 12	Understand the rigid body dynamics
C O 13	Learn the theory of small oscillation
PH 573.1 Classical Electrodynamics	
C O 1	To learn to apply the fundamentals of electrostatics and boundary conditions to solve various problems
C O 2	To learn the fundamentals of magnetostatics and magnetism
C O 3	To learn the electromagnetic theory through Maxwell equations and underlying theories
C O 4	To get a grip on gauge symmetries and transformations and also on radiation emission of a moving or oscillating charge
C O 5	To arrive at the plane wave equation of the electromagnetic fields and studying the plane wave solutions
C O 6	Analysis of reflection and transmission of waves: using electromagnetic boundary conditions.
C O 7	To learn the theory of waveguides and solve the problem of rectangular waveguide.
C O 8	To derive the Lorentz transformation equations and understanding basic relativistic dynamics.
C O 9	Lorentz transformation and relativistic dynamics is learnt to be written in four vector (tensor) notation.
C O 10	Basic laws of electrodynamics, continuity equation, Maxwell's equations, Gauge transformations and potential theory in tensor notation.

PH 574.1 Electronics	
C O 1	Understand characteristics of an ideal operational amplifier (Op-amp) and a practical operational amplifier, open loop and closed loop applications of op-amp; use Op-amp for basic mathematical operations like addition, subtraction, multiplication, integration and differentiation applications and a few special applications such as filtering and comparators.
C O 2	Learn the use of op-amp for wave form generation applications and the applications of timer IC 555.
C O 3	Understand the meaning and types of power amplifiers and their applications. The student will able to learn specialized applications of SCR, signal conditioning and other varieties of transducer circuits.
C O 4	Will be able to review basics of digital circuits, few aspects of rigisters and digital data storage, synchronous and asynchronous counter applications, memory devices and basics of a microprocessor.
Semester II **PH 571.2 Mathematical Physics II**	
C O 1	To review the concepts of complex numbers and functions of complex variables.
C O 2	To study calculus of complex functions, Cauchy Riemann conditions and differentiability.
C O 3	To learn integration of complex functions, Cauchy integral theorem, concepts of poles, singularities, residues.
C O 4	To study integration of complex functions using residue theorem also to get a good hold in the concept of mapping and conformal mapping.
C O 5	To review the understanding in Group theory and study the concept of transformation group and symmetry groups.
C O 6	To study representation of groups and understand the concepts of irreducible representations.
C O 7	To learn Lie groups and their application in Physics.
C O 8	To apply the Green's functions to solve various differential equations.
C O 9	Reviewing and understanding the concepts of Fourier series and studying the concepts of Fourier transform and their applications in Physics and

	Electronics.
C O 10	To study Laplace's transforms and their applications in Physics.
C O11	To learn to interpolate a function using various numerical methods.
C O 12	To study the method of solving non linear equations and also differential equations using numerical methods.
C O 13	To learn integration of various functions by numerical methods.
PH 572.2 Quantum Mechanics I	
C O 1	To setup the Schrödinger equation and to understand the physical interpretation of a quantum mechanical wave function.
C O 2	To study in detail the fundamental postulates of quantum mechanics.
C O 3	To understand the concepts of eigenvalues, eigenfunctions and degeneracy being applied to quantum mechanics.
C O 4	To study various commutation relations and to understand its meaning.
C O 5	To setup the Time Independent Schrödinger equation and to learn the concept of stationary states.
C O 6	To solve various problems like potential well, potential barrier and harmonic oscillator and to study the properties of stationary states of these problems.
C O 7	To study the concept of angular momentum in quantum mechanics and to arrive at the eigenvalues and eigenfunctions of angular momentum and hence to understand the concept of space quantization.
C O 8	To study the applications of angular momentum to spherically symmetric systems and to study parity.
C O 9	To solve the problem of Hydrogen like atoms in atomic physics.
C O 10	To review the concept of scattering and to study quantum mechanical scattering.
C O11	To understand Partial wave analysis in quantum mechanical scattering and also to apply Born approximation.
PH 573.2 Condensed Matter Physics- I	
C O 1	A brief idea about crystalline materials-lattice- unit cell-miller indices-reciprocal lattice etc.
C O 2	Production and applications of X-ray. X-ray diffraction. Point groups and space groups and quasi crystals
C O 3	Crystal binding- types of bonds, concept of phonon vibration, phonon

	scattering, thermal expansion of solids and lattice thermal conductivity
C O 4	Free electron models of metals, quantum free electron theory, F.D Statistics, Electron in aperiodic potential, Bloch theorem, metals, semimetals and semiconductors.
C O 5	Semiconductors-types,Impurity atoms, electrical conductivity, quantized Hall Effect, amorphous semiconductors, organic semiconductors.
PS 574.2 Research Methodology and Ethics	
C O 1	To have clear understanding of the meaning and purpose of Research in academics, research philosophy and strategies of Research.
C O 2	To acquaint with the knowledge of methodology involved in a scientific Research
C O 3	To know writing of a good Research Report.
C O 4	To understand the ethical issues and practices in research with an awareness of rights and obligations of research participants.
C O 5	Understand the process of Intellectual property Rights and its different forms and implications
C O 6	To know how to write research papers and publish research papers.
PO 577.2 Biophysics	
C O 1	To study the basic concepts of radioactivity and the dose measurements using dosimetry
C O 2	To study the interaction of radiations like charged particles, electrons, electromagnetic radiation and the neutrons with matter and their energy loss.
C O 3	The detection of nuclear radiation using gas filled detector, semiconductor detectors and neutron detectors
C O 4	To explain the effect of radiation on DNA and DNA repair mechanisms.
C O 5	To explain the effect of radiation on chromosome and to study the radiation dose response of chromosomal aberrations.
C O 6	Biological applications of delocalization of molecules
C O 7	DNA and RNA structure and the effect of radiation on them
C O 8	Study of proteins, enzyme and carcinogenic activities

Semester III PH 571.3 Quantum Mechanics II	
C O 1	To review the concepts of linear algebra studied in Mathematical Physics I (PH 571.1) so that it can be applied to quantum mechanical calculations.
C O 2	To learn the method of Dirac's ket and bra notations and to learn about general uncertainty relation and theorems like Schwartz inequality.
C O 3	To learn the Schrödinger, Heisenberg and interaction picture and to derive equations of motion and hence to get a broad idea of the process of quantization of a system.
C O 4	To solve the harmonic oscillator and angular momentum problem by matrix method.
C O 5	To study the concept of spin and addition of angular momenta.
C O 6	To study various approximation techniques in quantum mechanics like Perturbation theory, WKB approximation and variational technique.
C O 7	To study the above techniques with real quantum mechanical examples.
C O 8	To setup a relativistic wave equation (Klein-Gordon equation) and to understand the existence of negative probability density.
C O 9	To setup the Dirac's equation, to study the properties of the Dirac's matrices and to arrive at the solutions of Dirac's equation and hence to give the concept of anti particles through the negative energy solutions of the Dirac's equations.
C O 10	To introduce the concept of quantization of fields by first quantizing a classical field and then for a Schrödinger's field and relativistic fields.
PH 572.3 Condensed Matter Physics- II	
C O 1	To understand various types of crystal defects and imperfections in crystal growth process.
C O 2	To familiarise luminescence and related phenomenon.
C O 3	To understand thermodynamics phase transtions, order-disorderness and theories of phase transitions.
C O 4	To review magnetic properties of materials and theories of magnetism. Appllications of magnetic properties- Magnetometer, NMR, Reosaonce.
C O 5	Domain theory of magnetic materials.
C O 6	To understand dilectricmaterails and their applications.

PH 573.3 Thermodynamic and Statistical Physics	
C O 1	To understand the relevant quantities used to describe macroscopic systems and thermodynamic potential
C O 2	Understand the macroscopic and microscopic description of temperature, entropy and free energy
C O 3	Learn the theory of probability
C O 4	Understand the concept ensembles and theory of ensembles
C O 5	Understand macrostates and microstates
C O 6	Learn partition functions and their importance
C O 7	Learn the various distribution functions and their uses in classical and quantum mechanical non-interacting assemblies of systems
C O 8	Describe the transport phenomena and understand the diffusion coefficients
C O 9	Learn the concept of fluctuation
C O 10	Understand the random walk problem
PH 573.3 Thermodynamic and Statistical Physics	
C O 1	To understand the relevant quantities used to describe macroscopic systems and thermodynamic potential
C O 2	Understand the macroscopic and microscopic description of temperature, entropy and free energy
C O 3	Learn the theory of probability
C O 4	Understand the concept ensembles and theory of ensembles
C O 5	Understand macrostates and microstates
C O 6	Learn partition functions and their importance
C O 7	Learn the various distribution functions and their uses in classical and quantum mechanical non-interacting assemblies of systems
C O 8	Describe the transport phenomena and understand the diffusion coefficients
C O 9	Learn the concept of fluctuation
C O 10	Understand the random walk problem
PS 573.3 Relativity and Cosmology	
C O 1	To learn the concepts of Special Theory of Relativity in Tensor notations and also to understand the concepts like Momentum transformations.
C O 2	To study tensor analysis as a prerequisite for the General Theory of relativity

	and understand the meaning of a metric, geodesic and covariant differentiation.
C O 3	To learn the theory of General Relativity starting from the Principle of Equivalence and General Covariance by deriving the Einstein's field equations.
C O 4	To solve the Einstein's field equation for a weak metric case and arrive at Schwarzschild solutions and also to learn about the Schwarzschild radius and Black holes.
C O 5	To study the various experimental predictions of General Relativity in detail.
C O 6	To understand various principles underlying the study of Cosmology.
C O 7	To study various cosmological models that explain the birth and evolution of universe.
PS 574.3 Optics	
C O 1	To study the various natures of progressive plane waves with relevant solutions to the plane wave equations.
C O 2	To learn the Fermat's principle and Helmholtz and Lagrangian equations in magnification.
C O 3	To study the wave theory by Huygen in detail and to deduce the laws of reflection and refraction using the same.
C O 4	To study the phenomena of Interference, Diffraction and Polarization with rigorous mathematics and physical examples.
C O 5	To study Electro-optic effect and to learn to draw the index ellipsoid for crystals.
C O 6	To study the phenomenon of Acousto-optic effect and to understand Raman-Nath and Bragg diffraction in crystals.
PO 577.3 Experimental Techniques	
C O 1	Understand the properties of laser
C O 2	Learn about the specific laser and their applications in day to day life
C O 3	Learn about the theory of nonlinear optics
C O 4	Learn about the second and third harmonic generation
C O 5	Learn the concept of nonlinear absorption coefficients, nonlinear refractive index and nonlinear susceptibility
C O 6	Learn the method of Z-scan technique

C O 7	Learn the concept of vacuum and its units
C O 8	Learn about the techniques to measure vacuum
C O 9	Learn about the working principle of different vacuum pumps
C O 10	Understand the working principles of TEM, SEM, XPS etc.
Semester IV **PH 571.4 Atomic and Molecular Physics**	
C O 1	To review the Bohr model and Vector model of the atom based on the experiments determining space quantization.
C O 2	To understand the structure of the simplest atomic system, the hydrogen atom by studying its various spectra.
C O 3	The interactions within the atomic system is studied using the perturbation theory for a detailed understanding of the fine and hyperfine atomic structure.
C O 4	Zeeman effect, Stark effect elucidate the influence of an external magnetic and electric field on the atomic system.
C O 5	X-ray spectra of the atoms are studied.
C O 6	The transition processes by absorption, stimulated and spontaneous emission, when an atom interacts with an electromagnetic field are studied in detail.
C O 7	The probability of transitions, rates, selection rules, lifetime of atomic states, spectral line widths, line shapes and broadening are understood.
C O 8	Molecular structure is understood for a simple diatomic molecule by studying the spectra.
C O 9	Microwave spectroscopy, infrared spectroscopy, ultraviolet-visible spectroscopy techniques of the molecular systems are studied with detailed theory, instrumentation and application.
C O 10	Raman spectroscopy, nuclear magnetic resonance (NMR) spectroscopy, electronic spin resonance (ESR) spectroscopy, Mossbauer spectroscopy are studied with the fundamental theoretical background, instrumentation and applications to specific systems.
PH 572.4 Nuclear and particle Physics	
C O 1	The internal properties like mass, charge and size of atomic nuclei
C O 2	The external properties like binding energy, spin, electronic and magnetic moment.

C O 3	To study in detail the concept of Radioactivity.
C O 4	Detailed study on nuclear decays and their selection rules
C O 5	To study the radiation energy loss by charged particles, electrons, electromagnetic radiation and the neutrons with matter and their energy loss.
C O 6	The radiation detection through gas filled detector, semiconductor detectors and neutron detectors
C O 7	Two review the different properties of Nuclear forces like short range, saturation, charge independence, spin dependence.
C O 8	To study the ground state of the deuteron problem using square well potential and as a mixture of S and D states and to learn the electric and magnetic quadrupole moments of the Deuteron bound state.
C O 9	Yukawa's theory of nuclear forces and to explain the anomalous magnetic moment of nucleus.
C O 10	To describe basic models like liquid drop model and shell model of the atomic nucleus.
C O 11	Explain processes of nuclear collisions, nuclear reactions and cross section
C O 12	To study the classification of fundamental forces and conservation laws
C O 13	Classification of elementary particles and the properties of the particles
C O 14	Gell-Mann-Nishijima formula and CPT theorem
C O 15	Application of symmetry arguments to particle reactions
PS 574.4 Communication Theory	
C O 1	Transmission Lines, types and line parameters such as impedance, reflection coefficient, propagation constant. Line distortion and attenuation. Quarter and half wavelength lines. Impedance matching, quarter wave transformer, stub matching. Smith chart and its applications.
C O 2	Wave guides and antenna: Basic concepts, TE and TM waves, types. Cavity resonators. Directional couplers. Electromagnetic radiation, elementary doublet, current and voltage distribution, resonant and non resonant antennas and their characteristics, grounded and ungrounded antennas. Effect of antenna height. Microwave antennas.
C O 3	Microwave devices -Multicavity klystron, reflex klystron, parametric amplifiers, Gunn diode, Microwave transistors, FETs. Communication

	subsystems, description of the communication system transponders, spacecraft antennas, frequency reuse antennas, multiple access schemes, FDMA, TDMA, CDMA. Satellite communication.
PS 575.4 Laser, Vacuum Techniques and Nonlinear Optics	
C O 1	Understand the properties of laser
C O 2	Learn about the specific laser and their applications in day to day life
C O 3	Learn about the theory of nonlinear optics
C O 4	Learn about the second and third harmonic generation
C O 5	Learn the concept of nonlinear absorption coefficients, nonlinear refractive index and nonlinear susceptibility
C O 6	Learn the method of Z-scan technique
C O 7	Learn the concept of vacuum and its units
C O 8	Learn about the techniques to measure vacuum
C O 9	Learn about the working principle of different vacuum pumps
C O 10	Understand the working principles of TEM, SEM, XPS etc techniques
PS 576.4 Condensed Matter Physics- III	
C O 1	Different techniques of thin film preparation, thickness measurement techniques and theorry of nucleation, properties and applications.
C O 2	Superconductivity Principle, Types, Thermodynamics of superconductivity, BCS theory. Josephson effect and applications.
C O 3	Smart materials of types, preparation and properties.
C O 4	Nanostructural materials - synthesis, characterization, organization and application.
PS 577.4 Nuclear Structure	
C O 1	To study Deuteron problem as a mixture of S and D states and to learn the electric and magnetic quadrupole moments of the Deuteron bound state.
C O 2	Two review different properties of Nuclear forces like charge independence, spin dependence, tensor character and exchange character.
C O 3	To study Meson exchange theory and many body potential that describes the nuclear forces.
C O 4	To analyse the n-p and p-p scattering at low energies using partial wave analysis and to understand the spin dependence of nuclear forces.

