NETAJI SUBHAS UNIVERSITY

Estd. Under Jharkhand State Private University Act

Ph.D. Course Work Syllabus

(Effective from Academic Session 2020 Onwards)

Dean Academics
Netaji Subhas University
Jamshedpur, Jharkhand

Aims and Objectives:

As per UGC Minimum Standards and Procedure for Award of PhD Degree Regulations, a PhD scholar shall be required to undertake course work for a minimum period of one semester which is compulsory pre-requisite for both full time and part time candidates.

It shall consist of three compulsory papers i.e. Research Methodology, Research and Publication Ethics and Computer Applications which shall cover areas such as quantitative methods, computer basics and applications, Research ethics and review of published research in the relevant field, training, and field work and other areas found relevant to the departments concerned. The two elective departmental papers are also included which will focus on advanced level areas in the subjects concerned for enabling the students to acquire deep understanding of the concepts for the preparation of doctoral degree.

PROGRAM OUTCOME (PO):

- **Advanced Research Skills** – Develop expertise in research methodologies, data collection, and analysis techniques.
- **Critical Thinking & Problem-Solving** – Enhance analytical abilities to evaluate literature and address complex research questions.
- **Subject Matter Expertise** – Acquire in-depth knowledge of the chosen discipline and its theoretical foundations.
- **Academic Writing & Communication** – Improve skills for writing research papers, dissertations, and presenting findings effectively.
- **Ethical Research & Integrity** – Understand and adhere to ethical guidelines in research, including plagiarism and data privacy.
- **Teaching & Pedagogical Skills** – Gain experience in teaching methodologies and mentoring students.
- **Interdisciplinary & Collaborative Research** – Develop the ability to work across disciplines and collaborate with global researchers.
- **Innovation & Impactful Research** – Conduct research that contributes to scientific, technological, and societal advancements.
- **Publication & Knowledge Dissemination** – Learn to publish in reputed journals and present at national and international conferences.
- **Professional & Leadership Development** – Enhance leadership, networking, and project management skills in academia and industry.

PROGRAM SPECIFIC OUTCOME (PSO):

- **Advanced Research Competency** – Develop expertise in formulating research problems, designing methodologies, and conducting independent research.
- **In-Depth Subject Knowledge** – Attain a deep understanding of core and emerging concepts within the chosen discipline.
- **Scholarly Writing & Publication** – Enhance skills for writing high-quality research papers, dissertations, and publishing in reputed journals.
- **Interdisciplinary Research Integration** – Apply knowledge from multiple disciplines to solve complex problems and create innovative research solutions.
- **Ethical & Responsible Research Practices** – Adhere to ethical guidelines, maintain research integrity, and ensure academic honesty.
- **Effective Communication & Presentation** – Develop the ability to present research findings clearly in conferences, seminars, and academic discussions.
- **Teaching & Mentorship Skills** – Acquire pedagogical techniques to effectively teach, mentor, and guide students.
- **Industry & Societal Impact** – Conduct research that contributes to societal development, policy-making, and industry advancements.

Course Structure and Evaluation Scheme:

Course Code	Course Name	Credit	Internal		End Semester	Total Marks
			Assignment	Presentation		
	Common Compulsory course					
PDC-101	Research Methodology	3	20	10	70	100
PDC-102	Research and Publication Ethics	2	10	10	30	50
PDC-103	Computer Application	3	20	10	70	100
	Elective-1					
PDC-104	Elective1	4	20	10	70	100
	Elective-2					
PDC-105	Elective-2	4	20	10	70	100

SYLLABUS

FOR

DEPARTMENT OF EDUCATION

Compulsory Paper – 1st

Name of Paper – Research Methodology
Paper Code: PDC- 101

Course Objective:

This course is designed to empower students with the essential skills and knowledge needed to conduct meaningful research in the field of education. By the end of the course, students will be able to navigate the research process with confidence, from identifying research problems to analyzing data and presenting findings.

- **Building a Strong Foundation in Research** – Understand the fundamental concepts, significance, and different types of research in education.
- **Exploring Research Designs & Methods** – Get hands-on experience with qualitative, quantitative, and mixed-method research approaches.
- **Identifying and Refining Research Problems** – Learn how to ask the right questions and shape research topics that contribute to educational improvements.
- **Mastering Data Collection Techniques** – Discover how to gather valuable information using surveys, interviews, observations, and standardized tests.
- **Analyzing Data Effectively** – Develop the skills to interpret data using statistical methods and qualitative analysis to draw meaningful conclusions.
- **Applying Research to Real-World Education** – Learn how to use research insights to shape policies, enhance teaching strategies, and improve learning outcomes.
- **Leveraging Technology in Research** – Explore modern digital tools and software for data analysis, literature review, and research documentation.
- **Developing a Critical Eye for Research** – Cultivate the ability to critically evaluate existing research for its credibility, relevance, and impact.

Unit-I: Conceptual Framework of Educational Research

- Research as a Process of Acquiring Knowledge
- Meaning, Nature and Scope of Educational Research
- Types of Educational Research: Quantitative Descriptive, Historical/Philosophical, Developmental, Casual comparative, Correlational, Experimental (Weak, true and quasi-experimental and Action Research.
- Qualitative Phenomenology, Ethnography, Case Study, Grounded Theory, Narrative Analysis. (Purpose, Characteristics, Steps with common errors committed in planning and conducting the research).

Unit-II: Planning of Good Research/Preparing and Research Proposal

- Formulation of the problem for research (Sources, Specification, Forming Research Questions ,problem-analysis procedures, evaluation of the Problem)
- Building Rationale for the Study (Review of related literature, identifying the emerging trends from the review, building a strong rationale for selecting the

problem.

- Specifying objectives and hypotheses of the Study.
- Choosing appropriate design and stating the procedure (Selecting appropriate methods, instruments/tools/techniques, deciding about the subjects for the study, conditions for conducting the study including procedures of data collection and data-processing).
- Operational definitions of the concepts and terms used (with the statements of Underlying assumptions, perceived limitations and specific delimitations of the study).

Unit-III: Basic Methods of Educational Research

- Sampling -Types and Techniques of sampling
- Hypothesis and Testing of Hypothesis -Sources of Hypotheses
  -Type of Hypotheses (Null, Directional, Statistics)
  -Characteristics of good hypothesis -Hypothesis
  Testing and Theory -Errors in Testing Hypothesis

Unit-IV: Tools & Techniques of Educational Research

- Tools, preparing, piloting and finalizing.
  -Tests, Tasks, Attitude Scales, Check lists, Questionnaires/ Opinionnaire, Interview Schedules for interview and observation, Inventory, Semantic Differentiate Scale.