C O 5	To learn the effective range theory, coherent scattering and examples for hydrogen in scattering studies.
C O 6	To compare the theoretical understandings and predictions with the experimental results of n-p and p-p scattering.
C O 7	To study quantitatively the Fermi gas model, Independent particle model, the collective model and the Nilsson model.

M.Sc. SOFTWARE TECHNOLOGY	
PROGRAMME OUTCOMES	
PO1	To prepare software professional with expertise in system design principals anddevelopment.
PO2	Identify, understand and analyze scientific problems to formulate substantiated conclusions using first principles of mathematics, natural sciences, and applied sciences.
PO3	Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmentalconsiderations
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the informationto provide valid conclusions.
PO5	Understand the impact of the professional software engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and needfor sustainable development.
PO6	Apply ethical principles and commit to professional ethics and responsibilities andnorms of the scientific practice.
PO7	Function effectively as an individual, and as a member or leader in diverse teams,and in multidisciplinary settings
PO8	Communicate effectively on complex activities with the scientific community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO9	Demonstrate knowledge understanding of the scientific and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO10	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to theprofessional practice.

Programme Educational Objectives	
PEO1	Communicate Software Technology concepts, designs, and solutions effectively and professionally with real life examples and experiences.
PEO2	Apply knowledge of computing to bring out effective designs and solutionsfor specific problems across various domains.
PEO3	Ability to use various software development tools, multiple software systems, and modern computing platforms, with priority on the emerging technologies.
PEO4	Comprehend the advances of technology in light of its impact on society and the social, legal, ethical and cultural ramifications of computer technology and their usage.

COURSE OUTCOMES	
PH 531.1 DATA STRUCTURES AND ANALYSIS OF ALGORITHMS	
PO 1	To program using structures, function pointers, classes and objects.
PO 2	To implement and apply stack, queue and list data structures in different applications
PO 3	To program binary tree, binary search tree, AVL tree and other tree data structures and traverse and represent expressions using tree data structure.
PO 4	To program different searching and sorting algorithms using c++ programming language, and also able to select suitable techniques based on the situation
PO 5	To create graph using array and using linked list. Ability to find shortest path in graph,able to traverse the graph
PH 532.1 RELATIONAL DATABASE MANAGEMENT SYSTEMS	
PO 1	Have good understanding about data and database systems. Describe the fundamental elements of relational database management systems.
PO 2	Understand the design of relational databases through the use of Entity-Relationship Diagrams and Normalization procedures and Develop basic skills in the use of SQL in defining and creating a database, inserting and modifying entriesin a table.
PO 3	Gain Knowledge about Transaction, concurrency control and Lock management fordatabase design.

PO 4	Have awareness about how data is stored in different storage media and how datais indexed.
PO 5	Prepare the students to understand the power of Query languages and also write PL/SQLtransactions and to create different data objects.
PH 533.1 OBJECT ORIENTED PROGRAMMING WITH JAVA	
PO 1	An ability to understand the Object Oriented Concepts well and relate it with real world problems, develop solutions with programming constructs
PO 2	An understanding on classes, objects, methods, attributes, constructors and arrays andalso write efficient programs using these concepts
PO 3	An ability to do string manipulation, understand and apply reusability using inheritance and also use Interfaces for efficient programming
PO 4	An understanding and clear knowledge about Exceptions and Exception handling, File I/Ostreams and also collection frameworks
PO 5	An ability to develop and understand multithreaded applications with synchronization and apply generic programming concepts wherever required
PH 534.1: WEB DESIGN WITH PHP and MYSQL	
PO 1	To use knowledge of HTML and CSS code and an HTML editor to create personal and/or business websites following current professional and/or industry standards. Use critical thinking skills to design and create websites.
PO 2	To create effective scripts using JavaScript.
PO 3	To enhance the end user experience using JQuery.
PO 4	Students can be employed on entry-level jobs of PHP based web development in software industry
PO 5	To develop interactive and dynamic website using PHP and database connectivity
PS 537.1 SOFTWARE ENGINEERING WITH UML	
PO 1	Plan and deliver an effective software engineering process, based on developmentlifecycle models.
PO 2	Make effective use of UML, along with design strategies such as defining a softwarearchitecture, separation of concerns and design

	patterns.
PO 3	Capture, document, analyze requirements and translate a requirements specificationinto an implementable design, a structured and organized process.
PO 4	Understanding the different system design concepts such as coupling, cohesion andarchitectural styles.
PO 5	Formulate a testing strategy for a software system, employing techniques such as unittesting, test driven development and functional testing.
II Semester PH 531.2 PROGRAMMING WITH PYTHON	
PO 1	To design and program Python applications, use lists, tuples, and dictionaries in Pythonprograms.
PO 2	To identify Python object types, use indexing and slicing to access data in Pythonprograms.
PO 3	To build and package Python modules for reusability and to read and write files inPython.
PO 4	To design object oriented programs with Python classes and use class inheritance inPython for reusability.
PO 5	To use exception handling in Python applications for error handling.
PH 532.2 MOBILE APPLICATION DEVELOPMENT WITH ANDROID	
PO 1	Understand the architecture, working and environmental setup of Android
PO 2	Design and Implement simple GUI based Android Apps that handle user input andprovide information
PO 3	Implement Android apps that are able to receive broadcasted messages, act as contentprovider or receiver and run background services.
PO 4	Create Android Apps that can manipulate data from various data stores such as internal,external memory and also SQLite as a Database.
PO 5	Design and Work with advanced sensors of the phone and manipulate Telephony and SMS in an Android Phone.
PS 534.2 E1 FOUNDATIONS OF DATA SCIENCE	
PO 1	Select appropriate statistical techniques for summarizing and displaying of data.
PO 2	Identify outliers and use the right techniques to treat them in order to give a betterunderstanding of the data.
PO 3	Analyze and draw inferences from data using appropriate statistical methods.
PO 4	Perform correlation and regression, and be able to make predictions and interpretthe results

PO 5	Identify the types of learning and apply the appropriate tools to derive informationfrom the data.
PS 534.2 E2 DATA WAREHOUSING AND DATA MINING	
PO 1	Understand and implement classical models and algorithms in data warehouses.
PO 2	Display a comprehensive understanding of different data mining tasks and thealgorithms most appropriate for addressing them.
PO 3	Evaluate models/algorithms related to Association rule mining with respect totheir accuracy.
PO 4	Perform a self directed piece of practical work that requires the application of datamining techniques in classification and prediction.
PO 5	Conceptualize a data mining solution to a practical problem in clustering andoutlier analysis.
PS 535.2 E1 ARTIFICIAL INTELLIGENCE AND COGNITIVE COMPUTING	
PO 1	To Design intelligent agents for problem solving, reasoning and planning.
PO 2	To implement AI systems with different approaches of knowledge representation,design AI systems with heuristic search techniques
PO 3	To implement AI systems using statistical and symbolic reasoning, designing AImodels using Bayes rule
PO 4	Apply AI technique on current applications with cognitive psychology usingconnectionist approach
PO 5	To design applications using computational cognitive neuroscience by applyingtechniques of cognitive computing and neural network theory.
PS 535.2 E2 MACHINE LEARNING AND DEEP LEARNING	
PO 1	To implement Machine Learning with Bayes algorithm, to work out the concept ofdimensionality reduction using PCA & LDA
PO 2	To implement Machine Learning with SVM, Decision tree and clustering methods
PO 3	To use MLP, HMM for classification and also to measure the performance of theclassification algorithm, to design models using reinforcement learning
PO 4	To implement CNN and RNN for Deep Learning models by applying all the methods forcreating optimal model
PO 5	To implement Transfer learning and Auto encoders for Deep Learning models
[OPEN ELECTIVE – OFFERED TO OTHER DEPTS] PO 537.2 (E1): ENTERPRISE INFORMATION SYSTEMS	
PO 1	Understand the enterprise need of integrating information assets, and be able to articulate the advantages and tradeoffs of different information integration designs of organizations.
PO 2	Understand the key components of Enterprise Information Systems such as Enterprise
PO 3	Resource Planning, Customer Relationship Management, Supplier

	Relationship
PO 4	Management and Business Intelligence. | Understand the key issues in implementing and managing EIS.
PO 5	Understand the emerging business models of enterprise system vendors
PO 537.2 (E2): MARKETING ANALYTICS	
PO 1	Have a high- level understanding of the benefits and objectives of marketinganalytics.
PO 2	Apply metrics -driven techniques to improve marketing decisions.
PO 3	Understand best practices through case studies.
PO 4	Learn by doing through hands-on computer spreadsheet models and metric
PO 5	Design and analyze appropriate predictive models.& apply statistical tools foranalysis
	Research Methodology and Ethics
PO 1	Research output with philosophical base and greater relevance to the society
PO 2	Quality research with scientific methodology
PO 3	Production of good Research Reports
PO 4	Original Research following ethical guidelines and practices in conducting the research and publication of papers.
PO 5	More awareness on Intellectual Property Rights and Patents.
Semester III	
PH531.3 CLOUD COMPUTING WITH AMAZON WEB SERVICES	
PO 1	Describe the key technologies, architecture, strengths, limitations and applications ofcloud computing
PO 2	Explain the types and service models of cloud and Understand security implications in cloud computing
PO 3	Design Cloud Services and Set a private cloud
PO 4	Create and automate infrastructure to design cost-effective, highly available applications
PO 5	Integrate AWS services with your application to meet and exceed non-functionalrequirements
PH 532.3: WEB TECHNOLOGIES and .NET FRAMEWORK	
PO 1	Learn to develop correct, well documented programs using C#

	programming language.
PO 2	Create visually rich and attractive Web applications with ASP.NET controls and controls in the AJAXControl Toolkit
PO 3	Display dynamic data from a data source by using Microsoft ADO.NET, LINQ and EF.
PO 4	Create MVC Models and write code that implements business logic within Model methods, properties, and events.Dynamic web applications, create and consume web services,understand the Microsoft Web Technologies stack.
PO 5	Write an application that can create, edit, and view data from a database using ASP.Net Core, and create
PO 6	Single Page Applications (SPAs)and Navigation, Routing, State Management, Security.
PS534.3 E1 INTERNET OF THINGS and APPLICATIONS	
PO 1	Understand why IoT is used and how it is implemented and how networks andcommunication is used to implement IoT
PO 2	Understand how identity management models are used in IoT, also understandwhy trust management is important for IoT environment
PO 3	Understand the use of protocols which are used in different layers and how it iscombined with other protocols down the layers to carry out the communication
PO 4	Understand how data is stored in cloud and how it is represented using differentapplication to carry out or execute different data analytics tools
PO 5	Understand the concepts of data science for IoT analytics, how to organize datafor analytics, and how to get benefits from IoT analytical tools.
PS534.3 E2 NATURAL LANGUAGE PROCESSING	
PO 1	Ability to create morphemes and perform morphological analysis. Construct simple DFA. Perform POS tagging
PO 2	Ability to construct parse trees for sentences when CFG is given. Perform leftmostand rightmost derivations. Perform top-down and bottom-up parsing. Perform ambiguity analysis and word sense disambiguation.
PO 3	Perform reference resolution on sentences. Differentiate Cohesion and Coherence.
PO 4	Differentiate pipelined, interleaved and integrated architecture of NLG.
PO 5	Compare direct MT system with transfer system. Implement a simple MT system.
PS535.3 E1 BIG DATA ANALYTICS WITH SCALA AND SPARK	
PO 1	Understand what Functional programming is and will know why

	classical dataanalysis techniques are no longer adequate
PO 2	Understand the benefits that Spark and Spark SQL offers for processing structuredand unstructured data.
PO 3	Understand conceptually how Spark SQL is used for Data Exploration, DataMunging and Data Streaming.
PO 4	Understand how Spark can be used for Machine Learning.
PO 5	Understand the use of PySpark and Spark
PS 535.3 E2: BIG DATA ANALYTICS with MAP REDUCE & HADOOP	
PO 1	Identify and distinguish big data analytics applications from other applications and the use of Big Data.
PO 2	Describe No SQL databases and understanding different concepts related to NoSQL and its applications using MongoDB.
PO 3	Understanding Hadoop and its advantage over the traditional database applications in solving practical problems
PO 4	Writing programs using mapper and reducer.
PO 5	Using Hive and Pig for analyzing and querying data and knowing the advantagesover the traditional Data handling solutions.
PO 537.3 E1 SOCIAL MEDIA ANALYTICS	
PO 1	Apply multiple quantitative and qualitative methods
PO 2	Understand sources and limitations of web-based data
PO 3	Perform social network analysis to identify important social actors, subgroups andnetwork properties in social media.
PO 4	Use appropriate information visualization technique to gain insights into largedatasets
PO 5	Apply best practices in Search Engine Optimization
PO537.3 E2 STREAMING ANALYTICS	
PO 1	Describe and use a wide variety of streaming analytics methods in a business or anindustry.
PO 2	Understand how analytics can be used in business development using Kafka and Flume.
PO 3	Learn to use and to apply a selection of modern business analytics tools and software tosolving real-world problems with real-world data
PO 4	Demonstrate hands-on skills using visualization in applying business analytics
PO 5	Demonstrate hands-on skills in applying analytics into real-world business usingstatistical approximation and sketching.
SEMINAR AND TECHNICAL COMMUNICATION	
PO 1	Gather, organize, summarize and interpret literature with the purpose of

	formulatinga proposal.
PO 2	Write a technical report summarizing state-of-the-art on an identified topic.
PO 3	Present the study using graphics and multimedia techniques.
PO 4	Define intended future work based on the technical review.
Semester IV	
PS535.4 DOMAIN KNOWLEDGE PROJECT	
PO 1	Gather, organize, summarize and interpret literature with the purpose of formulatinga Research problem and working on it to propose a solution.
PO 2	Write a technical paper summarizing state-of-the-art on an identified topic.
PO 3	Present the study using graphics and multimedia techniques.
PO 4	Define intended future work based on the technical review.
PO 5	Publish the work in a reputed Journal of interest or present it in an international/national State/Regional conferences.
PH 531.4/532.4/533.4/534.4: INDUSTRY INTERNSHIP / PROJECT WORK / DISSERTATION	
PO 1	The Internship / Project work / Dissertation for credit requires students to spend themajority of their time in technical, analytical, or administrative work that will contribute to their learning as outlined in the course objectives.
PO 2	Work of a clerical nature must be limited to a maximum of 15 percent of the time spenton the job.
PO 3	Prior to beginning an internship for credit, students must receive an internship orientation at the Training and Placement Cell of AIMIT.
PO 4	A meeting with the faculty advisor / Guide to cover the ground rules and requirements.
PO 5	Submission of the Final Report within seven days of the completion of the internship

******

M.Sc BIG DATA AND ANALYTICS	
PROGRAM OUTCOMES	
PO1	**Statistical computing:** Ability to understand the basic concepts of how to explore the datasets using statistical analysis techniques in Python and R.
PO2	**Mathematical Skills:** Ability to understand and implement various algorithms which require strong hold on the mathematical skills
PO3	**Database management:** Ability to Execute queries, implement views and joins, use MongoDB for various operations on unstructured data. Ability to Optimize business decisions and create competitive advantage with Big Data analytics and understand architectural concepts of Hadoop and map reduce paradigm
PO4	**Implementation using various software:** This enables the students to develop strong programming skills required to handle complex data and build algorithms that will provide efficient solutions to the problem at hand.
PO5	**Machine learning:** Understand a wide variety of learning algorithm, how to evaluate models generated from data and apply the algorithms to a real problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
PO6	**Enabling technologies:** Learn about the relationship between data science and natural language and audio-visual content processing
PO7	**Natural language processing:** Understand approaches to syntax, semantics in *NLP*, to discourse, generation, dialogue and summarization within *NLP and* Understand current methods for statistical approaches to machine translation.
PO8	**Value thinking:** Recognize important ethical issues that arise in various business contexts and professional practice; To Demonstrate an understanding of the ethical, social

	and economic environments in which those occur.
PO9	**Advanced Statistical Analysis:** Mastering of a suite of methods and workflow styles that will enable the student to produce several new statistical analysis correctly and efficiently present the results from those analyses.
PO10	**Societal development:** Identify the information security models and their characteristics, by analyzing the different types of cryptographic and forensic methods. Identify and solve different cyber security threats that hamper the society.
PO11	**Application of Skills:** Provide the knowledge and necessary skills to accomplish various analytics with respect to areas like health, HR, Travel, … so that they are able to provide efficient analysis and interpretation.
Programme Specific Outcomes	
PSO1	To practice big data analytics and machine learning approaches, which include the study of modern computing using big data technologies and machine learning techniques focusing on industry applications.
PSO2	To develop Numerical and Statistical skills that will play an important role in their Job role as data Scientist / data analytics in analyzing the problem at hand and give the appropriate and efficient solution.
PSO3	Apply the concepts of Analytics to the real-world problems by converting datasets to models in order to make better business decisions.
PSO4	Apply the skills gained in the course to improve the research which would have a great impact on the societal development by emphasizing on how data can be collected and used in ethical and socially sensitive ways.
COURSE OUTCOMES:	
SEMESTER – I	
PH 801.1: STATISTICAL METHODS	
CO 1	To design appropriate instruments to collect data effectively.
CO 2	To provide effective data visualization that will provide new insights from the data.
CO 3	To Organize, manage and present data effectively.

CO 4	To analyze statistical data graphically using frequency distributions.
CO 5	To Construct and interpret *Contingency Tables*
PH 802.1: <u>PROBABILITY & STOCHASTIC PROCESS</u>	
CO 1	To calculate the probabilities and identify the various types.
CO 2	To express the features of discrete random variables and formulate the *distribution* functions.
CO 3	To express the features of continuous random variables and formulate the *distribution* functions
CO 4	To Classify a stochastic process according to whether it operates in continuous or discrete time and whether it has a continuous or a discrete state space. To Understand the concept of Markov chains and study the transition diagram.
CO 5	To apply the concept of stationarity to the analysis of time series data in various contexts
PH 803.1: <u>LINEAR ALGEBRA & LINEAR PROGRAMMING</u>	
CO 1	Understand the basic concepts of linear Algebra
CO 2	Understand the concept of Random Numbers and its properties.
CO 3	Understand the principles of solving a set of linear equations,
CO 4	Familiarize with the methods involved in solving a set of linear equations.
CO 5	To model a problem as a linear programming problem
CO 6	Use the simplex method to solve small linear programming models by hand, given a basic feasible point.
PH 804.1P: <u>COMPUTING FOR DATA SCIENCES LAB</u>	
CO 1	To perform data analysis using the appropriate techniques.
CO 2	To know how convergence, takes place and use the appropriate methods.
CO 3	To generate random numbers and understand how a system can be simulated using them.
PS 805.1: <u>DATABASE MANAGEMENT SYSTEM</u>	
CO 1	Draw an ER Diagram for a given system by analysing the requirements
CO 2	Normalize the tables atleast to 3N form and perform various operations on tables that are thus created
CO 3	Appreciate and apply Graph database

CO 4	Execute queries, implement views and joins, use MongoDB for various operations on unstructured data
CO 5	Work with Hadoop Ecosystem and also implement database security in SQL, NoSQL and Hadoop
PS 806.1: PYTHON PROGRAMMING	
CO 1	Choose the right data type or Collection module for any given set of data.
CO 2	Use conditional statements and loops to manipulate; Create, use & reuse functions created from python
CO 3	Open, Read and Write a File from Python and also to import and use various logical modules in python
CO 4	Handle any type of exceptions that might be raised from a typical program
CO 5	Create classes and objects to perform operations and also to perform CRUD Operations on a SQLite Database
PS 807.1 P: DBMS & PYTHON PROGRAMMING LAB	
CO 1	Solve real world problems using python as a programming language
CO 2	Create applications that handle files and include various packages to solve complex issues
CO 3	Create a completely data driven application that includes exception handling and perform all database related operations.
CO 4	Create a table, Execute complex and nested queries, create views and joins and also execute cursors and triggers using Oracle SQL
CO 5	Use MongoDb to create Database, Collection, Document etc. and also understand Hadoop Ecosystem
SEMESTER – II	
PH 801.2: MACHINE LEARNING - I	
CO 1	To implement machine learning models with linear regression
CO 2	To design applications using Logistic regression by using the methodology to avoid overfitting
CO 3	To design systems using Perceptron algorithm

CO 4	To implement machine learning systems using SVM
CO 5	To implement machine learning models using k-means clustering by applying dimensionality reduction and anomaly detection
PH 802.2: <u>ENABLING TECHNOLOGIES FOR DATA SCIENCE – I</u>	
CO 1	To understand data mining principles and will identify appropriate datamining algorithms to solve real-world problems. To understand the strength and weakness of algorithms.
CO 2	To design a data mart or data warehouse for any organization. To design data warehouse with dimensional modelling and apply OLAP operations.
CO 3	To learn methods in integrating and interpreting the data sets and improving effectiveness, efficiency and quality for data analysis.
CO 4	To predict categorical class labels (discrete or nominal) and classifies data (constructs a model) based on the training set and the values (class labels) in a classifying attribute and uses it in classifying new data and also predicts unknown or missing values.
CO 5	To identify clusters in multivariate data, apply normalization techniques, and correctly interpret the output of different clustering procedures. And to describe complex data types with respect to spatial and temporal data mining.
<u>Electives (Choose 1)</u> **PH 803.2 (E1): <u>OPERATIONS RESEARCH</u>**	
CO 1	To Proficiently deal with the tools for optimization.
CO 2	To Develop an understanding of the foundation of classic continuous optimization problems and to identify the convexity, smoothness, feasible region and dual reformulation.
CO 3	To proficiently allocate scarce resources to optimize and maximize profit or minimize loss and facilitates the optimal method of allocating jobs to persons.
CO 4	To facilitate with mathematical and computational modeling of real decision-making problems.
CO 5	To construct and analyse priority queuing systems.
PH 803.2 (E2): <u>CLOUD COMPUTING</u>	
CO 1	After successfully completing the course the students will have an understanding of:

CO 2	Apply the fundamental concepts in data centers to understand the trade-offs in power, efficiency and cost.
CO 3	Discuss system virtualization and outline its role in enabling the cloud computing system model.
CO 4	Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems
CO 5	Illustrate the fundamental concepts of web services.
CO 6	Analyze various cloud programming models and apply them to solve problems on the cloud.
PH 803.2 (E3): NATURAL LANGUAGE PROCESSING	
CO 1	Analyse syntax, semantics, and pragmatics of NLP. Ability to develop simple N-gram models
CO 2	Perform POS tagging on simple English sentences using Hidden Markov model
CO 3	Develop grammars for some simple English sentences, ability to draw parse trees. Apply different parsing techniques
CO 4	Analyse syntactic, semantic and pragmatic ambiguities, learn to apply supervised and unsupervised word-sense disambiguation.
CO 5	Analyse different Machine translation approaches.
	PH 803.2 (E4): UNIX PROGRAMMING
CO 1	Students are able to know an overview of Unix operating system and uses of shell commands.
CO 2	Students will able to understand the concept of I-node and its use with applications of grep commands.
CO 3	Students get know about user and program interface with some system calls requirement and its applications.
CO 4	Students are able to know use of signaling and importance of Inter process communications.
CO 5	Students will understand the importance and application of inter-process communications
PH 803.2(E5): OPERATING SYSTEMS	
CO 1	Students are able to understand the basics of operating systems with need and working.

CO 2	Students will able understand the fundamentals of UNIX operating system with signals and system class.
CO 3	Students will able to understand fundamentals of concurrent process and concept of mutual exclusion and implementation of semaphores.
CO 4	Students are able to understand importance of Inter process communications resulting deadlocks which can be prevented or avoided with some algorithms.
CO 5	Students will understand the importance and benefits of virtual memory. The file structure of UNIX operating system.
	PH 803.2 (E6): MULTIVARIATE STATISTICS:
CO 1	To identify the most appropriate statistical techniques for a multivariate dataset and carry out and apply commonly used multivariate data analysis techniques, and interpret results
CO 2	To carry out a principal component's analysis Assess how many principal components are needed and Interpret principal component scores.
CO 3	To classify data using appropriate algorithms.
CO 4	To describe the difference between Factor Analysis (FA) and Principal Component Analysis (PCA) and will be able to extract factors that describe the data.
CO 5	To Create a document retrieval system using k-nearest neighbors. -Identify various similarity metrics for text data.
PH 804.2P: MACHINE LEARNING AND DATA SCIENCE LAB - I	
CO 1	Examine the concepts of data warehousing and OLAP;
CO 2	Apply the concepts of BI and DM techniques for clustering, association, and classification;
CO 3	Understand the operation procedures of BI projects in an organization;
CO 4	Select appropriate DM tools and methods to manipulate and achieve data;
CO 5	Apply DM concepts for formulating business strategies and programs to enhance business intelligence.
PS 805.2: FOUNDATIONS OF DATA SCIENCE	
CO 1	Solve problems using basic graph theory
CO 2	Applying various concepts relevant with high-dimensional data.
CO 3	Understanding large structures, like the web and social networks, in building

	models.
CO 4	Applying the use of singular value decomposition (SVD) for dimension reduction of high-dimensional data sets, and multi-dimensional scaling and its connection to principle component analysis.
CO 5	Applying the concept of frequency moments of data streams and matrix algorithms in streaming model
PS 806.2: ADVANCED STATISTICAL METHODS	
CO 1	To *estimate* population parameters using point and interval *estimates.*
CO 2	To recognize the logic behind a hypothesis test and how it relates to the P-value.
CO 3	To know the theoretical foundation of applied linear modeling, starting with the univariate models and then with multivariate data
CO 4	To apply multiple linear regression analysis, differentiate between simple linear regression analysis and multiple linear regression analysis and predict the model and interpret it.
CO 5	To apply the functional form of the logistic model and how to interpret model coefficients.
PS 807.2: VALUE THINKING	
CO 1	Recognize important ethical issues that arise in various business contexts and professional practice;
CO 2	Demonstrate an understanding of the ethical, social and economic environments in which those occur;
CO 3	Demonstrate critical thinking skills required for the successful practice of management and the professions within the framework of societal values;
CO 4	Demonstrate confidence in introducing ethical considerations into professional and managerial decision making and explaining their importance to others; and
CO 5	Use their ethical imaginations in resolving dilemmas and enhancing business decision-making.
PS 808.2P: PROGRAMMING FOR BIG DATA AND ADVANCED STATISTICAL METHODS LAB	
CO 1	To perform machine learning techniques such as clustering and classification effectively.