  -Use of ICT
- Techniques Observation, Interview, focused Group Discussion, Ethnography, Document Study,
  Anecdotal. Role play and Simulation, Case Study

Unit-V: Preparation of Research Report

- General Guidelines: format, language style, bibliography and appendices
- Format of Research Report (Journal Article, Thesis and Dissertation, Paper at Professional Conferences)
- Preparation of the Manuscript
- Writing style
- APA Reference Style
- Preparation of summary and abstract
- Evaluating and Finalizing the Report (Including the process of converting dissertations and theses for publication as a journal article)
- Research Ethics
- Steps to avoid Plagiarism in Research

Suggested Reading:

- Anfara, Vincent & Mertz Norma T. (2006). *Theoretical Frameworks in Qualitative Research.* SAGE Publication.
- Best J.W. (1986) *Research in Education,* New Delhi: Prentice Hall of India Pvt. Ltd.
- Borg, W.R. and Gall, M.D. (1983) *Educational Research - An Introduction,* New York, Longman, Inc.
- Booch, M.B. (1978) A Survey of Educational Research, CASE, The M.S. University Barodara.
- Broota, K.D., Experimental design in behavioural sciences, New age international publishing house, New Delhi.
- Chohan,L., Manion, L.& Morrison ,K. (2007) Research method in education (6th edition) Routledge ,London.
- Elliott, Jane (2005).Using Narrative in Social Research: Qualitative and Quantitative Approaches. SAGE Publication.
- Fraenkel, J.R., Wallen, N.E. (1983) *How to Design and Evaluate Research in Education,* Singapore: McGraw Hill, Inc.
- Gravetter. F.J. & Wallanau, C.B. (2002). Essentials of Statistics for the Behavioural Sciences (4th edition) Australia, Wodsworth.
- *Grbich, Carol (2006). Qualitative Data Analysis: An Introduction. SAGE Publication.*
- Gupta, Santosh (1983) *Research Methodology and Statistical Techniques,* New Delhi : Deep and Deep Publisher.
- Kerlinger, F.N. (1973) *Foundations of Behavioural Research,* New York : Holt, Rinehart and Winston.
- Kaul, Lokesh (1984) *Methodology of Educational Research,* New Delhi : Vikas Publications.
- Leary, M.R. (2004). Introduction to Behavioural research Methods (4th edition) Boston: Pearson Prentice hall
- *Lichtman, Marilyn (2006). Qualitative Research in Education-A User Guide. SAGE Publication.*
- Srivastava, G.N.P. (1994) *Advanced Research Methodology,* New Delhi : Radha Publications.
- Sidhu, K.S. (1987) *Methodology of Research in Education,* New Delhi: Sterling Publishers Pvt. Ltd.
- Travers, R.M.W. (1969) *An Introduction to Educational Research,* New Delhi: Sterling Publishers Pvt. Ltd.
- Van, Dalen, Debonald, B. and Meyer, William J. (1979) *Understanding Educational Research: An Introduction,* New York: McGraw Hill Co.

COURSE OUTCOME:

- **Understand the Foundations of Educational Research** – Demonstrate a clear understanding of research concepts, significance, and different types of research in education.
- **Design and Conduct Research Studies** – Develop well-structured research designs using qualitative, quantitative, and mixed-method approaches.
- **Identify and Formulate Research Problems** – Define research problems effectively and create research questions that address educational challenges.

- **Apply Data Collection Methods** – Utilize various techniques such as surveys, interviews, observations, and standardized assessments to gather reliable data.
- **Analyse and Interpret Data** – Use statistical tools and qualitative analysis methods to process and interpret research findings accurately.
- **Maintain Ethical Research Practices** – Adhere to ethical guidelines, ensuring integrity, authenticity, and responsible handling of research data.
- **Develop Research Proposals and Academic Reports** – Write well-structured research proposals, literature reviews, theses, and scholarly papers.
- **Apply Research Findings in Educational Settings** – Use research insights to improve teaching methodologies, curriculum design, and education policies.
- **Leverage Technology in Research** – Integrate digital tools and software for data analysis, referencing, and academic writing.
- **Critically Evaluate Research** – Assess the validity, reliability, and relevance of existing educational research to enhance evidence-based practices.

Compulsory Paper – 2nd

Name of Paper - Research & Publication Ethics
Paper Code: PDC-102

Course Objective:

Understand the Fundamentals of Research Ethics – Learn the core principles of ethical research, including honesty, integrity, and transparency in academic work.
Recognize Ethical Issues in Educational Research – Identify ethical concerns such as plagiarism, data fabrication, falsification, and conflicts of interest.
Adopt Responsible Research Practices – Develop skills to conduct research ethically, including informed consent, confidentiality, and participant rights.
Ensure Ethical Data Collection and Management – Understand how to collect, store, and analyze research data responsibly while maintaining accuracy and credibility.
Understand Plagiarism and Copyright Laws – Learn how to avoid plagiarism, properly cite sources, and comply with intellectual property rights.
Navigate the Academic Publishing Process – Gain knowledge of journal selection, peer review systems, and ethical considerations in manuscript submission.
Address Predatory Journals & Misconduct – Learn how to identify predatory publishers and unethical publishing practices.
Develop Ethical Writing & Citation Practices – Master proper citation techniques, reference management, and the use of plagiarism detection tools.

Unit-I: Philosophy and Ethics: Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions

Unit-II: Scientific conduct: Ethics with respect to science and research, Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications, salami slicing, Selective reporting and misrepresentation of data

Unit-III: Publication Ethics: Publication ethics: definition, introduction and importance, Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Unit-IV: Open Access Publication - Open Access Publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal suggester.

Unit-V: Publication misconduct

A. Group Discussion: Subject specific ethical issues, FFP, authorship, Conflict of interest, Complaints and appeals: example and fraud from India and abroad

B. Software tools - Use of plagiarism software like Turnitin, Urkund another open software tools.

Unit-VI: Data Base and Research Matric

A. Data base: Indexing data base, Citation Data base: web of science, Scopus, research scholar, etc.

B. Research matrix : Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, altmetric

Suggested Readings:

- Bird, A. (2006) Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics, London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized,
- ISBN: 978-9387480865.
- National Academy of Science, National Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press

Course Outcome:

- **Understand Ethical Principles** – Demonstrate knowledge of core research ethics and responsible academic conduct.
- **Identify Ethical Issues** – Recognize and address ethical concerns such as plagiarism, falsification, and conflicts of interest.
- **Ensure Integrity in Research** – Conduct research with honesty, transparency, and adherence to ethical guidelines.
- **Apply Ethical Data Practices** – Collect, store, and analyze research data responsibly while maintaining confidentiality.
- **Comply with Copyright & Plagiarism Guidelines** – Properly cite sources and avoid academic misconduct.

Compulsory Paper – 3rd

Name of Paper - Computer Applications
Paper Code: PDC-103

Course Objective:

- **Develop Basic and Advanced Computing Skills** – Understand fundamental and advanced computer applications relevant to educational research.
- **Utilize Word Processing & Documentation Tools** – Learn to format, edit, and manage research documents using software like MS Word and LaTeX.
- **Master Data Analysis Software** – Gain proficiency in statistical and qualitative data analysis tools such as SPSS, R, NVivo, or Excel.
- **Enhance Literature Review Management** – Use reference management tools like Zotero, Mendeley, or EndNote for organizing research papers.

Unit–I: Basic Knowledge of Computer – Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit– II: Computer Applications for Research

Word Processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data Processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defense Seminar).

Unit–III: Use of Different Software for Research– Statistical Package for the Social Sciences (SPSS) and other statistical software for data analysis.

Unit-IV: Use of Internet in Research- Introduction, Evaluating internet resources: Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC info net, INFLIBNET and ERNET, What is Plagiarism and how to avoid it?

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York.

  Rajaram V., Fundamentals of computers, Prentice Hall of India, New Delhi

Course Outcome:

- **Demonstrate Proficiency in Computing Tools** – Apply fundamental and advanced computer applications in educational research.
- **Create and Format Research Documents** – Use word processing software (MS Word, LaTeX) for thesis writing and academic documentation.
- **Analyze Data Using Statistical Software** – Utilize tools like SPSS, R, or NVivo for quantitative and qualitative data analysis.
- **Manage References Efficiently** – Organize and cite research sources using Mendeley, Zotero, or EndNote.
- **Utilize Educational and E-Learning Technologies** – Integrate learning management systems (LMS) and digital teaching tools in research.
- **Manage Data with Spreadsheets** – Use Excel and Google Sheets for organizing, analyzing, and visualizing research data.

Elective – 1st

Name of Paper - Teacher Education

Paper Code – PDC - EDU-104

Course Objective:

- **Understand the Foundations of Teacher Education** – Explore the historical, philosophical, and sociological perspectives of teacher education.
- **Analyze Teacher Education Policies & Reforms** – Examine national and international policies, frameworks, and contemporary reforms in teacher education.
- **Explore Pedagogical Theories & Instructional Strategies** – Gain insights into innovative teaching methodologies, curriculum design, and assessment techniques.
- **Examine Teacher Professional Development** – Understand the role of continuous professional growth, in-service training, and capacity-building programs.
- **Evaluate Quality Assurance in Teacher Education** – Learn about accreditation standards, teacher competency frameworks, and evaluation mechanisms.
- **Research Trends & Issues in Teacher Education** – Identify emerging trends, challenges, and innovations in teacher preparation and training.

Unit-I:

Meaning and Scope of Teacher Education, Aims and Objectives of Teachers education at Elementary, Secondary and Higher Secondary levels, Development of Teacher Education in India before and after Independence, Changing Context of Teacher Education in the Indian and Global Scenario, Role of UGC, NUEPA, NAAC, NCTE, NCERT, SCERT, DIET for the development and innovative approach in Teacher Education.

Unit-II:

Microteaching, Simulation and Interactional Analysis, Role of student teaching in Teacher Education programme, Organisation of Students Teaching: various patterns-internship, integrating theory and practice, Supervision and Evaluation of student Teaching, & Programmed learning, Pre-service and In-service Teacher Education-Objectives, Content, Methods and Evaluation at various levels, Integrated Teacher Education Programme.

Unit-III:

Maintaining standards in Teacher Education- Admission Policies and Procedures for Student Teachers, Recruitment of Teacher educators Issues, Concerns and Problems of Teacher Education in India. National Curriculum Framework-Concerns on Teacher Education, NCFTE-2009, Innovative Practices in Teacher Education: Co-Operative and Collaborative Teacher Education, Constructivist and Reflective Teacher Education, E-Teacher Education, Value-Based Teacher Education, Competency-Based Teacher Education.

Unit–IV:

Teaching as a Profession, Professional Ethics of a Teacher, Performance Appraisal of Teachers, Accountability of Teachers, Research in Teacher Education: Nature, Purpose, Scope, Areas, Problems, and Trends.

Suggested Readings:

- Anand, C.L. (1988). Aspects of Teacher Education. Delhi: S. Chand and Co.
- Mukerjee, S.N. (1988). Education of the Teacher in India, Vol. I & Vol. II, Delhi: S. Chand and Co.
- NCTE (1978). Teacher Education Curriculum-A Framework, New Delhi: NCERT.
- Panda, B.N & Tewari, A.D(1997). Teacher Education, New Delhi: A.P.H. Publishing Corporation.
- Pareek, R. (1996). Role of Teaching Profession, Guwahati: Eastern Book House.
- Passi, B. K. (1976). Becoming a Better Teacher, microteaching Approach, Amedabad: Sahitya Mudranalaya
- Raina, V.T. (1998). Teacher Education: A Perspective, Guwahati: Eastern Book House.
- Singh, L.C. (ed) (1990). Teacher Education In India- A Resource Book, New Delhi: NCERT.
- Tibble, J.W. (ed) (1995). The future of Teacher Education, London: Routledge and Kegan Paul.
- Caggart, G.L. (2005).Promoting Reflective Thinking in Teachers. Crowin Press.
- Joyce, B., and Weal, M. (2003).Models of Teaching (7Ed.).
- Lampert, M. (2001). Teaching problems and the problems of teaching. New Haven: Yale University Press.
- Linda Darling Hammond & John Bransford (Ed.) (2005).Preparing Teachers for a Changing World. Jossey-Bass, San Francisco.
- Martin, D. J. & Kimberly S. Loomis (2006).Building Teachers: A constructivist approach to introducing education. Wadsworth Publishing, USA.
- Martin, R.J. (1994). Multicultural Social Reconstructionist education: Design for diversity in teacher education. Teacher Education Quarterly 21(3)77-89, EJ 492(4).
- Mohanty, J. (2003). Teacher Education. Deep and Deep, New Delhi Publications Pvt. Ltd.
- NCERT (2005). National Curriculum Framework. New Delhi.
- NCERT (2006). Teacher Education for Curriculum renewal. New Delhi.
- NCTE (1998). Perspectives in Teacher Education. New Delhi.
- NCTE (2014). NCTE New Norms and Regulation, 2014. New Delhi.

Course Outcome:

- **Demonstrate an In-Depth Understanding of Teacher Education** – Analyze the historical, philosophical, and sociological foundations of teacher education.
- **Evaluate Educational Policies & Reforms** – Critically examine national and global policies, frameworks, and reforms in teacher education.
- **Apply Pedagogical Theories in Practice** – Integrate innovative teaching-learning strategies, curriculum design, and assessment techniques.
- **Promote Teacher Professional Development** – Design and implement teacher training, mentoring, and professional development programs.

- **Assess Quality Assurance Mechanisms** – Evaluate accreditation standards, teacher competency models, and performance assessment methods.
- **Engage in Advanced Research on Teacher Education** – Conduct high-quality research addressing contemporary challenges and innovations in teacher training.
- **Integrate Technology in Teacher Education** – Utilize ICT tools, e-learning platforms, and digital pedagogies for teacher training.
- **Develop Leadership & Policy-Making Abilities** – Contribute to policy formation, institutional management, and educational leadership in teacher education.

Elective - 2nd

Name of Paper- Educational Assessment and Evaluation
Paper Code- PDC -EDU-105

Course Objective:

- **Understand the Principles of Assessment and Evaluation** – Gain a solid foundation in the key concepts, purposes, and significance of educational assessment.
- **Explore Various Assessment Approaches** – Examine formative, summative, diagnostic, and competency-based assessment models.
- **Analyze Measurement Techniques** – Learn about standardized testing, performance-based assessments, rubrics, and alternative evaluation methods.
- **Interpret and Utilize Assessment Data** – Develop skills in data analysis, interpretation, and decision-making for educational improvement.
- **Integrate Technology in Assessment** – Understand the role of digital tools, AI, and online platforms in modern assessment practices.

Unit- I: Overview of Assessment and Evaluation

Scales of Measurement: Nominal, Ordinal, Interval and Ratio.
Concept of Test, Assessment, Measurement and Evaluation, Functions of Evaluation and the basic principles of Evaluation. Types and purpose of evaluation -Placement, formative, diagnostic, Summative, Types of test -Teacher made, standardized, Norms referenced Vs criterion referenced test, Continuous and Comprehensive Assessment.

Unit-II: Criteria of a Good Test and Procedure for Test Construction

Reliability: Concept, Nature, Methods of Determining Reliability, Factors influencing the Reliability and Relationship between Reliability and Validity.

Validity: Concept, Nature, Methods of ascertaining Validity and Factors affecting Validity.
Norms: Meaning, Significance, Types- Age norms, Grade Norms, Percentiles, Z- Scores, T-scores. Construction and standardization of an achievement test including item analysis, Construction of Attitude Scales by Likert Method.

Unit-III: Tools of Measurement and Evaluation

Bloom's Taxonomy of Educational Objectives (Cognitive, Affective and Psychomotor) Subjective and Objective tools; Essay tests, Objective type tests, Scales, Questionnaires, Schedules, Inventories.
Statistical Interpretation of Data : Classification and tabulation of data, frequency distribution, Diagrammatic and graphical presentation of data, measures of central tendency, measures of dispersion, correlation, regression analysis, measures of Variability, standard error, parametric and non-parametric statistics, chi square Test, NPC, ANOVA(up to two way) and socio-matric Test

Unit–IV: New Trends in Evaluation

Grading, Semester system, Open Book Examination, Question Bank, Online examination and uses of computers in evaluation.