CO 2	To apply the concepts of BI and DM techniques for clustering, association, and classification;
CO 3	To apply the graph theory algorithms to real data and analyze appropriately.
CO 4	To use appropriate statistical testing criteria based on the problem.
CO 5	To evaluate and apply ANOVA to the problem at hand.
CO 6	To identify and apply appropriate regression models considering all the assumptions.
CO 7	To perform binary output models using logistic regression.
Research Methodology and Ethics (Non -Credit Course)	
CO 1	Research output with philosophical base and greater relevance to the society
CO 2	Quality research with scientific methodology
CO 3	Production of good Research Reports
CO 4	Original Research following ethical guidelines and practices in conducting the research and publication of papers.
CO 5	More awareness on Intellectual Property Rights and Patents.
CO 6	Provide a better research perspective in the field of Data Analytics.
CO 7	Application of various Machine learning to the real-world problems.
[OPEN ELECTIVE – OFFERED TO OTHER DEPTS] OE 809.2: STATISTICAL DATA ANALYSIS USING R	
CO 1	Ability install R programming language on windows, Linux and Mac operating systems and able to program simple R programs.
CO 2	Ability to use inbuilt R functions to work on objects, matrix, vectors, data frames and tables.
CO 3	Ability to program summary and cumulative commands to apply it on tables and objects.
CO 4	Ability to use stem and leaf plot on the dataset, histograms to represent the data and ability to use sharpiro-wilk test, Kolmogorov-Smirnov test etc.
CO 5	Ability to use students t-test, U-test, chi squared test montecarlo simulation and able apply these on different data sets.
SEMESTER – III PH 801.3: MACHINE LEARNING - II	
CO 1	To implement classification models with decision tree and probabilistic classifiers; regression models with regression tree classifiers
CO 2	To implement predictive models using SVM and Perceptron with usage of loss functions and gradient descent
CO 3	To implement machine learning models with k-means clustering; models with collaborative filtering and implement EM algorithm
CO 4	To implement machine learning systems using Ensemble models and graphical models
CO 5	To implement models with genetic algorithm and working out gradient descent for large datasets
PH 802.3: ENABLING TECHNOLOGIES FOR DATA SCIENCE - II	

CO 1	Read data from persistent storage and load it into Apache *Spark*, - manipulate data with *Spark*
CO 2	Understand working of spark sessions, functions to manipulate and analyze data using Spark data frames
CO 3	Warehouse your data efficiently using Hive, *Spark SQL* and Spark Data Frames
CO 4	Manipulate data using Scala and write programs that effectively use parallel collections to achieve performance
CO 5	Recognize and apply design principles of functional programs
PH 803.3 P: <u>MACHINE LEARNING AND DATA SCIENCE LAB - II</u>	
CO 1	Demonstrate the knowledge of big data, data science, data analytics, distributed file systems, parallel Map Reduce paradigm, NoSQL, machine learning, etc.
CO 2	Program and implement examples of big data and NoSQL applications using open source Hadoop, HDFS, Spark, Scala, etc.
CO 3	Read current research papers and implement example research group project in big data.
PS 804.3: <u>DATA VISUALIZATION WITH TABLEAU & MODELLING IN OPERATIONS MANAGEMENT</u>	
CO 1	Understand and apply the fundamental concepts and techniques in data visualization
CO 2	Design, develop, and evaluate effective visualizations and dashboards using various development tools
CO 3	Solve specific real-world problems related to the Visualization and interpretation of data analysis results
CO 4	Making use of patterns and insights in healthcare analytics
CO 5	Visualize the analyzed data pertaining to retail industry
PS 805.3 (E1): <u>INTRODUCTION TO ECONOMETRICS & FINANCE</u>	
CO 1	To apply the above theories to empirical data or be able to develop new econometric theory
CO 2	To apply the generalized method of moments (GMM) estimation and interpret the results.
CO 3	To Use various economic models and methods to interpret and analyze real data in economics and finance.
CO 4	To test cointegration among times series data using appropriate tests.
CO 5	To perform Autoregressive conditional heteroscedasticity model and interpret the coefficients.
PS 805.3 (E2): <u>TIME SERIES ANALYSIS & FORECASTING</u>	
CO 1	Know the basic time series structure and identify patterns.
CO 2	Define the concept of stationarity and describe its importance in time series analysis
CO 3	Test for non-stationarity that exists in the time series data by applying suitable tests.

CO 4	Model times series data and and use them efficiently to forecast.
CO 5	Identify and deal with the missing data values in time series data.
PS 805.3 (E3): BIOINFORMATICS	
CO 1	Gain knowledge in using tools for implementing sequence alignment (BLAST, FASTA), MSA (ClustalW, T-Coffee etc), variants of BLAST
CO 2	To implement Gibbs sampling and genetic mapping using tools available
CO 3	Gain knowledge in using tools for implementing gene recognition and Transcriptomics
CO 4	Gain knowledge in using tools for implementing HMM, finding motifs
CO 5	Gain knowledge in using tools for implementing lattice models
PS 805.3 (E4): BIG DATA TECHNOLOGIES AND ARCHITECTURE	
CO 1	Identify the use of Hadoop for processing the data, configuring Hadoop cluster and exploring Hadoop distributed file system.
CO 2	Describe No SQL databases and understanding different concepts related to No SQL and its applications using Hive and Hbase.
CO 3	Writing map reduce programs using mapper and reducer.
CO 4	Writing map-reduce programs to perform K-Means clustering customizing partitioner and sort comparator.
CO 5	Learning the role of Inverted Index and usage of hadoop as a database.
PS 806.3 (E1): INTELLECTUAL PROPERTY RIGHTS IPR	
CO 1	Understand and distinguish between different Intellectual properties and also identify the procedures to protect Intellectual property
CO 2	Protect his own invention under patent and copyright specifically related to software. And also understand how one can derive revenue from protection of patents/copyrights
CO 3	Identify the importance of industrial design and its protection
CO 4	Recognizes the importance of different types of digital contracts and also finds mechanisms to protect digital documents
CO 5	Identify different types of cybercrimes and also will understand what are the remedies available under cyber law in the case of such unlawful activities
PS 806.3 (E2): CYBER SECURITY	
CO 1	Understand the basics of security attacks and threat model
CO 2	Appreciate the vulnerabilities and threats posed by criminals, terrorist and nation states to national infrastructure
CO 3	Have a strong understanding of different cryptographic protocols and techniques and be able to use them.
CO 4	Apply methods for authentication, access control, intrusion detection and prevention.
CO 5	Identify and mitigate software security vulnerabilities in existing systems
PS 806.3 (E3): TEXT MINING	
CO 1	Ability to analyse structured, unstructured and semi-structured data. Understand about user experience of information seeking behaviour.

CO 2	Ability to analyse linguistic foundations, and various approaches to text mining.
CO 3	To analyse various text types, document formats and conversion, character encodings. Perform parts-of-speech tagging for simple English sentences.
CO 4	To distinguish few tasks of text extraction – keyword extraction, named entity recognition. Perform simple extraction from small text.
CO 5	To understand computational grammars, design and construction.
PS 806.3 (E4): ADVANCED ANALYTICS	
CO 1	Understand why IoT is used and how it is implemented and how networks and communication is used to implement IoT
CO 2	Understand how identity management models are used in IoT, also understand why trust management is important for IoT environment
CO 3	Understand the use of protocols which are used in different layers and how it is combined with other protocols down the layers to carry out the communication
CO 4	Understand how data is stored in cloud and how it is represented using different application to carry out or execute different data analytics tools
CO 5	Understand the concepts of data science for IoT analytics, how to organize data for analytics, and how to get benefits from IoT analytical tools.
PS 807.3 P: DATA VISUALIZATION WITH TABLEAU & OPERATION MANAGEMENT LAB	
CO 1	Understand and apply the fundamental concepts and techniques in data visualization
CO 2	Design, develop, and evaluate effective visualizations and dashboards using various development tools
CO 3	Solve specific real-world problems related to the Visualization and interpretation of data analysis results
CO 4	Making use of patterns and insights in healthcare analytics
CO 5	Visualize the analyzed data pertaining to retail industry
PS 808.3: LAB ON ELECTIVES 1 & 2	
CO 1	Model times series data and and use them efficiently to forecast.
CO 2	Use various models/ algorithms to gain information from the data and use it for better decision making
CO 3	Architect multiple real life use cases
CO 4	Apply the concepts of data science for IoT analytics, how to organize data for analytics, and how to get benefits from IoT analytical tools.
CO 5	Analyze various text types, document formats and conversion, character encodings. Perform parts-of-speech tagging for simple English sentences

OE 809.3: <u>BIG DATA & DESIGN THINKING</u>	
CO 1	Develop viable solutions to user challenges using the design thinking and hypothesis-driven innovation processes.
CO 2	Gain user empathy through observation and interviewing, and develop user insights to identify unmet needs.
CO 3	Use multiple brainstorming techniques to find innovative solutions.
CO 4	Prototype a solution to a user challenge.
CO 5	Develop and test a business model or business case to support the viability of the solution.
<u>SEMESTER – IV:</u> **PH 801.4: INDUSTRY INTERNSHIP / PROJECT WORK / DISSERTATION**	
CO 1	Provide a structure that will enable students to make connections between what they learn in the classroom and on the job, to further develop analytical and interpersonal skills, and to practice business writing skills.
CO 2	Ability to select and implement machine learning techniques and computing environment that are suitable for the applications under consideration.
CO 3	Ability to recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
CO 4	Ability to integrate machine learning libraries and mathematical and statistical tools with modern technologies like Hadoop and map reduce.
PS 802.4: DOMAIN KNOWLEDGE PROJECT	
CO 1	Help the students to work on a specific research area by identifying the research gaps and building their topic.
CO 2	Help the students to know the complete process of model building and apply the same based on the area of study.
CO 3	Build the confidence to work on any project by considering all the aspects of research questions that needs to be addressed.
CO 4	Develop the capability of the students to Create, Analyze and critically evaluate different analytical solutions.
CO 5	Holistic approach to a problem-solving ability will be well developed.

MBA	
PROGRAMME OUTCOMES (POs)	
PO1:	Business Acumen: To apply acquired KSA (Knowledge, Skills and Abilities) in the domain of management sciences to detect, diagnose, predict and resolve Business problems.
PO2:	Analytical and critical thinking: To adopt analytical and critical thinking for scenario analysis based decision-making.
PO3:	Ethical leadership: To exhibit ethical behaviour in managerial choices as responsible corporate citizens.
PO4:	Team management: To lead diverse cross-functional teams in a globalized organizational environment to optimize the welfare of stakeholders.
PO5:	Ideation: To be able to generate, develop and communicate new ideas.
PO6:	Catalytic Innovation: To approach social problems in an innovative way to create viable, feasible, sustainable solutions.
PO7:	Ecological sustainability: To spear head environmentally responsible decisions that cater to the needs of the present without compromising the future.
PO8:	Developmental alliances: To develop an association at the individual and organizational level for mutual attainment of objectives and goals.
PO9:	Continual learning: To adopt experiential learning for reflection on real world situations and ensure life-long learning.
PO10:	Value based education: To internalise values that promote effective learning and reinforce continuous improvement of the personal, social, moral, and economic wellbeing.
PO11:	Professional development: To refine the industry readiness and agility of business professionals
PO12:	Community Spirit: To engage in service oriented activities so as to empowering and benefiting social stakeholders.
PROGRAMME SPECIFIC OBJECTIVES (PSOs)	
	ECONOMICS AND FINANCE:
PSO1:	To identify, evaluate and select the available investment avenues that enhance wealth maximization.
PSO2:	To critically analyze sources of capital which lead to optimal capital structure decisions
PSO3:	To apply the knowledge of accounting, financial analytical tools and costing techniques to crystallize decision making strategies for global business.
PSO4:	To apply the fundamentals of finance and demonstrate an ability to assess the market value of corporate securities and to manage complex short term finance decisions.
PSO5:	To integrate the areas of business activity to solve the complex unstructured business problems.
	BUSINESS ANALYTICS:
PSO1:	To select and apply advanced data analytical techniques and tools for data driven decision-

	making.
PSO2:	To fashion professionals to have an innovator's attitude to technology which fosters technical adaptability in the dynamic business environment
PSO3:	To enhance analytical capability and process the information to produce result oriented data sets for effective decision making.
PSO4:	To mature as an independent data scientist with robust cross-domain skills to manage analytics driven organization.
PSO5:	To generate meaningful insights across diverse functional domains to develop innovative data analytics solutions.
	MARKETING
PSO1:	To identify key principles in marketing practice in today's new , more connected , more engaging marketing world going beyond traditional tried-and –true marketing concepts
PSO2:	To incorporate creating and capturing customer value and engagement in the digital and social age as a fundamental bulwark of marketing
PSO3:	To apply traditional and trending concepts like customer engagement marketing, omni-channel marketing and retailing , customer cocreation , marketing content creation and native advertising and many more to solve complex marketing problems.
PSO4:	To facilitate the development of the customer engagement framework –creating direct and continuous customer involvement in shaping brands, brand conversations, brand experiences and brand communities
PSO5:	To demonstrate critical-thinking and problem solving skills in today's complex global environment via application of "marketing accountability and "sustainable marketing" skills
	HUMAN RESOURCE MANAGEMENT
PSO1:	To apply the fundamental functions of Human Resource Management in contrast with the contemporary dynamic business environment.
PSO2:	To design selection process based on assessment of manpower planning and formulate a suitable compensation package to keep the human resource extrinsically driven
PSO3:	To develop, implement and evaluate employee orientation, training and development programmes to enhance productivity and facilitate professional advancement in the organization.
PSO4:	To recognize and comply with the policies and practices governing labour markets in India and abroad.
PSO5:	To foster distinctive practices that are designed to attract and retain the most talented human capital of the organization.
COURSE OUTCOMES	
I SEMESTER MBA	
PH 301.1 PRINCIPLES OF ACCOUNTING	

CO 1	To demonstrate knowledge of accounting concepts and techniques and to make sound financial and economic decisions in real world settings.
CO 2	To analyze the effect of business transactions using debits and credits.
CO 3	To evaluate financial statement and access a range of different outcomes and the ability to justify the chosen outcome.
CO 4	To identify and evaluate worksheet and closing entries for an organization.
CO 5	To evaluate the most common components of shareholders' equity.
PH 302.1 ORGANISATIONAL BEHAVIOUR	
CO 1	To apply the concept of organizational behavior to understand the behavior of people in the organization.
CO 2	To consider personality traits, attitude, emotion, values, learning and perception of individuals in the workplace and act accordingly to increase individual's productivity and job satisfaction.
CO 3	To apply motivation theories to analyze the performance problems.
CO 4	To demonstrate skills required for working in groups including leadership skill and manage power, politics and conflict.
CO 5	To be able to implement change effectively in an ever-dynamic organisation environment
PH 303.1 ECONOMICS FOR MANAGERS	
CO 1	To apply the principle of marginal analysis and opportunity cost in real-world managerial decisions.
CO 2	To use the demand and supply analysis to evaluate the competitive position of a company.
CO 3	To assess the functional relationship between production and factors of production and to determine the least cost production function.
CO 4	To design appropriate competitive and price strategy based on the nature of product market.
CO 5	To assess the state of an economy using Gross Domestic Product and its components.
PH 304.1 STATISTICS FOR BUSINESS DECISIONS	
CO 1	To apply statistical concepts, techniques and applications to analyses current business problems

CO 2	To analyze data using univariate and bivariate statistical tools.
CO 3	To enable optimum decision making adopting probability concepts in ambiguous managerial environment.
CO 4	To employ the appropriate statistical inferential techniques and apply it to generalize data on population
CO 5	To apply ANOVA to make inferences on more than two population data sets.
PH 305.1 PRINCIPLES OF STRATEGIC MANAGEMENT	
CO 1	To analyze strategy as a unique activity and to distinguish it from operational effectiveness.
CO 2	To analyze the impact of and role of external environment in the prospects of business and to develop strategies using external environment analysis.
CO 3	To conduct internal analysis of companies and to generate feasible paths to create capabilities and distinctive competencies in organizations.
CO 4	To generate and to execute corporate level, business level and functional level strategies.
CO 5	To apply recent developments in strategic management to achieve sustainable competitive advantage.
PH 306.1 PRINCIPLES OF MARKETING	
CO 1	Understanding and acquainting with the basic concepts of marketing management
CO 2	Understanding the components, and categorizing type and levels of product offered to the customer
CO 3	Ability in determining the pricing strategy for the product offering
CO 4	Acquainting with the concepts of distribution and its role and importance in marketing
CO 5	Apprising the need and importance of promotion in marketing function
PS 307.1 CONTEMPORARY BANKING	
CO 1	Incorporate the knowledge and understanding of a range of areas on Banking Technology
CO 2	Awareness of the latest trends and developments in banking
CO 3	Understanding of the basic terminology in Banking
CO 4	Applying acquired skills and competencies to help to manage the diverse range

	of situations which occur in a dynamic banking environment
CO 5	Reviewing the challenges of the Indian Banking Sector in the LPG era and implementing of strategic mechanism to cope with the challenges
PS 308.1 PRINCIPLES OF HUMAN RESOURCE MANAGEMENT	
CO 1	To Effectively manage and plan key human resource functions within organizations
CO 2	To develop job description and specification and successfully accomplish human resource planning of the organization.
CO 3	To be able to apply the relevant skill set which is required to address the current issues, trends, practices in Recruitment, Selection and Orientation
CO 4	To develop and implement training, and development programme and design performance management system
CO 5	To design compensation package and be cable to manage industrial relations.
PS 309.1 MANAGEMENT DATA ANALYTICS	
CO 1	To apply principles and skills of economics, marketing, and decision making to contexts and environments in data science
CO 2	To build and enhance business intelligence capabilities by adapting the appropriate technology and software solutions
CO 3	To acquire the ERP concepts for real world applications
CO 4	To understand Data Warehouse fundamentals and Data Mining principles
CO 5	To communicate effectively using Data Visualization with MS Excel
PS 310.1 EXECUTIVE COMMUNICATION	
CO 1	To develop strategies for improving organizational communication
CO 2	To effectively use verbal and non-verbal communication in business discourse
CO 3	To compose business messages by using appropriate formats of messages
CO 4	To formulate strategies for writing appropriate letters for various purposes
CO 5	To prepare a professional resume and cover letter
PS 311.1 SOCIAL MARKETING	
CO 1	To internalize the basic concept of and need for social marketing
CO 2	To transform into practice-ready social marketers ready to juxtapose and carry along social marketing and corporate marketing objectives harmoniously
CO 3	To apply the systematic and comprehensive framework of social marketing

CO 4	To bring into effect the influential new 3Cs model (Containment, Counter-Marketing, and Critical Capacity Building)
CO 5	To embody the spirit of social marketing which involves the application of marketing techniques to social ends
II SEMESTER MBA	
PH 301.2 OPERATIONS MANAGEMENT	
CO 1	To formulate the input–process–output framework and apply it to a wide range of operations
CO 2	To identify the elements of operations management and various transformation processes to enhance productivity and competitiveness
CO 3	To analyze and design the work systems by calculating the basic, allowed and standard time and also be able to identify and efficiently manage bottlenecks.
CO 4	To apply different forecasting models/techniques both quantitative and qualitative
CO 5	To analyze and evaluate various facility alternatives and their capacity decisions, develop a balanced line of production & scheduling and sequencing techniques in operation environments.
PH 302.2 INTERNATIONAL BUSINESS ENVIRONMENT	
CO 1	To identify the development of pattern of international trade with the help of trade theories
CO 2	To analyse the role of globalisation in modern times and to evaluate the multilateral agreements while framing global business strategies
CO 3	To design internationalisation strategies for firms and to utilise the benefits of expansion of firms in foreign markets especially emerging markets
CO 4	To analyse international business environment evaluating various cultural, social, economic and demographic elements and to design business tactics according to market dynamics.
CO 5	To identify the various means for international investment and to appraise the significance of each with the help of various theories.
PH 303.2 BUSINESS RESEARCH METHODOLOGY	
CO 1	To apply research and knowledge acquired in business decisions.
CO 2	To critically evaluate secondary data and apply it for optimum business

	decision making.
CO 3	To apply knowledge of research process and practices to assess business environment and solve business problems.
CO 4	To apply survey research concepts, methods and techniques in modern day research problem.
CO 5	To draft research proposals, report with citation techniques.
PH 304.2 BUSINESS LAW	
CO 1	To develop a practical understanding of the basic concepts of those laws which regulate businesses
CO 2	To apply legal ideas, principles and concepts understood earlier through concrete business case law
CO 3	To recognize the linkages between law and other fields like marketing, finance, economics and information systems
CO 4	To apply the basic principles of Contract Law and Company Law in business
CO 5	To foresee the impact of relevant economic laws and laws relating to intellectual property
PH 305.2 COST AND MANAGEMENT ACCOUNTING	
CO 1	To apply both conventional and emerging concepts to facilitate managerial decision making.
CO 2	To assess the impact of costing methods on valuation of stock and net profit.
CO 3	To adopt the cost volume profit analysis for short- and long-term decision making.
CO 4	To formulate master budget and functional budgets for organizational planning and control purposes.
CO 5	To measure the deviations that arise in organizations as compared to the standards set and take corrective action.
PH 306.2 ENTREPRENEURSHIP MANAGEMENT	
CO 1	To develop the spirit of entrepreneurship among the young management graduates and contribute towards the Economic Development
CO 2	To develop next generation innovators, intrapreneurs, entrepreneurs and change-makers
CO 3	To direct the budding entrepreneurs to start up their own venture following the

	legal formalities and be equipped with the required capital.
CO 4	To formulate and present the business plans in a professional manner to all the stakeholders.
CO 5	To be able to effectively manage the various stages of growth of an entrepreneurial firm
PS 307.2 CORPORATE FINANCIAL MANAGEMENT	
CO 1	To apply theoretical framework for considering corporate finance problems, and issues.
CO 2	To review the impact of allocation, management and funding of financial resources.
CO 3	To assess risk and return based on the given scenario.
CO 4	To evaluate the financial objectives of various types of organizations and the requirements of all the stakeholders
CO 5	To assess the sources of corporate finance which lead to optimal capital structure decisions
II SEMESTER MBA	
PS 308.2 LEADERSHIP IN BUSINESS ORGANISATIONS	
CO 1	To synthesize leadership development through application of theoretical knowledge.
CO 2	To Identify and develop traits and characteristics essential for leadership development.
CO 3	To appraise the application of charismatic and transformational leadership styles in the contemporary business organizations.
CO 4	To measure implementation of contingency theories of leadership in varying business conditions.
CO 5	To justify ethical leadership in contemporary business organizations.
PS 309.2 SERVICES MARKETING	
CO 1	Successfully navigate the challenges of services marketing and develop distinct strategies and tactics more attuned to services
CO 2	To develop strong customer relationships through service quality to organizations whose core product is service and to organizations that depend on service excellence for competitive advantage
CO 3	To apply frameworks for customer focussed management and increase

	customer satisfaction and retention through service quality
CO 4	To successfully implement service strategies for competitive advantage across industries
CO 5	To generate the service advantage by measuring and manging service quality enabling cocreation and cross functional treatment of issues through integration of marketing with other domains in the organization
PS 310.2 ECONOMETRIC ANALYSIS	
CO 1	To translate business problems into formal testable hypothesis within regression model
CO 2	To construct linear regression equations to model business decision making problems
CO 3	To draw inference from estimated regression results
CO 4	To identify and develop solutions to the problems that results from violating the assumptions of classical regression model
CO 5	To estimate and validate linear regression models using E-Views, STATA and R
PH 301.3 BUSINESS ETHICS	
CO 1	To inculcate a sense of ethical values and ethical behaviour at personal, professional and corporate governance level.
CO 2	To Understand Human Person as unique and a foundation for any ethical issues.
CO 3	Distinguish the ethical and unethical issues and practices in the marketing management and Human Resource Management of a firm.
CO 4	Examine the implications of issues and unethical practices in the area of finance and accounts.
CO 5	To examine the implications of issues and unethical practices in the area of Environment and Technological Development.
PH 302(a).3 LOGISTICS AND SUPPLY CHAIN MANAGEMENT	
CO 1	Acquainting with the basic concepts, processes, and scope and key elements of a supply chain.
CO 2	Apprising role, functions, strategies and decision making in Warehousing function
CO 3	To develop the understanding of classification, role, policies and costs in Inventory management

CO 4	Analyzing and applying the structure, logistical program and make decisions in designing of distribution channel
CO 5	Exploring the developments taking place in the field of logistics and supply chain
PH 302(b).3 CREATIVITY AND INNOVATION MANAGEMENT	
CO 1	Identifying the role of Industrial Revolution 4.0 and Innovation in designing Sustainable Development practices.
CO 2	Apprising the role of Creativity, Innovation and Imagination in Experience engineering.
CO 3	Understand the role of different types of innovations to respond to the agile business environment.
CO 4	Interpreting and practicing the pattern of Innovation with the help of various models of innovation.
CO 5	Designing the right customer solutions and to create customer value propositions using design thinking and to generate innovative ideas for social change
(FINANCE SPECIALIZATION) **PS 303(a).3 INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT**	
CO 1	Become informed, independent and ethical investors in various financial instruments.
CO 2	Find attractive career as advocates of capital markets, investment advisers and portfolio managers.
CO 3	Grow as campaigners of investor's awareness programs and make more and more knowledgeable investing community.
CO 4	Fashion as crusaders against the financial market fraudsters and safeguard the investors' interest.
CO 5	Become champions in new financial products development.
(FINANCE SPECIALIZATION) **PS 303(b).3 SHORT TERM DECISION MAKING IN FINANCE**	
CO 1	Underling the management of current assets and current liabilities
CO 2	Evaluating the ability of a firm to continue its operations
CO 3	Comprehending the capacity of a firm to meet its maturing short-term debt and

	upcoming operational expenses.
CO 4	Assessing the various components of working capital
CO 5	Determining factors that affect firm's liquidity, risk and shareholder wealth.
(FINANCE SPECIALIZATION) **PS 303(c).3 INTERNATIONAL FINANCIAL MANAGEMENT**	
CO 1	To demonstrate basic understanding of the global business environment and the international monetary system
CO 2	To compute the Balance of Payments and evaluate various aspects of capital account liberalization.
CO 3	To demonstrate the significance of various market participants and components of the international financial markets.
CO 4	To forecast exchange rates based on the parity conditions that should apply between spot rates, forward rates, inflation rates, and interest rates.
CO 5	To demonstrate how international capital budgeting can be applied to determine whether an international project should be implemented.
PS 303(d).3MERCHANT BANKING AND FINANCIAL SERVICES	
CO 1	Articulating the significant role played by Financial Services sector in the realm of Economic Development of a Country.
CO 2	Deliberate on the prominent components of the financial sector providing specialized services
CO 3	Illustrate specialized knowledge in existing and emerging areas of the Financial Services.
CO 4	Enhance the technical knowhow of the Banking and Financial market.
CO 5	Understanding of how credit rating and its regulatory framework functions.
PS 304(a).3 INDUSTRIAL RELATIONS	
CO 1	Successfully navigate the challenges of managing all aspects of work and employment between the parties to an employment contract
CO 2	To develop strong skills in resolving issues relating to people as groups/collectives vis a vis management in unionized and in non-unionized situations
CO 3	To apply frameworks for managing conflict in the industry including techniques like arbitration, mediation and conciliation

CO 4	To successfully implement human resource management strategies for successfully managing industrial relations which in turn will influence and affect the performance of organizations
CO 5	To generate the human capital advantage by being mature business personnel who recognize and understand the need for labour to collectivise in India even in the era of the fourth industrial revolution
PS 304(b).3 ORGANISATIONAL CHANGE AND DEVELOPMENT	
CO 1	To implement change successfully in an organization
CO 2	To apply the concept of organizational renewal in the workplace in order to create an agile organization.
CO 3	To act as an Organization Development practitioner and design various Organization development interventions.
CO 4	To align organization culture and structure with the change and development strategy of the organization.
CO 5	To use Information Technology effectively in organizational design
PS 304(c).3 TALENT MANAGEMENT	
CO 1	To assess the role of Talent management in achieving organizational objectives and to design a Talent Management system
CO 2	To evaluate the role of Talent management in the current volatile environment using various Talent management models
CO 3	To build an effective employer brand with the help of employee value proposition and to attract the best talent with the employer brand
CO 4	To develop suitable Talent development strategies using potential identification, executive development programs and Talent pipeline management strategies
CO 5	To design the right Talent retention strategy with the help of employee engagement initiatives and to align Talent strategy to business strategy
PS 304(d).3INTERNATIONAL AND STRATEGIC HUMAN RESOURCE MANAGEMENT COURSE OUTCOME	
CO 1	Develop understanding to manage human resources in the global context.
CO 2	Involving in recruiting, selection and training the staff for international assignments