Suggested Readings:

- Anastasi A. (1976).Psychological Testing (4th edition). New York: McMillan Pub Co.
- Ansatassi, A. and Urbina, S. (2005). Psychological testing. Singapore: PearsonEducation.
- Atkin, L.R. (2000). Psychological Testing and Measurement. London: Allyn and Bacon.
- Bloom B.S & Other (1976).Handbook of Formative and Summative Evaluation ofStudent Learning. New York: McGrew Hill Book Co.
- bel, R. L. and Frisbee (1979). Educational Achievement. Singapore: PearsonEducation.
- Edwards, A.L. (1975).Techniques of Attitude Scale Construction. Bombay: Ferfter & Semens Pvt Ltd.
- Fetsco, T and McClure, J (2005). Educational Psychology: An Integrated Approach toClassroom Decisions. U.S.A.: Pearson Education.
- Gronlund, N.E. and Linn, R.L. (2003). Measurement and Assessment in Teaching, Singapore: Pearson Education.
- Harper (Jr.), A.F & Harper, E.S (1990).Preparing Objective Examination: A Handbook for Teachers, Students and Examiners.New Delhi: Prentice Hall.6
- Linn, R.L. and Miller, M.D. (2005).Measurement and Assessment in Teaching .U.S.: Pearson Education.
- Reynolds, C.R., Livingstone, R.B. and Wilson, V. (2005). Measurement and Assessment in Education.

Course Outcome:

- **Demonstrate a Strong Understanding of Assessment Principles** – Explain key concepts, purposes, and significance of educational assessment and evaluation.
- **Differentiate Between Assessment Approaches** – Analyze and apply formative, summative, diagnostic, and competency-based assessment models.
- **Utilize Various Measurement Techniques** – Implement standardized tests, performance-based assessments, and alternative evaluation methods effectively.
- **Interpret and Apply Assessment Data** – Use statistical and qualitative analysis techniques to interpret data for improving educational practices.
- **Leverage Technology in Assessment** – Incorporate digital tools, AI-driven platforms, and online assessments in evaluation processes.

Elective Paper-3rd

Name of Paper-Philosophical, Psychological and Sociological Foundations of Education

Paper Code-PDC-EDU-106

Course Objective:

- **Understand the Philosophical Foundations of Education** – Explore major educational philosophies, their historical evolution, and their influence on modern educational practices.
- **Examine Psychological Theories of Learning** – Analyze key psychological principles related to cognitive development, motivation, and learning processes in education.
- **Explore the Sociological Perspectives on Education** – Understand the role of education in society, including socialization, equity, and the impact of cultural and social factors on learning.
- **Critically analyse the Interconnections between Philosophy, Psychology, and Sociology** – Evaluate how these disciplines collectively shape educational policies, curriculum development, and teaching methodologies.

Unit -I: School of Philosophy and Indian Thinkers

- Idealism, Realism, Naturalism, Pragmatism, Existentialism
- Sankhya, Vedanta, Buddhism, Jainism
- Swami Vivekananda, Rabindranath Tagore, Sri Aurobindo, Mahatma Gandhi

Unit -II: Intelligence, Creativity and Learning

- Intelligence: meaning, theories of measurement, multiple intelligence, artificial intelligence
- Creativity: meaning, process, identification, measurement & fostering
- Learning: Thorndike's connectionism; Pavlov's classical and Skinner's operant conditioning; Learning by insight; Hull's Reinforcement Theory and Tolman's theory of learning, Lewin's Field Theory, Gagne's hierarchy of learning, Factors influencing learning, Transfer of learning and its theories.

Unit -III: Childhood, Adolescence and Adulthood

- Physical development, Cognitive Development and Social Development
- Nature versus Nurture
- Challenges during Childhood, Adolescence and Adulthood

Unit- IV: Sociology and Socialization

- Education as related to modernization, culture and democracy
- Education as related to social stratification and social mobility
- Education as related to social equity and quality of educational opportunities

Suggested Readings:

- Pandey, R.S. (1982). An Introduction to Major Philosophies of Education. Agra: Vinod Pustak Mandir.
- Taneja, V.R. (2005). Foundation of Education. Chandigarh: Abhishek Publishers.
- Walia, J.A. (2011). Philosophical, Sociological and Economic Bases of Education. Jalandhar: Ahim Paul Publishers.
- Pandey, R.S. (2013). Education in Emerging Indian Society. Agra: Aggarwal Publications.
- Pandey, R.S. (1997). East West Thoughts on Education. Allahabad: Horizon Publishers.
- Sodhi T.S. & Suri A. (1998). Philosophical and Sociological Foundation of Education. Patiala: Bawa Publications.
- Gupta, Rainu (2011). Philosophical, Sociological and Economic Bases of Education. Ludhiana: Tondon Publications.

Course Outcome:

- **Analyze Major Educational Philosophies** – Critically evaluate different philosophical perspectives and their influence on educational thought and practice.
- **Apply Psychological Theories to Learning and Teaching** – Utilize principles of cognitive, behavioral, and constructivist psychology to enhance teaching and learning processes.
- **Examine the Social Functions of Education** – Understand the role of education in shaping society, promoting social mobility, and addressing issues of equity and inclusion.
- **Evaluate the Interdisciplinary Nature of Education** – Integrate philosophical, psychological, and sociological perspectives to address contemporary educational challenges.
- **Conduct Research on Educational Theories and Practices** – Apply foundational knowledge to research studies, policy analysis, and curriculum development.
- **Critically Reflect on Educational Policies and Reforms** – Assess how historical, cultural, and social contexts influence education systems and contribute to policy-making.

SYLLABUS
FOR
DEPARTMENT OF LAW

Compulsory Paper: 1st

Name of Paper: Research Methodology
Paper Code: PDC- 101

Course Objective:

- **Understand Legal Research Foundations** – Explore the principles, scope, and significance of research in the field of law.
- **Examine Research Methods in Law** – Analyze doctrinal, empirical, and socio-legal research methodologies.
- **Develop Skills in Legal Data Collection & Analysis** – Utilize case laws, statutes, legal databases, and qualitative and quantitative techniques.
- **Ensure Ethical & Academic Integrity in Legal Research** – Follow ethical guidelines, citation standards, and avoid plagiarism.
- **Apply Research Findings to Legal Policy & Practice** – Contribute to legal scholarship, policy-making, and judicial reforms through evidence-based research.

Unit-I: Introduction

Development of Legal Research in India. Meaning and importance of Research, Types of Research, Challenge for conducting research, Inter-disciplinary research and legal research models, Arm chair research vis-a-vis empirical research, Legal research-common law and civil law legal systems, how to formulate Research Problem.

Unit-II: Research Design

Meaning and Definition of Research Design, Various types of Research Design, Importance, Research Design in Qualitative and Quantitative Design with illustration, Major steps in research design, Literature Review and its steps, Hypothesis-formulation and evaluation and how to write Hypothesis.

Unit-III: Research Techniques

Sampling- Meaning, Definition, Various form of Sampling, Principle of Sampling. Survey and Case Study method

Unit-IV: Method and Techniques Of Legal Research/Studies

Observation, Interview and schedule, Questionnaire, Survey, Case Study Method, Scaling and Content Analysis and interpretation of data, Online Legal Research–Use of Electronic Databases

Unit-V: Legal Writing

Research Proposal and its Content with exercise; Report/Article writing & legal research, Citation methodology and Bibliography, Book review and case comments.

Suggested Readings:

- Robert Watt- Concise book on Legal Research
- Good and Hatt- Research Methodology
- Earl Babbie- Research Methodology
- S.K. Verma & Afzal Wani- Legal Research Methodology
- Dr C R Kothari-Research Methodology
- Dr. Mohan Kumar- Research Methodology

Course Outcome:

- **Demonstrate a Comprehensive Understanding of Legal Research** – Apply fundamental principles and methodologies in legal research and analysis.
- **Employ Appropriate Research Methods** – Utilize doctrinal, empirical, and socio-legal research techniques effectively in legal studies.
- **Analyze and Interpret Legal Data** – Evaluate case laws, statutes, and legal documents using qualitative and quantitative research tools.
- **Ensure Ethical and Academic Integrity** – Adhere to ethical guidelines, proper citation methods, and plagiarism-free research practices.
- **Contribute to Legal Scholarship and Policy Development** – Produce well-structured research papers, theses, and policy recommendations based on rigorous legal research.
- **Apply Research Skills to Contemporary Legal Issues** – Address real-world legal challenges by integrating theoretical knowledge with practical legal research.

Compulsory Paper –2nd

Name of Subject - Research and Publication Ethics
Paper Code: PDC-102

Course Objective:

- **Understand the Fundamentals of Research Ethics** – Explore ethical principles, integrity, and responsible conduct in legal research.
- **Examine Ethical Issues in Legal Scholarship** – Analyze plagiarism, authorship rights, conflict of interest, and intellectual property concerns in legal publications.
- **Develop Awareness of Research Misconduct** – Identify and prevent unethical practices such as falsification, fabrication, and misrepresentation of data.
- **Learn Publication Ethics and Best Practices** – Understand peer review processes, citation standards, and ethical guidelines for publishing legal research.

Unit–I: Philosophy and Ethics:
Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions

Unit-II: Scientific Conduct:

Ethics with respect to science and research, Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications, salami slicing, Selective reporting and misrepresentation of data

Unit-III: Publication Ethics:

Publication ethics: definition, introduction and importance, Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Unit-IV: Open Access Publication -:

Open Access Publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal suggester

Unit-V: Publication misconduct

A. Group Discussion: Subject specific ethical issues, FFP, authorship, Conflict of interest,Complaints and appeals: example and fraud from India and abroad
B. Software Tools: Use of Plagiarism Software like Turnitin, Urkund another open software tools.

Unit-VI: Data Base and Research Matric

A. Data base: Indexing data base, Citation Data base: web of science, Scopus, research scholar, etc.
B. Research matrix: Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, Altmetrics

Suggested Readings:

- Bird, A. (2006)Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics, London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized, ISBN: 978-9387480865.
- National Academy of Science, national Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press

Course Outcome:

- **Demonstrate a Strong Understanding of Research Ethics** – Apply ethical principles and integrity in conducting legal research.
- **Identify and Prevent Research Misconduct** – Recognize plagiarism, data falsification, and fabrication in legal scholarship.
- **Follow Ethical Guidelines in Legal Publications** – Adhere to proper citation methods, authorship norms, and intellectual property rights.
- **Understand the Peer Review and Publishing Process** – Navigate journal selection, peer review standards, and open-access publishing in law.
- **Ensure Compliance with National and International Ethical Standards** – Apply legal and institutional guidelines for ethical research and publication.
- **Promote Transparency and Accountability in Legal Research** – Uphold responsible conduct, data accuracy, and fairness in academic contributions.

Compulsory Paper – 3rd

Name of Paper - Computer Applications

Paper Code: PDC-103

Course Objective:

- **Understand the Role of Technology in Legal Research** – Explore how digital tools, databases, and software enhance legal research and analysis.
- **Develop Proficiency in Legal Research Databases** – Learn to navigate platforms like Westlaw, LexisNexis, SCC Online, and Manupatra for case law and statutory research.
- **Apply Data Management and Analysis Tools** – Utilize software for organizing legal documents, citation management, and data analysis in legal research.
- **Enhance Legal Writing and Publication Skills** – Use word processing, referencing tools, and plagiarism detection software for academic writing.

Unit-I: Basic Knowledge of Computer

Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit-II: Computer Applications for Research

Word Processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defense Seminar).

Unit-III: Use of Different Software for Research

Statistical Package for the Social Sciences(SPSS) and other statistical software for data analysis.

Unit-IV: Use of Internet in Research

Introduction, Evaluating internet resources: Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC infonet, INFLIBNET and ERNET, What is

Plagiarism and how to avoid it?

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York.
- Rajaram V., Fundamentals of computers, Prentice Hall of India, New Delhi.

Course Outcome:

- **Effectively Use Legal Research Databases** – Navigate platforms like Westlaw, LexisNexis, SCC Online, and Manupatra for advanced legal research.
- **Apply Digital Tools for Legal Writing and Citation** – Utilize word processing, referencing software (Zotero, EndNote), and plagiarism detection tools for academic writing.
- **Analyze Legal Data Using Technology** – Employ data management and analysis tools to interpret case laws, legislation, and legal trends.
- **Enhance Legal Document Management** – Organize and manage legal files, e-libraries, and case repositories using digital tools.
- **Understand the Role of Emerging Technologies in Law** – Explore AI, blockchain, and legal analytics for advancing legal research and practice.

Elective Paper – 1st

Name of Paper - Indian Constitutional Law- New Dimension
Paper Code: PDC-LAW 104

Course Objective:

- **Explore the Evolution of Constitutional Law** – Analyze the historical development and dynamic nature of the Indian Constitution in response to contemporary challenges.
- **Examine Emerging Constitutional Doctrines** – Study new interpretations, judicial trends, and landmark rulings that have expanded constitutional jurisprudence.
- **Understand Fundamental Rights and Socio-Legal Issues** – Assess the evolving scope of fundamental rights, directive principles, and their impact on governance and social justice.
- **Analyze the Role of Judiciary in Constitutional Development** – Evaluate judicial activism, public interest litigation, and transformative constitutionalism in shaping legal reforms.

Unit-I: Constitutionalism

Creation of New state, Centre state relation, Distribution of powers between them. Election and electoral reform. Parliamentary and Presidential form of Government, Nature of Government—Unitary and Federal.

Unit-II: Fundamental Rights

Emerging shades of Fundamental Rights through changing society, right to equality Freedom of Speech and expression and reasonable restriction, Changing dimension of Protection of Life and personal liberty in contemporary times.

Unit-III: Indian Judicial System

Judicial Independence, Judicial Activism and Judicial Restraint –PIL, Power of Judicial Review.

Unit-IV: The Federalism

Concept and Development of Federalism, Essentials, Indian Federalism, Doctrine of Pith & Substance, Repugnancy, Eclipse, Colorable Legislation.

Unit-V: Good Governance

Principle of Good Governance—administrative responsibility and accountability Liability of state in torts-Constitutional torts and compensatory jurisprudence Right of Minorities under Constitution. Empowerment of Women.