CO 3	Actively participating in designing and developing of international performance management & compensation system
	Becoming instrumental in aligning HR Strategy to the Organizational Strategy
CO 5	Involve in strategizing the HR process
(MARKETING SPECIALIZATION) **PS 305(a).3 SALES AND DISTRIBUTION MANAGEMENT**	
CO 1	To propose emerging functions of sales management in modern business organizations.
CO 2	To plan personal selling strategies for successful salesmanship activities.
CO 3	To design the functions for selecting and retaining efficient salesmen for the sales organization.
CO 4	To defend the role of distribution management in creating place and time utility.
CO 5	To revise the activities of intermediaries in delivering value for customers in the modern business scenario.
PS 305(b).3 RURAL MARKETING	
CO 1	Awareness creation about Indian rural market
CO 2	Understanding the consumer behavior and decision making process in rural markets
CO 3	Understanding and application of the marketing mix practiced in the rural market
CO 4	Sensitizing the need of innovative distribution system required in the rural market
CO 5	Apprising the need of innovative research techniques to understand the rural market better
PS 305(c).3 STRATEGIC BRAND MANAGEMENT	
CO 1	To gain valuable perspectives on the challenges in creating and nurturing strong brands.
CO 2	To provide managers with concepts and techniques to improve the long term profitability of their brand strategies
CO 3	To combine a comprehensive theoretical foundation with enough practical insights to assist them in their day to day and long term brand decisions
CO 4	To create profitable brand strategies by building, measuring and managing

	brand equity.
CO 5	To recognise the effects of their day to day marketing decisions on brand performance
PS 305(d).3 CONSUMER BEHAVIOUR	
CO 1	To develop appropriate marketing strategies by applying the knowledge of consumer behavior in segmenting markets.
CO 2	To apply personality traits and consumer perceptions in positioning products and predicting buyer behavior.
CO 3	To strategize entry into new market segments and devise strategies for customer retention based on formation of customer attitudes and to apply attitude changing models to attract/ woo competitor's loyals to switch.
CO 4	To attract global markets by penetrating the products based on social, economic and cultural dimensions.
CO 5	To prepare plans/policies relating to corporate social responsibility and pave the way for ethical conduct of business.
PS 306(a).3 FACILITY LOCATION AND PROCESS DESIGN	
CO 1	Enhanced understanding of facility location and layout decisions
CO 2	Comprehensive knowledge of factors affecting facility location and layout decisions
CO 3	Strategize on best possible process to implement based upon product profile of the Organization.
CO 4	Implement and evaluate process flow based on product attribute and process competencies.
CO 5	Insight of operations process design-selection of equipment and technology.
PS 306(b).3 INVENTORY AND WAREHOUSE MANAGEMENT	
CO 1	Articulate knowledge of inventory systems its valuations, decision and control techniques used in inventory management.
CO 2	Develop and manage effective and efficient warehouse management system.
CO 3	Understanding of relationship between warehousing, inventories and supply chain planning.
CO 4	Effect of managerial decisions in functional area of Warehouse management.
CO 5	Implement feasible, effective and efficient warehousing system in retail setup.

PS 306(c).3 MATERIALS AND PROCUREMENT MANAGEMENT	
CO 1	Understand elementary idea of material management linkages with other areas of management, supply chain management and production processes.
CO 2	Critique successful supply chain management practices.
CO 3	Integrate a biblical worldview within the context of material management.
CO 4	Deliberate the role of materials mmanagement in other areas of management functions.
PS 306(d).3 SERVICE OPERATIONS MANAGEMENT	
CO 1	Getting acquainted to the nature, classification, framework and delivery systems of services
CO 2	Evaluating criteria for site selection for service industry
CO 3	Understanding the concept of yield management and its importance and application to the service industry
CO 4	Analyzing and applying Inventory management in service industry
CO 5	Apprising digital application in service sector
PS 307(a).3 FINANCIAL MODELING	
CO 1	To perform accurate financial calculations with the help of packages like MS Excel and R.
CO 2	To create interactive financial models which help in quick decision making.
CO 3	To scrutinize the dividend payment pattern of the corporations and their implications.
CO 4	To construct the financial statements and to predict the future financial positions of the companies.
CO 5	To analyze the implications of corporate events on the share prices and to take informed investment decisions.
PS 307(b).3 PEOPLE ANALYTICS	
CO 1	To enable to make data-driven decisions to attract, manage, and retain employees
CO 2	To effectively manage the challenges involved in implementing analytics
CO 3	To develop data driven, proactive workforce planning and take appropriate workforce-related decisions.
CO 4	To use the talent sourcing analytics, talent acquisition analytics and predictive

	analytics for making HR decisions.
CO 5	To apply analytics in onboarding and performance management system.
PS 307(c).3 DATA DRIVEN MARKETING	
CO 1	To conduct descriptive marketing analysis using excel
CO 2	To predict market swings based on price fluctuations
CO 3	To forecast sales adopting various statistical forecasting tools
CO 4	To estimate life time customer value and allocation of resources for customer acquisition and retention
CO 5	To segment markets and predict duration of future sales
PS 307(d).3 FORECASTING ANALYTICS	
CO 1	To disentangle the components of time series data
CO 2	To construct data driven models of forecasting, such as naïve models, moving average models and exponential smoothing models
CO 3	To build and validate stationary time series models
CO 4	To apply multivariate and volatility models for forecasting, such as VAR, Granger Causality, ARCH and GARCH Models
CO 5	To construct and evaluate time series models using E-Views/R
PH 301.4 CORPORATE GOVERNANCE	
CO 1	To interpret the fundamental concepts and issues in corporate governance in conjunction with the current Indian business scenario.
CO 2	To appraise the theories and models of corporate governance applied in business organizations across the world.
CO 3	To review the application of committee recommendations in business organizations in India.
CO 4	To Justify the role of boards and committees in the healthy governance of business organizations.
CO 5	To predict the future of corporate governance and plan best practices for the future.
PH 302(a).4 DECISION MAKING MODELS	
CO 1	To apply Linear Programming Models and Transportation Problems for tackling business environment challenges quantitatively to allocate limited resources.
CO 2	To employ the Decision Theory techniques to analyze current business

	problems under risk certainty and uncertainty.
CO 3	To apply the Replacement Models techniques in planning of replacing of items keeping cost considerations.
CO 4	To apply Network Modelling of activities to ensure optimum utilization of human and other resources like time and cost.
CO 5	To employ simulation tools for real world business problems where mathematical modeling may not be applied and make strategic decisions
PH 302(b).4 KNOWLEDGE MANAGEMENT	
CO 1	To be able to relate the concepts of knowledge management to the real world.
CO 2	To apply complex theories of knowledge management to a wide range of scenarios;
CO 3	To exhibit the skills and competences to work as an effective knowledge managers and knowledge workers in a knowledge-based organization.
CO 4	To use the effective tools for knowledge transfer and sharing.
CO 5	To be able align organizational culture in knowledge application.
CO 6	To implement various KM strategies and metrics for the success of knowledge management.
CO 7	To lead knowledge knowledge-based organization from ethical, and legal perspective
PS 304(a).4 FINANCIAL REPORTING AND ANALYSIS	
CO 1	Evaluate different types of performance measurement systems in accounting and commonly used financial control systems.
CO 2	Interpret financial statement based on different techniques of analysis.
CO 3	Design appropriate business policies and strategies to meet stakeholder and shareholder needs in the light of the recent changes in financial reporting.
CO 4	Create, evaluate financial statement and access a range of different outcomes and the ability to justify the chosen outcome.

PS 304(b).4 TAXATION FOR MANAGERS	
CO 1	Expose students to real life situations involving taxation and to equip them with techniques for taking tax-sensitive decisions.
CO 2	Assess the value of goods and services for payment of GST.

CO 3	Exhibit a clear understanding of various provisions of GST system and utilisation of input tax credit.
CO 4	Demonstrate the ability to draw meaningful conclusions about tax compliance of individuals, business firms and companies.
	Advise on valuation of goods for payment of customs duty.
PS 304 (c).4 PROJECT FINANCING AND APPRAISAL	
CO 1	Comprehend the conceptual clarity about project organization and feasibility analyses -Market, Technical, Financial and Economic.
CO 2	Analyse and understand the techniques for Project planning, scheduling and Execution Control.
CO 3	Apply the risk management plan and analyse the role of stakeholders.
CO 4	Apprehend Project Procurement, generation and screening of project ideas to excel in the industry.
CO 5	Analyse the prerequisites for successful Project Implementation considering the human perspectives for the benefit of the society at large.
PS 304(d).4 DERIVATIVES AND RISK MANAGEMENT	
CO 1	To enhance the investment basket by including the various financial derivative products.
CO 2	To become independent investor/trader in the derivatives market.
CO 3	To apply the derivative trading strategies to hedge the positions against risk.
CO 4	To face the practical challenges in the application of derivative instruments.
CO 5	To formulate alternative trading strategies to the conventional strategies.
PS 305(a).4 TRAINING AND DEVELOPMENT	
CO 1	Attain basic concepts of training and development and its process
CO 2	Assimilate best of all the components of training and development and familiarize it.
CO 3	Gain a deeper understanding of the tools and techniques of the training process.
CO 4	Familiarize training strategy with corporate strategy.
CO 5	Learn new approaches to the training programme in a changed environment.
PS 305(b).4 LABOUR LAW	
CO 1	To examine the constitutional provisions of Labour Legislations and to incorporate the newly introduced labour codes in the work place

CO 2	To assess the various challenges faced by trade unions and to evaluate the various provisions of Trade unions Act, 1926 and to examine the various statutory requirements of Industrial Disputes Act, 1947.
CO 3	To analyse and to incorporate the different provisions of Factories Act, 1948.
CO 4	To assess the various statutory requirements as specified by wage legislations and to critically analyse different wage legislations
CO 5	To evaluate social security as a human right and to apply the various provisions of Social Security legislations in the work place
PS 305(c).4 STAFFING AND COMPENSATION MANAGEMENT	
CO 1	To implement effective staffing system and strategy in the organization
CO 2	To be able to manage staffing activities in the workplace.
CO 3	To apply the concept of compensation and reward management in firms
CO 4	To administer wage and salary system effectively.
CO 5	To practice performance-based reward system in the organization setting.
PS 305(d).4 PUBLIC RELATIONS	
CO 1	To demonstrate an understanding of the public relations practice.
CO 2	To practice public relations based on the theoretical foundation.
CO 3	To use Media and Communication in Public Relations activities.
CO 4	To recognize the importance of community relations in building public relations.
CO 5	To manage crisis situation with effective public relations practice.
PS 306(a).4 ADVERTISING MANAGEMENT	
CO 1	To gain valuable perspectives on the internal and external environmental challenges involved in managing and integrating a firms marketing communication
CO 2	To provide managers with concepts and techniques to conceptualise and execute creative advertising in various media
CO 3	To combine a comprehensive theoretical foundation with enough practical insights to assist them in practical communication management
CO 4	To expertly optimise the use of all major marketing communication tools like sales promotion, direct marketing, public relations and publicity.
CO 5	To create profitable marketing communication strategies by optimising media

	planning and putting creative ideas to the test of fixed budgets and defined objectives through the process of evaluation
PS 306(b).4 NEW PRODUCT DEVELOPMENT	
CO 1	Understanding the strategic importance, classification and hierarchy of products
CO 2	Involving in the nuances of concept generation and evaluation in the new product development process
CO 3	Involving in the process of evaluation and selection of concepts in new product development process
CO 4	Acquainting with the process of product development, design and team management in the NPD process
CO 5	Recognizing the importance of product testing and commercialization phase in the NPD process
PS 306(d).4 DIGITAL MARKETING	
CO 1	Acknowledging the impact of digital movement in the present marketing scenario
CO 2	Understanding the social media impact in the present marketing scenario
CO 3	Acquainting with the drivers in the social marketing domain
CO 4	Enabling to adopt and experiment with the online tools for marketing function
CO 5	Apprising the developments in digital domain and impacts on the marketing domain
PS 307(a).4 OPERATIONS ANALYTICS	
CO 1	Development of analytical and problem solving skills, confidence to use tools, ability to visualize data and infer decisions.
CO 2	Develop a multi-dimensional approach to problem solving/decision making
CO 3	Exposure to practical analysis tools in decision making and problem solving in operations
CO 4	Model future demand uncertainties, to predict the outcomes of competing policy choices and to choose the best course of action in the face of risk.
CO 5	Find an attractive career in the area of operations analytics.
PS 307(b).4 PURCHASE MANAGEMENT	
CO 1	Comprehensive understanding of process of the purchase management and

	practical aspects involved in it.
CO 2	Find an attractive career in purchase division of the well-known business houses
CO 3	Become an expert consultant in the area of purchase and procurement.
CO 4	Develop modern and customized purchase system and help the corporates to achieve greater efficiency in purchasing.
CO 5	Emerge as an expert negotiator between the corporate buyers and sellers.
PS 307(c).4 STRATEGIC OPERATIONS MANAGEMENT	
CO 1	Understanding the the importance of strategic operations management.
CO 2	Understanding the scope of operations management to gain competitive advantage.
CO 3	Building step by step operations strategy.
CO 4	Implementing the strategic operations strategies to meet the objectives of the firm.
PS 307(d).4 TOTAL QUALITY MANAGEMENT	
CO 1	To achieve the objectives of quality control by understanding the need for total quality management.
CO 2	To implement and use the theories developed by the various philosophers in creating customer focus and achieving customer satisfaction.
CO 3	To apply various statistical tools to measure quality and to analyze the quality-cost relationship.
CO 4	To be able to measure customer satisfaction by the use of the Kano Model and Teboul Model.
CO 5	To identify and analyze the cost of benchmarking and to utilize the tools of concurrent engineering in total quality management.
PS 307 (e).4 PROJECT FINANCING AND APPRAISAL	
CO 1	Comprehend the conceptual clarity about project organization and feasibility analyses -Market, Technical, Financial and Economic.
CO 2	Analyse and understand the techniques for Project planning, scheduling and Execution Control.
CO 3	Apply the risk management plan and analyse the role of stakeholders.
CO 4	Apprehend Project Procurement, generation and screening of project ideas to

	excel in the industry.
CO 5	Analyse the prerequisites for successful Project Implementation considering the human perspectives for the benefit of the society at large.
PS 308(a).4 FINANCIAL ANALYTICS	
CO 1	To become expert in different software packages in technical analysis and to guide others.
CO 2	To inculcate the problem solving ability whenever need arises in the area investment management.
CO 3	To become self-reliant investors and traders in financial products.
CO 4	To obtain an attractive career in the field of investment analysis.
CO 5	To create awareness among the investing community about the fraudulent investment tips providers.
PS 308(b).4 TALENT ANALYTICS	
CO 1	To measure talent engagement and make a strong organizational culture to improve performance
CO 2	To enable the students with the technique of predicting the attrition rate using analytics
CO 3	To leverage big data to significantly improve the value of the workforce.
CO 4	To optimize employee wellness, health and workplace with predictive analytics
CO 5	To be competent to handle the future demands of talent analytics

MASTER OF COMPUTER APPLICATION (MCA)	
PROGRAMME OUTCOMES (PO'S)	
PO1	**Computational Knowledge:** Apply knowledge of mathematics, computing fundamentals, data analytics, software engineering concepts and application development knowledge appropriate for the computing specialization
PO2	**Problem Analysis:** Identify, formulate, design and develop applications to analyze and solve computer science related problems
PO3	**Design /Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex Computing problems:** Use appropriate review literatures, research methodologies, techniques and tools, design, conduct experiments, analyze and make inferences from the resulting data.
PO5	**Modern Tool Usage:** Create, Select, Integrate and apply efficiently appropriate techniques, resources, and modern computing tools to solve complex problem, with an understanding of the limitations.
PO6	**Professional Ethics:** Understand and work with a professional context pertaining to ethics with appropriate societal and cyber regulations in a global economic environment
PO7	**Life-long Learning:** Recognize and develop the passion for a continued career development and progress as a computer professional
PO8	**Project management and finance:** Apply the principles of management with computing knowledge to manage the projects effectively both as a team leader and team member on multidisciplinary environments
PO9	**Communication Efficacy:** Communicate effectively with the computing community as well as society by being able to make effective presentations and design documentation with respect to appropriate standards.
PO10	**Societal and Environmental Concern:** Ability to utilize the computing knowledge efficiently in projects to analyze the global and local impact of business solutions for societal, environmental, and cultural aspects
PO11	**Individual and Team Work:** Develop the ability to act as a member or leader for the fulfillment of diverse teams in multidisciplinary environments.