Suggested Reading:

- H.M. Seervai : Constitutional Law of India, 3rd edition. pp. 133-44
- M. Hidayatullah : Constitutional Law of India, Vol. I, pp. 13-14
- M. Ghouse : Society and Law in India (1973)

- . M.P. Jain : Constitution of India, pp. 340-42
- Faizan Mustafa : Constitution & Article 356 (Chapter 1, II, V)
- D.D. Basu : Constitution of India
- V.N. Shukla : Constitution of India
- J.N. Pandey : Constitution of India
- B.K. Sharma : Introduction to the Constitution of India

Course Outcome:

- **Critically Analyze the Evolution of Indian Constitutional Law** – Examine historical developments, amendments, and judicial interpretations that have shaped constitutional principles.
- **Evaluate Emerging Constitutional Doctrines** – Understand and apply concepts like constitutional morality, transformative constitutionalism, and the basic structure doctrine.
- **Interpret Fundamental Rights and Directive Principles** – Assess their evolving scope in light of contemporary socio-legal issues and judicial pronouncements.
- **Examine the Role of the Judiciary in Constitutional Interpretation** – Analyze the impact of judicial activism, public interest litigation, and landmark Supreme Court decisions.
- **Address Contemporary Constitutional Challenges** – Explore issues related to federalism, privacy, digital governance, environmental rights, and socio-political conflicts.
- **Contribute to Scholarly Research in Constitutional Law** – Conduct independent research that advances constitutional jurisprudence and informs policy reforms.

Elective Paper - 2nd

Name of Paper - Legal Thought and Interpretation
Paper Code: PDC-LAW 105

Course Objective:

- **Understand the Evolution of Legal Theories** – Explore classical and modern legal philosophies, including natural law, positivism, realism, and critical legal studies.
- **Examine Principles of Statutory and Constitutional Interpretation** – Analyze different methods of interpreting legal texts, such as literal, purposive, and harmonious construction.
- **Critically Evaluate Jurisprudential Concepts** – Study fundamental legal concepts like justice, rights, duty, and sovereignty in relation to legal interpretation.
- **Analyze the Role of Judiciary in Legal Interpretation** – Understand how courts shape legal principles through precedents, judicial reasoning, and evolving interpretations.

Unit-I: Introduction and its Development

Bentham's theory of Utility and its relevance, Rules of Interpretation and Aid of Interpretation, Concept of Eternal and Moral Values, Relation between law and morality.

Unit-II: Feminism and Legal Development

Concept of Feminism- Post-modernism, Feminism, Critical Legal Studies, Race theory, Constitutional and legal right, Crime against Women.

Unit-III: Concept of Development of Law and Interpretation

Concept, nature and characteristic features of Analytical School of Jurisprudence, Bentham's contribution to Analytical Jurisprudence John Austin's command and sovereignty theory and Kelsen's theory of Law, H.L.A Hart's legal system and Dworkin_s theory of adjudication

Unit-IV: Historical Development of Law and Interpretation

Characteristic features of Historical School of Jurisprudence, Von Savigny's theory of Law Henry Maine's historical materialism, Concept of status to contract and vice-versa.

Unit-V: Sociological development of Law and Interpretation

Sociological development of Law as an instrument, Amendment of law as per changing dimension for all vulnerable group (National and International perspective), Contribution of Rosco pound

Suggested Readings:

- Freeman, M.D. A., Lloyd's Introduction to Jurisprudence (Sweet & Maxwell, London, 2001)
- Dias, R.W. M, Jurisprudence, (Lexis Nexis, Gurugram India, 5th edn. 2013)
- J. Salmond, Jurisprudence (Sweet & Maxwell, 12th Edn. 1966)
- B.N.M. Tripathi, An Introduction to Jurisprudence and Legal theory, (Allahabad Law Agency, Allahabad, 2013)
- SURI RATNAPALA, JURISPRUDENCE, (CAMBRIDGE UNIVERSITY PRESS, NEW YORK, IIND EDN. 2013) 6. E.W. Patterson, Jurisprudence (edn. 1st. 1952)
- Julius Stone, Social Dimension of Law and Justice (1996, Australia)
- Roscoe Pound, An Introduction to Philosophy of Law (ed. 1954, London)

Course Outcome:

- **Demonstrate a Comprehensive Understanding of Legal Theories** – Analyze classical and contemporary schools of legal thought and their relevance to modern law.
- **Apply Principles of Legal Interpretation** – Utilize different methods of statutory and constitutional interpretation in legal analysis and research.
- **Critically Evaluate Jurisprudential Concepts** – Assess key legal concepts such as justice, rights, rule of law, and sovereignty in various legal frameworks.
- **Analyze Judicial Reasoning and Precedents** – Examine how courts interpret laws, establish legal doctrines, and influence legal developments.
- **Address Contemporary Legal Challenges through Interpretation** – Apply legal reasoning to issues in human rights, governance, and socio-political debates. **Contribute to Advanced Legal Research and Scholarship** – Develop scholarly work that critically engages with legal thought and interpretation in evolving legal systems.

Elective Paper-3rd

Name of Paper-Recent Legal Trends

Paper Code- PDC-LAW-106

Course Objective:

- **Analyze Emerging Legal Developments** – Explore contemporary changes in national and international law, including evolving judicial precedents and legislative reforms.
- **Examine the Impact of Globalization on Legal Systems** – Understand how international treaties, trade laws, and human rights frameworks influence domestic legal structures.
- **Investigate Technological Advancements in Law** – Study the legal implications of artificial intelligence, cybersecurity, digital privacy, and blockchain in governance and legal practice.
- **Evaluate Socio-Legal Issues and Policy Responses** – Assess legal responses to pressing social challenges such as environmental protection, gender justice, and corporate accountability.

Unit – I: Recent trends in Environmental & Labour law :

Climate Change and Sustainable Development , National Policies and Legislation ,Environmental Protection Measures ,Measures for Economic and Social Development , Institutional Structure ,Trade Regulation and Environment.

Unit – II :Intellectual Property Rights :

Recent international and national Trends in Intellectual Property Rights , Issues and challenges relating to Patent ,Copyright Protection: Ethical and Legal Challenges , Farmer's Rights Protection ,Geographical Indication Registration and Protection , Protection of Bio-Diversity.

Unit – III: Recent Socio-legal trends:

Ethics, Morality and Law, Inter- relationship between Law and Modernization in a developing society, Modern Challenges to Legal Formalism and Recent Legal Theories: Critical Legal Studies; Feminism; Postmodernism, Emerging Regime of New Rights and Remedies , Alternative Dispute Resolution: Lok Adalats, Nyaya Panchayaths, Legal Aid

Unit-IV: Emerging trends and Challenges in Cyber Law:

International Cyber Law , Challenges in mobile laws , Cyber Crimes and cyber security ,Cloud computing and law , Social media and legal problems , Spam laws

Unit – V : Compensatory jurisprudence:

The Motor Vehicles Act, 1988 ,The Criminal Procedure Code, 1973 , The Probation of Offender Act, 1958, The Constitutional Remedies for Human Rights Violation.

Suggested Readings:

- Allen, C.K. : Law in the Making (1961)
- Baxi, Upendra : Towards a Sociology of Indian Law (1986)
- Collins, Hugh : Marxism and Law (1982)
- Maine, Henry : Ancient law (1900)
- Miller, D. : Social Justice (1976)
- V.D. Mahajan, Jurisprudence and Legal Theory, (5th ed.), Eastern Book Co., Lucknow, 2005
- U.Baxi, The Crisis of the Indian Legal System (1982) Vikas, New Delhi 15.

Course Outcome:

- **Demonstrate an In-depth Understanding of Emerging Legal Trends** – Analyze recent legislative developments, judicial decisions, and evolving legal doctrines.
- **Evaluate the Influence of Globalization on Legal Frameworks** – Assess the impact of international treaties, trade agreements, and human rights conventions on domestic laws.
- **Apply Legal Analysis to Technological Innovations** – Examine legal challenges related to artificial intelligence, cybersecurity, digital privacy, and blockchain regulations.
- **Critically Assess Socio-Legal Issues** – Investigate contemporary legal concerns such as environmental law, gender justice, and corporate governance reforms.
- **Develop Advanced Legal Research and Policy Recommendations** – Conduct research on legal reforms and contribute to scholarly discussions on pressing legal challenges.
- **Enhance Legal Scholarship and Professional Expertise** – Produce well-researched academic papers and policy critiques that address contemporary legal issues.

SYLLABUS
FOR
DEPARTMENT OF INFORMATION TECHNOLOGY

Compulsory Paper -1st

Name of Paper- Research Methodology

Paper Code: PDC-101

Course Objective:

- **Understand the Fundamentals of Research in IT** – Explore key research concepts, methodologies, and the significance of systematic inquiry in information technology.
- **Develop Proficiency in Research Design and Techniques** – Learn qualitative, quantitative, and mixed-method research approaches relevant to IT studies.
- **Apply Data Collection and Analysis Methods** – Utilize statistical tools, machine learning models, and big data analytics for IT research.
- **Ensure Ethical and Scholarly Integrity in Research** – Adhere to ethical guidelines, plagiarism prevention, and responsible data handling in IT research.

Unit-I: Meaning of Research :

Meaning, Aims, Nature and Scope of research; Prerequisites of research; Types of Research.

Unit-II: Research Problem -:

Meaning of Research Problem; Sources of research problem; Characteristics of a good research problem; Hypothesis: Meaning and types of hypothesis; Research proposal or synopsis.

Unit-III: Methods of Research Studies:

Qualitative and Quantitative research methods.

Unit-IV: Review of Related Literature:

Purpose of the review; Identification of the related literature; Organizing the related literature.

Unit-V: Data Collection (Sampling):

Population and sample, Characteristics of a good sample; Techniques of sample Selection; Types of data in research.

Unit-VI: Tools of Data Collection :

Characteristics of good research; Types of data collection tools.

Unit-VII: Descriptive Statistics:

Tabulation, Organization, and Graphical Representation of Quantitative data; Measures of Central Tendencies: Mean, Median, Model; Measures of Variability: Range, Quartile Deviation, Standard Deviation.

Unit-VIII: Research Report - Format of the research report; Style of writing the report

Suggested Reading:

- Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
- Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
- Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
- Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
- Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.
- Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.

Course Outcome:

- **Demonstrate a Strong Understanding of Research Methodologies** – Apply qualitative, quantitative, and mixed-method approaches to IT research.
- **Develop Effective Research Designs** – Formulate well-structured research problems, hypotheses, and methodologies for IT-based studies.
- **Utilize Advanced Data Collection and Analysis Techniques** – Implement statistical tools, machine learning models, and big data analytics in IT research.
- **Ensure Ethical and Responsible Research Practices** – Adhere to academic integrity, plagiarism prevention, and ethical guidelines in IT research.
- **Enhance Academic Writing and Publishing Skills** – Produce high-quality research papers, technical reports, and conference publications in IT.
- **Apply Research Findings to Real-World IT Challenges** – Contribute to innovative solutions in software engineering, cybersecurity, artificial intelligence, and emerging technologies.

Compulsory Paper - 2nd

Name of Subject - Research and Publication Ethics

Course Code: PDC-102

Course Objective:

- **Understand the Fundamentals of Research Ethics** – Explore ethical principles, integrity, and responsible conduct in IT research and scholarly publishing.
- **Identify and Prevent Research Misconduct** – Learn about plagiarism, data falsification, fabrication, and unethical authorship practices in IT research.
- **Examine Ethical Guidelines for Publishing** – Understand peer review processes, citation standards, open-access publishing, and intellectual property rights.
- **Ensure Compliance with Data Privacy and Security Regulations** – Apply ethical considerations related to cybersecurity, data protection laws, and responsible AI research.

Unit–I: Philosophy and Ethics:

Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Unit-II: Scientific Conduct:

Ethics with respect to science and research, Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications, salami slicing, Selective reporting and misrepresentation of data.

Unit-III: Publication Ethics:

Publication ethics: definition, introduction and importance, Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and types Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Unit-IV: Open Access Publication :

Open Access Publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal.

Unit-V: Publication Misconduct

A. Group Discussion: Subject specific ethical issues, FFP, authorship, Conflict of interest, Complaints and appeals: example and fraud from India and abroad

B. Software Tools: Use of Plagiarism software like Turnitin, Urkund another open software tools.

Unit -VI: Data Base and Research Matric

A. Data base: Indexing data base, Citation Data base: web of science, Scopus, research

scholar, etc.

B. Research Matrix: Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, altmetrics

Suggested Readings:

- Bird, A. (2006)Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics, London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized, ISBN: 978-9387480865.
- National Academy of Science, National Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press.

Course Outcome:

- Demonstrate **a Strong Understanding of Research Ethics** – Apply ethical principles and responsible conduct in IT research and academic writing.
- Identify **and Prevent Research Misconduct** – Recognize and avoid plagiarism, data falsification, fabrication, and unethical authorship practices.
- Follow **Ethical Guidelines in Scholarly Publishing** – Adhere to peer review standards, citation norms, open-access policies, and copyright regulations.
- Ensure **Data Privacy and Security Compliance** – Implement ethical practices in handling sensitive IT research data, cybersecurity concerns, and AI-driven studies.
- Enhance **Integrity and Transparency in Research** – Uphold academic honesty, conflict-of-interest policies, and responsible reporting of research findings.
- Contribute **to High-Quality Research Publications** – Develop and publish ethical, well-structured research papers in reputed IT journals and conferences.

Compulsory Paper -3rd

Name of Paper - Computer Applications
Paper Code: PDC-103

Course Objective:

- **Develop Advanced Computational Skills** – Gain proficiency in using programming languages, data analysis tools, and software applications for IT research.
- **Enhance Research Productivity with Digital Tools** – Utilize specialized software for literature review, reference management, and research documentation.
- **Apply Data Science and Machine Learning Techniques** – Use statistical and AI-driven tools for data processing, visualization, and predictive modeling in IT research.
- **Understand High-Performance Computing and Cloud Technologies** – Explore distributed computing, cloud platforms, and big data frameworks for large-scale IT research projects.

Unit-I: Basic Knowledge of Computer:

Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit-II: Computer Applications for Research:

Word Processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data Processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing.

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defense Seminar).

Unit-III: Use of Different Software for Research:

Statistical Package for the Social Sciences (SPSS) and other statistical software for data analysis.

Unit-IV: Use of Internet in Research- Introduction, Evaluating internet resources: Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC infonet, INFLIBNET and ERNET.

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York
- Rajaram V., Fundamentals of computers, Prentice Hall of India, New Delhi

Course Outcome:

- **Effectively Utilize Advanced Computing Tools** – Apply programming languages, data analytics software, and research-oriented applications in IT studies.
- **Enhance Research Efficiency with Digital Tools** – Use reference management, document automation, and collaboration platforms for academic research.
- **Analyze and Interpret Data Using Computational Methods** – Employ statistical software, machine learning models, and big data tools for IT research.
- **Implement Cloud and High-Performance Computing Solutions** – Utilize distributed computing, cloud services, and virtualization techniques in large-scale IT research.
- **Ensure Cybersecurity and Data Privacy Compliance** – Apply encryption, ethical hacking, and regulatory standards to safeguard research data.

Elective Paper - 1st

Name of Paper - Software Design and Engineering

Paper Code – PDC-IT- 104

Course Objective:

- **Understand Advanced Software Engineering Principles** – Explore modern software development methodologies, design patterns, and best practices for scalable systems.
- **Develop Efficient and Optimized Software Architectures** – Learn to design robust, modular, and high-performance software systems using advanced architectural frameworks.
- **Apply Research-Oriented Software Development Techniques** – Utilize empirical research methods, algorithm analysis, and experimental software engineering approaches.
- **Integrate Emerging Technologies in Software Design** – Examine AI-driven development, cloud computing, microservices, and DevOps practices in modern software engineering.