PO12	**Innovation and Entrepreneurship:** Develop and design innovative methodologies to create value as a successful entrepreneur and wealth for betterment of individual and society at large.
PROGRAMME OUTCOMES (PSO'S)	
PS01	Excel in professional career and/or higher education by acquiring knowledge in various sub-domains related to the field of computer science and applications
PS02	Analyze real life problems, design computing systems appropriate to its solutions that are technically sound, economically feasible and socially acceptable
PS03	To develop the abilities to face the changing trends and career opportunities in computer application
PS04	Exhibit professionalism, ethical attitude, communication skills, team work in their profession and adapt to current trends by engaging in lifelong learning
COURSE OUTCOMES	
I Semester	
PH 601.1 [E1]: DATABASE MANAGEMENT SYSTEMS	
CO 1	Very good understanding about data and database systems.
CO 2	Describe the fundamental elements of relational database management systems
CO 3	Understand the design of relational databases through the use of Entity-Relationship Diagrams and Normalization procedures
CO 4	Develop basic skills in the use of SQL in defining and creating a database, inserting and modifying entries in a table, creating views and other data objects
CO 5	Effective way of manipulating the database to produce useful decision making information for management & analytics. Using data in the distributed environment
PH 601.1 [E2] :DATABASE DESIGN AND IMPLEMENTATION	
CO 1	Upon successful completion of this course, students should be able to:
CO 2	Understand the limitations of traditional file management systems, different data models
CO 3	Understand the need for an efficient management system to administer the

	data repository of any organization, designing relational database systems with normalization concept
CO 4	Identify the importance of data consistency and also how data integrity ignorance affects any business organization
CO 5	Providing data security through different means (such as Views)
CO 6	Identifying the power of Query language - generating flexible and customized reports
CO 7	Providing complex integrity constraints through the use of Triggers
CO 8	Know the Power of procedural SQL, writing Stored procedures, functions and packages
CO 9	Gain knowledge about the emerging trends in database technology and also schema less database
PH 601.1 [E3]: NoSQL with MongoDB	
CO 1	After successful completion of the course students should be able to
CO 2	Understand that data need not be structured for storage, retrieval and manipulation
CO 3	Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column-oriented and Graph).
CO 4	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
CO 5	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.
CO 6	Using NoSQL tools efficiently in the academic projects
CO 7	Understands different types of Indexing/shading and marinating NoSQL data, Comparing the power of different NoSQL tools
PH 602.1 [E1] DATA STRUCTURES AND ANALYSIS OF ALGORITHMS	
CO 1	Ability to understand and implement algorithms and are able to calculate the time and space complexities.
CO 2	Able to implement and apply stack and queue data structure in different applications.
CO 3	Ability to implement linked list and concepts and apply list concepts to solve

	different problems.
CO 4	Ability to implement tree data structure and tree data structure to solve expressions
CO 5	Ability to implement and apply different searching and sorting methods.
	PH 602.1 (E2) DATA STRUCTURES AND GRAPH THEORY
CO 1	Ability to program using structures, function pointers, classes and objects.
CO 2	Ability to implement and apply stack, queue and list data structures in different applications.
CO 3	Ability to implement and apply tree data structure in different applications
CO 4	Ability to program different searching and sorting methods and how to apply these in different applications
CO 5	Ability to implement and apply different graph methods in different applications
	PH 602.1 (E3) ADVANCED DATA STRUCTURES AND ALGORITHMS
CO 1	Understand what is data structure and able to implement different programs using structures, functions, pointer and memory allocation functions
CO 2	Skill to program stack, queue using array and apply these algorithms to different applications.
CO 3	Ability to program binary tree, binary search tree, AVL tree and other tree data structures and traverse and represent expressions using tree data structure.
CO 4	Ability to program different searching and sorting algorithms using C++ programming language.
CO 5	Ability to create graph using array and using linked list, find shortest path in graph, able to traverse the graph
PH 603.1 [E1]: OBJECT ORIENTED PROGRAMMING WITH JAVA	
CO 1	Develop simple Java applications using control structures
CO 2	Design user defined classes and create instances for them, Learn to invoke methods on those objects, Create programs to execute various methods of String and StringBuffer classes.
CO 3	Develop applications to illustrate simple inheritance and multilevel inheritance, Simulate multiple inheritance with the help of interfaces.
CO 4	Develop programs to illustrate synchronization between multiple threads, also

	to handle exceptions caused by them.
CO 5	Students will be able to build Java applications where they can read from and write to files. Design generic classes and test them.
PH 603.1 [E2]: ENTERPRISE COMPUTING WITH ADVANCED JAVA	
CO 1	To analyze various JEE components. To understand about distributed applications
CO 2	To develop server-side programs using Servlets
CO 3	To develop server-side web applications using JSP
CO 4	Update and retrieve the data from the databases using Apache Derby
CO 5	Create session and entity beans using EJB
PH 603.1 [E3]: ENTERPRISE COMPUTING: JAVA EE Frameworks	
CO 1	Developing server-side web applications using Servlet, JSP
CO 2	Update and retrieve the data from the databases using Apache Derby, develop web applications using various JSTL tags
CO 3	Develop enterprise applications using EJB
CO 4	Create simple web applications using JSF framework
CO 5	Map Java classes to database tables using Hibernate
PH 604.1 [E1]: WEB DESIGN with HTML 5, CSS, Java Script	
CO 1	Students will be able to develop websites and web-based projects.
CO 2	Students can be employed on entry-level jobs of web development in software industry.
CO 3	Students will be able to develop interactive and dynamic webpages
PH 604.1[E2]: WEB PROGRAMMING WITH PHP and MYSQL	
CO 1	Students will be able to develop static webpages using HTML elements
CO 2	Students will be able to design HTML forms, Perform graphics design using CANVAS, SVG, Play audio and video in web pages
CO 3	Ability to style HTML pages using CSS
CO 4	Develop simple JavaScript programs
CO 5	Ability to develop interactive web pages using JavaScript
PH 604.1[E3] WEB APPLICATION DEVELOPMENT USING PYTHON	
CO 1	Define the structure and components of a Python program and to design and program Python applications.

CO 2	Learn how to use lists, tuples, dictionaries in Python programs, to read and write files in Python, to design object-oriented programs with Python classes.
CO 3	Learn how to use exception handling in Python applications for error handling and do CRUD operations.
CO 4	To use various libraries in Python and successfully configure and install DjangoFramework
CO 5	To develop a secure and robust web applications using Django framework
PS 606.1 [E1] STATISTICAL TECHNIQUES FOR COMPUTING	
CO 1	Select appropriate statistical techniques for summarizing and displaying data
CO 2	Analyze and draw inferences from data using appropriate statistical methods.
CO 3	Analyze the dispersion in the data and draw inference.
CO 4	Understand the concept of a frequency distribution for sample data and be able to summarize the distribution by diagrams and statistics.
CO 5	Understand correlation and regression, and be able to make predictions and understand their limitations.
PS 606.1 [E2] PROBABILITY AND STOCHASTIC PROCESS	
CO 1	Calculate the probabilities and identify the various types.
CO 2	Apply inverse probability concepts and solve problems.
CO 3	Express the features of discrete random variables and formulate the *distribution* functions.
CO 4	Identify the various distributions and apply them.
CO 5	Classify a stochastic process according to whether it operates in continuous or discrete time and whether it has a continuous or a discrete state space, to understand the concept of Markov chains and study the transition diagram.
PS 606.1 [E3] OPERATIONS RESERACH	
CO 1	Calculate the probabilities and identify the various types.
CO 2	Apply inverse probability concepts and solve problems.
CO 3	Express the features of discrete random variables and formulate the *distribution* functions.
CO 4	Identify the various distributions and apply them.
CO 5	Classify a stochastic process according to whether it operates in continuous or discrete time and whether it has a continuous or a discrete state space.
CO 6	Tounderstand the concept of Markov chains and study the transition diagram.

PS 607. 1 P Java & Web Development Lab	
CO 1	Use the Java SDK & JRE Environment to Create, Debug and Run Simple Java Programs.
CO 2	Analyze the Problem, Identify the Requirements & Features of Applications and Utilities
CO 3	Implement Object Oriented Concepts for Solving Real Problem.
CO 4	Develop Small Applications, Utilities, and Web Applications Using AWT, Event and Layout Manager
PS 608.1 Foundations of Entrepreneurship	
CO 1	Define basic terms, analyse the business environment in order to identify business opportunities
CO 2	Identify the elements of success of entrepreneurial ventures,
CO 3	Consider the legal and financial conditions for starting a business venture
CO 4	Evaluate the effectiveness of different entrepreneurial strategies and specify the basic performance indicators of entrepreneurial activity,
CO 5	Explain the importance of marketing and management in small businesses venture, interpret their own business plan
II Semester **PH 601.2 [E1] CLOUD COMPUTING WITH AMAZON WEB SERVICES**	
CO 1	On the successful completion of the course, students will be able to
CO 2	Describe the key technologies, architecture, strengths, limitations and applications of cloud computing
CO 3	Explain the types and service models of cloud
CO 4	Understand security implications in cloud computing
CO 5	Design Cloud Services and Set a private cloud
CO 6	Create and automate infrastructure to design cost-effective, highly available applications
CO 7	Integrate AWS services with your application to meet and exceed non-functional requirements
PH 601.2 [E2] Grid and Cluster Computing	
CO 1	Understand fundamentals of cluster computing and Environments
CO 2	To enable resource sharing across networks.
CO 3	To integrate heterogeneous computing systems and data resources with the

	aim of providing a global computing space.
CO 4	To manage and schedule the resources in grid environments.
CO 5	To know the standards and protocols used.
CO 6	To Know the middleware in grid computing.
CO 7	To understand the latest advances in the field of computation to optimize the utilization of resources.
PH 601. 2 [E3] HIGH PERFORMANCE COMPUTING	
CO 1	To Study various computing technology architecture.
CO 2	To know Emerging trends in computing technology.
CO 3	To highlight the advantage of deploying computing technology.
CO 4	Demonstrate understanding of learned concepts of parallel algorithm design, performance evaluation, communication operators by writing algorithms and programs exploiting parallel architecture
CO 5	Analyze the efficiency of parallel algorithms designed for matrix, graph and sorting operations
	PH 602.2 E1: SOFTWARE ENGINEERING and UML
CO 1	Plan and deliver an effective software engineering process, based on development lifecycle models.
CO 2	Employ group working skills including general organization, planning and time management and negotiation.
CO 3	Apply software engineering principles and techniques.
CO 4	Understand the principles of large scale software systems, and the processes that are used to build them
CO 5	Analyze a problem, and identify and define the computing requirements appropriate to its solution.
CO 6	Design, implement, and evaluate a computer-based system, process, component, or program to meet desired needs.
PH 602.2 E2: OBJECT ORIENTED SOFTWARE ENGINEERING	
CO 1	Display understanding and the ability to apply object-oriented programming principles.
CO 2	Have detailed knowledge of the software development lifecycle.
CO 3	Apply skills relevant for academic progression and career development within

	the sector.
CO 4	Explore and analyze different analysis and design models, such OO Models, Structured Analysis and Design Models, etc.
CO 5	Show an ability to use the graphical UML representation using tools.
CO 6	Apply software engineering perspective through software design and construction, requirements analysis, verification, and validation, to develop solutions to modern problems such as security, data science, and systems engineering.
PH 602.2 E3: AGILE SOFTWARE DEVELOPMENT	
CO 1	Understand concept of agile software engineering and its advantages in software development.
CO 2	Recognize various agile methods.
CO 3	Understand the principles behind the agile approach to software development
CO 4	Deconstruct user stories into tasks and ideal day estimates.
CO 5	Differentiate between the testing role in agile projects compared with the role of testers in non-agile projects.
PH 603.2 (E1): Mobile Application Development using Android	
CO 1	Understand the architecture, working and environmental setup of Android
CO 2	Design and Implement simple GUI based Android Apps that handle user input and provide information
CO 3	Implement Android apps that are able to receive broadcasted messages, act as content provider or receiver and run background services.
CO 4	Create Android Apps that can manipulate data from various data stores such as internal, external memory and also SQLite as a Database.
CO 5	Design and Work with advanced sensors of the phone and manipulate Telephony and SMS in an Android Phone.
PH 603.2 (E2): Cross Mobile App Development using React Native	
CO 1	Write JavaScript code for any particular scenario and also be familiar with the syntax of JavaScript
CO 2	Create simple React JS based User Interfaces and UI Components
CO 3	Create React Native apps that simultaneously work in Android and iOS
CO 4	To Use Widgets and components to create professional mobile applications

CO 5	To Create Cross Platform apps that makes use of all the advanced features that React Native has to offer.
PH 603.2 (E3): Mobile App Development for iOS with Swift	
CO 1	Understand the working of mobile devices compared to the various architectures available
CO 2	Do programming with the Swift Language
CO 3	Use advanced concepts of Swift to solve complex problems
CO 4	Use Widgets and components to create professional iOS applications
CO 5	Develop iOS apps to perform the various advanced tasks like Database handling.
PH 604.2 P Cloud Computing and Mobile App Development Lab	
CO 1	Understand the business models that underlie Cloud Computing
CO 2	Understand the importance of protocols and standards in computing.
CO 3	Understand the issues involved in distributed computing
CO 4	Ability to deploy applications using the Unicore Grid middleware
CO 5	Ability to programme using the APIs of Cloud Computing
CO 6	Ability to create Virtual Machine images and to deploy them on a Cloud.
PS 605.2 [E1]: NATURAL LANGUAGE PROCESSING	
CO 1	Understand natural language processing and to learn how to apply basic algorithms in this field.
CO 2	Understand POS tagging and context free grammar for English language
CO 3	Learn how model linguistic phenomena with formal grammars; and to design, implement and test algorithms for NLP problems
CO 4	Understand the mathematical and linguistic foundations underlying approaches to the various areas in NLP
CO 5	Apply NLP techniques to design real world NLP applications such as machine translation, text categorization, text summarization, information extraction
PS 605.2 [E2]: IMAGE PROCESSING AND PATTERN RECOGNITION	
CO 1	Understand image formation, role of human visual system plays in perception of gray and color image data.
CO 2	Apply image processing techniques in both the spatial and frequency (Fourier) domains. Apply different de-noising models to recover original image.

CO 3	Design image analysis techniques, image segmentation and to evaluate the Methodologies for segmentation. Conduct independent study and analysis of feature extraction techniques.
CO 4	Identify different pattern recognition techniques and apply them in real world problems.
CO 5	Learn how to classify patterns. And build a statistical classifier and will learn how to use other classifiers.
CO 6	Be able to write programs in Matlab language/Python for digital manipulation of images; image acquisition; preprocessing; segmentation; Fourier domain processing.
PS 605.2 [E3] : Bioinformatics Algorithms, Databases and Tools	
CO 1	Gain a knowledge of simple biology and Bioinformatics
CO 2	Gain knowledge of database and tools with respect to Genomics and Proteomics; usage of different biological databases for understanding protein domains and families
CO 3	Understand the algorithmic complexity of Biological algorithms; application of algorithms to find motifs in proteins
CO 4	Usage of gene prediction algorithms and its statistical approaches
CO 5	Usage of HMM for Profiling; applying graph algorithm for protein sequencing
PS 606.2 [E1] : DATA WAREHOUSING AND DATA MINING	
CO 1	List the definitions, concepts and architectures of data warehousing and data mining
CO 2	Demonstrate the impact of business reporting, information visualization and dashboards
CO 3	Explain data mining, support vector machines and text mining.
CO 4	Define social impacts of data mining.
CO 5	Handle classification through statistical methods used in prediction.
PS 606.2 [E2] : BUSINESS INTELLIGENCE & ADVANCED DATA MINING	
CO 1	Identify the major frameworks of business intelligence (BI).
CO 2	List the definitions, concepts and architectures of data mining
CO 3	Demonstrate the impact of business reporting, information visualization and dashboards

CO 4	Handle classification through statistical methods used in prediction.
CO 5	Explain data mining, neural networks, support vector machines, text mining, web mining and social network analysis.
PS 606.2 [E3]: DATA SCIENCE AND ANALYTICS	
CO 1	Use data management techniques to store data
CO 2	Use statistical methods and visualization to quickly explore data
CO 3	Apply statistical and computational analysis to make predictions based on data
CO 4	Implement data-intensive computations on cluster and cloud infrastructures.
CO 5	Effectively communicate the outcome of data analysis using descriptive statistics and visualizations
PS 607. 2 P Advanced Computing and Data Mining Lab	
CO 1	Examine the concepts of data warehousing and OLAP;
CO 2	Apply the concepts of BI and DM techniques for clustering, association, and classification;
CO 3	Understand the operation procedures of BI projects in an organization;
CO 4	Select appropriate DM tools and methods to manipulate and achieve data;
CO 5	Apply DM concepts for formulating business strategies and programs to enhance business intelligence.
PH 608.2: MINI PROJECT AND ADVANCED ENTREPRENURESHIIP	
CO 1	Explore and experience the joy of creating unique solutions to market opportunities
CO 2	Create and exploit innovative business ideas and market opportunities
CO 3	Turn market opportunities into a business plan
CO 4	Build a mind-set focusing on developing novel and unique approaches to market opportunities
CO 5	Demonstrate and present successful work, collaboration and division of tasks in a multidisciplinary and multicultural team
CO 6	Demonstrate understanding and application of the tools necessary to create sustainable and viable businesses
PA 609.2 Seminar & Technical Communication – I	
CO 1	How to Gather, organize, summarize and interpret literature with the purpose of formulating a proposal.

CO 2	Write a technical report summarizing state-of-the-art on an identified topic.
CO 3	Present the study using graphics and multimedia techniques.
CO 4	Define intended future work based on the technical review.
III Semester **PH 601.3 [E1]: FUNCTIONAL PROGRAMMING PARADIG**	
CO 1	Understand the basic fundamentals data types, and function structure required for Haskell programming language.
CO 2	Implementation of functions, loops, arrays, objects, and working with JSON data.
CO 3	Implementation of files, I/O and Buffering.
CO 4	Understand the basic fundamentals object-oriented, Scalars, Collections and functions required for Clojure programming language.
CO 5	Implementation of vectors, list, queues and function for Clojure programming language.
PH 601.3 [E2]: INTERNET OF THINGS AND APPLICATIONS DEVELOPMENT	
CO 1	Understand the basic networking model, internet/Web, networking equipment required for design of IoT.
CO 2	Understand the basic IoT protocols, architecture, reference architecture, data representation, required for design of IoT.
CO 3	Understand the basic of data link layer protocols and their feature for the design of IoT.
CO 4	Understand the basic of user experience in design of IoT and multipurpose computer concepts, sensor for IoT design.
CO 5	Understand the basic of networking, issues, challenges, communication patterns for the IoT design.
PH 601.3 [E3]: AUGMENTED AND VIRTUAL REALITY	
CO 1	Understand the basic fundamental topics to consider for the design of Augment and Virtual Reality.
CO 2	Understand the Software and Hardware needed for Augment and Virtual Reality.
CO 3	Knowledge on fundamentals of Wearable Computers, scope, augmented Reality and their challenges.
CO 4	Knowledge on fundaments of Input, Output interface required for the design of

	Virtual Reality.
CO 5	Knowledge on fundaments of technology, features and visualization techniques required for design of Augment Reality.
PH 602.3 [E1] WEB DEVELOPMENT WITH ANGULAR .JS, NODE .JS	
CO 1	Get introduced in the area of JavaScript's Role in recent web applications.
CO 2	Acquire knowledge about client side java framework angularJs
CO 3	Acquire knowledge about Building Applications using Angular JS.
CO 4	Acquire knowledge about server side framework nodeJS
PH 602.5 [E2] CONTENT MANAGEMENT WITH JOOMLA & WORDPRES	
CO 1	Create and deploy websites using CMS, including creating and editing content, adding functionality, and creating custom templates and themes.
CO 2	Understand ongoing maintenance considerations with CMS websites.
PH 602.3 [E3] Blockchain Technology with Ethereum	
CO 1	Understand what and why of Blockchain
CO 2	Explore the major components of Blockchain
CO 3	Learn about Hyperledger Fabric model and its Architecture
CO 4	Learn about Hyperledger Composer and Explorer
CO 5	Learn about Bitcoin, Ethereum
CO 6	Learn about Ethereum Virtual machine, The Ethereum network. Applications development on Ethereum.
PH 603.3 (E1) Computing with C# and .NET Framewor	
CO 1	Understand what is .NET Framework and how does it work
CO 2	Develop Programs using various C# concepts
CO 3	Design and develop full-fledged UWP applications using C#
CO 4	Use any DB technology and create a dynamic UWP.
CO 5	Gain knowledge in the area of .NET Core and develop applications using .NET Core
PH 603.3 (E2): Web Technologies and .NET Framework	
CO 1	To study the elements of the .NET Framework platform and its working
CO 2	To understand what is ASP.NET and what it has to offer in Web Development
CO 3	Understand the architecture and main classes of ADO.NET, LINQ and EF to develop Data Driven Applications
CO 4	To Develop Web Services using ASP.NET and to understand ASP.NET AJAX and

	MVC
CO 5	To Introduce ASP.NET Core MVC Programming Paradigm
PH 603.3 (E3) Cross Platform Development using .NET Core	
CO 1	Understand what is .NET Framework and Develop Programs using various C# concepts
CO 2	Design and develop full-fledged applications using .NET Core
CO 3	Use DB technologies like Entity Framework and LINQ with .NET Core
CO 4	Create and Deploy Web Applications using ASP.NET Core
CO 5	Develop Professional Websites using ASP.NET Core, ASP.NET MVC Core and Razor View Engine
PH 604.3 P Web Application Development & .NET Lab	
CO 1	Identify important events and individuals in the history of human-computer in terfaces.
CO 2	Design and develop Windows application using different Windows technologie s that use a variety of GUI controls and classes to fulfill specific user requirements.
CO 3	Explain how event driven applications use threading to perform time-consumi ng operations.
CO 4	Demonstrate how to use specific features of the C# programming language to write object-oriented programs and handle run-time errors.
CO 5	Explain in a public presentation how user interfaces should be designed to acc ommodate human physiology and limitations.
PS 605.3 [E1]: Cognitive Computing and Artificial Intelligence	
CO 1	To design applications using computational cognitive neuroscience by applying techniques of cognitive computing and neural network theory
CO 2	To Design intelligent agents for problem solving, reasoning and planning.
CO 3	To implement AI systems with different approaches of knowledge representation, design AI systems with heuristic search techniques
CO 4	To implement AI systems using statistical and symbolic reasoning, designing AI models using Bayes rule
PS 605.3 [E2] : Computational Intelligence and Machine Learning	
CO 1	Gain a working knowledge of knowledge-based systems using neural networks
CO 2	Implement intelligent systems technologies with neural network and fuzzy logic
CO 3	Implement typical computational intelligence systems with various performance metrics and conducting the analysis

CO 4	To implement machine learning models using Bayesian algorithm; implement applications using k-means clustering.
CO 5	To implement machine learning models using decision trees & LDA and analyze the results.
PS 605.3 [E3] Deep Learning and Neural Networks	
CO 1	To implement a neural network for an application of your choice using an available tool
CO 2	To implement different memory network using programming language; develop applications using fuzzy logic.
CO 3	Apply fuzzy logic to many real world problems.
CO 4	To design and implement deep learning models using CNN and RNN
CO 5	To implement deep learning models using autoencoders and transfer learning
PS 606.3 [E1]: BIG DATA ANALYTICS with MAP REDUCE AND HADOOP	
CO 1	Identify and distinguish big data analytics applications from other applications and the use of Big Data.
CO 2	Describe No SQL databases and understanding different concepts related to No SQL and its applications using MongoDB.
CO 3	Understanding Hadoop and its advantage over the traditional database applications in solving practical problems
CO 4	Writing programs using mapper and reducer.
CO 5	Using Hive and Pig for analyzing and querying data and knowing the advantages over the traditional Data handling solutions.
PS 606.3 [E2]: BIG DATA ANALYTICS WITH SCALA AND SPARK	
CO 1	Understand what Functional programming is and will know why classical data analysis techniques are no longer adequate
CO 2	Understand the benefits that Spark and Spark SQL offers for processing structured and unstructured data.
CO 3	Understand conceptually how Spark SQL is used for Data Exploration, Data Munging and Data Streaming.
CO 4	Understand how Spark can be used for Machine Learning.
CO 5	Understand the use of PySparrk and SparkR
PS 606.3 [E3] : BIG DATA VISUALIZATION USING TABLEAU	

CO 1	Knowing the impact of Data visualization techniques and how it helps to better understand the data Topics in information design, interaction design and user engagement.
CO 2	Understand and apply the fundamental concepts and techniques in data visualization
CO 3	Solve specific real-world problems related to the visualization and interpretation of data analysis results using charts and maps.
CO 4	Getting to know Tableau public and using its various features.
CO 5	Working with different real time examples and understanding the impact of visualization in real life situations.
PS 607. 3 P Machine Learning & Big Data Lab	
CO 1	Examine the concepts of data warehousing and OLAP;
CO 2	Apply the concepts of BI and DM techniques for clustering, association, and classification;
CO 3	Understand the operation procedures of BI projects in an organization;
CO 4	Select appropriate DM tools and methods to manipulate and achieve data;
CO 5	Apply DM concepts for formulating business strategies and programs to enhance business intelligence.
PH 608.3 BUSINESS CONSULTANCY PROJECT	
CO 1	Considerably more in-depth knowledge of the major subject/field of study, including deeper insight into current research and development work.
CO 2	Concepts to address specific management needs at the individual, team, division and/or organizational level
CO 3	Practical applications of project management to formulate strategies allowing organizations to achieve strategic goals
CO 4	A perspective of leadership effectiveness in organizations
CO 5	Team-building skills required to support successful performance
CO 6	Critical-thinking and analytical decision-making capabilities to investigate complex business problems to propose project-based solutions
CO 7	Skills to manage creative teams and project processes effectively and efficiently

PA 609.3 SEMINAR AND TECHNICAL COMMUNICATION - II	
CO 1	How to Gather, organize, summarize and interpret literature with the purpose of formulating a proposal.
CO 2	Write a technical report summarizing state-of-the-art on an identified topic.
CO 3	Present the study using graphics and multimedia techniques.
CO 4	Define intended future work based on the technical review.
VI SEMESTER	
PH 601.6 : INDUSTRY INTERNSHIP / PROJECT WORK	
CO 1	Gather,organize,summarizeandinterpretliteraturewiththepurposeofformulating a Research problem and working on it to propose a solution.
CO 2	Writeatechnical papersummarizingstate-of-the-artonanidentifiedtopic.
CO 3	Presentthestudyusinggraphicsandmultimediatechniques.
CO 4	Defineintendedfutureworkbasedonthetechnicalreview.
CO 5	Publish the work in a reputed Journal of interest or present it in an international/national State/Regional conferences.

*****