Unit-I: Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, legacy software, Software myths. A Generic view of process: Software engineering-A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process Models:

The waterfall model, Incremental process models, Evolutionary process models, specialized process models, The Unified process. Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document. Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

Unit-II: Role of Software Design:

The nature of the design process; transferring design knowledge; constraints upon the design process and product, recording design decisions, designing with others, context for design, economic factors, assessing design qualities, quality attributes of the design product, assessing the design process.

Transferring Design Knowledge-Representing abstract ideas; design viewpoints, the architecture concept, design methods, design patterns, Design representations, and rationale for design methods. Design Processes and Strategies: The role of strategy in design methods, describing the design process –The D – Matrix, design by top-down decomposition, design by composition and organizational influences upon design.

Unit-III: Designing with objects and components:

Designing with objects: design practices for object-oriented paradigm, Object- oriented frame works, Hierarchal object oriented design process and heuristics, the fusion method, the unified process.

Component based design: The component concept, designing with components, designing components, COTS, Performing User interface design-The Golden rules, Interface analysis and design models, user and task analysis, analysis of display content and work environment, applying interfacedesign steps, user interface design issues, design evaluation.

Unit –IV Project Management and Metrics:

Project Management: The management spectrum: people, product, process and project, W5HH principle, critical practices. Metrics for Process and Projects: Process metrics, project metrics, size-oriented metrics, function oriented metrics, Object-oriented and use-case metrics, metrics for software quality, integrating metrics within the software process.

Unit-V Project Scheduling and Risk Management:

Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, timeline Charts, tracking the schedule, tracking the progress for an OO project, Earned value analysis.
Risk Management: reactive vs. Proactive risk strategies, software risks, risk identification, risk Projection, risk refinement, risk mitigation and monitoring, the RMMM plan.

Suggested Reading:

- Software design, David Budgen, second edition, Pearson education,2003.
- Software Engineering: A practitioner"s Approach, Roger S Pressman, seventh edition Mc-Graw Hill International Edition, 2009.
- Software Engineering, Ian Sommerville, seventh edition, Pearson education,2004.
- Software Project Management, Bob Hughes & Mike Cotterell, fourth edition Tata Mc-Graw Hill,2006
- The art of Project management, Scott Berkun, O"Reilly, 2005.
- Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, Second edition, Wiley India 2004.
- Software Engineering Foundations, Yingxu Wang, AuerbachPublications, 2008

Course Outcome:

- **Demonstrate Expertise in Software Engineering Principles** – Apply advanced software design methodologies, architectural patterns, and best practices in research and development.
- **Develop Scalable and Efficient Software Systems** – Design and implement high-performance, modular, and maintainable software architectures for complex applications.
- **Utilize Research-Based Approaches in Software Development** – Apply empirical research methods, algorithmic analysis, and experimental software engineering techniques.
- **Integrate Emerging Technologies in Software Solutions** – Implement AI-driven development, cloud computing, DevOps, and microservices for innovative software applications.
- **Ensure Software Security, Testing, and Quality Assurance** – Apply secure coding practices, automated testing, and quality control techniques for reliable software solutions.
- **Contribute to Advanced Research in Software Engineering** – Conduct innovative research, publish scholarly articles, and develop cutting-edge software solutions that advance the field.

Elective-2nd

Name of the Paper: Software Testing and Quality Assurance

Paper Code - PDC-IT-105

Course Objective:

- **Understand Advanced Software Testing Principles** – Explore various testing methodologies, techniques, and frameworks for ensuring software reliability.
- **Develop Expertise in Automated Testing Tools** – Learn to implement automated testing strategies using modern testing tools and frameworks.
- **Ensure Software Quality through Best Practices** – Apply quality assurance models, standards, and process improvement techniques for software development.
- **Analyze Software Performance and Security** – Evaluate software systems for performance, scalability, and security vulnerabilities using advanced testing approaches.

Unit-I

A perspective on Testing, STLC, Functional testing: Boundary value testing, Equivalence –class testing, Decision Table Testing etc., Retrospective on Functional Testing; Structural testing: path testing, data flow testing, mutation testing, etc. Retrospective testing, Levels of testing: Integration testing, system testing, acceptance testing, stress testing, Regression testing-β testing.

Unit-II

Object-oriented Testing, Interaction testing, Testing of Web Applications, Testing metrics, Testing Paradigms: Scripted testing, Exploratory testing, Test planning, Supporting Technologies: Defect taxonomies, Testing tools and standards, Case studies.

Unit-III

Introduction to Software Quality, Quality Models: McCall"s Model , Hierarchical model FCMM , Measuring Software Quality, Quality Metrics: Process, Product, Quality Control Tools, Quality assurance concept, importance, Requirements for SQA works

Unit-IV

Pareto Principle to SQA, Costs of Software Quality, SQA metrics, Audit Review, Walk through, Inspection techniques, SQA plan, Quality standards: SEI-CMM, ISO 9000 series, comparison between SEI CMM and ISO 9000.

Suggested Readings:

- A Practitioner"s Guide to Test Case Design by LEE Copland, Artech House Publishers, Boston - London.
- Software Testing – A Craft"s man Approach, Paul C. Jorgensen, A CRC Press LLC.

- Software Quality Theory and Management by Alan C. Gillies, Chapman & Hall.
- Software Quality by Galrry S. Marliss , Thomson.
- Metrics and Models in Software Quality Engineering by Stephen H. Kan

Course Outcome:

- **Apply Advanced Software Testing Techniques** – Utilize manual and automated testing methodologies to ensure software reliability, functionality, and performance.
- **Implement Modern Testing Tools and Frameworks** – Use industry-standard tools for unit testing, integration testing, regression testing, and security testing.
- **Ensure Software Quality through Best Practices** – Apply quality assurance models, software process improvement techniques, and international standards (ISO, CMMI).
- **Evaluate Software Security and Performance** – Conduct vulnerability assessments, load testing, and stress testing to enhance software security and scalability.
- **Develop Research-Based Testing Strategies** – Innovate new testing methodologies, conduct empirical studies, and contribute to advancements in software quality assurance.
- **Contribute to High-Quality Software Engineering Research** – Publish scholarly research on software testing, defect prevention, and quality assurance methodologies.

Elective Paper-3rd

Name of Paper- DATA WAREHOUSING AND MINING
Paper Code—PDC-IT-106

Course Objective:

- **Understand Fundamental Concepts of Data Warehousing** – Explore data warehouse architecture, ETL (Extract, Transform, Load) processes, and OLAP (Online Analytical Processing) techniques.
- **Develop Expertise in Data Mining Techniques** – Learn classification, clustering, association rule mining, and anomaly detection for knowledge discovery.
- **Apply Big Data Analytics and Machine Learning** – Utilize advanced analytics and AI-driven models to extract meaningful patterns from large datasets.
- **Ensure Data Quality, Security, and Privacy** – Implement best practices for data integrity, access control, and compliance with ethical and legal standards.
- **Conduct Research in Data Warehousing and Mining** – Develop innovative approaches, optimize data-driven decision-making, and contribute to advancements in big data research.

Unit-I:

Introduction

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Unit-II: Data Preprocessing:

Need for Preprocessing; the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Unit-III: Data Warehouse and OLAP Technology for Data Mining:
Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

Unit-IV: Mining Frequent Patterns, Associations and Correlations:
Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining .

Unit- V: Classification and Prediction:
Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Unit- VI: Cluster Analysis Introduction:
Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis - Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence, Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi-relational Data Mining

Unit- VII: Mining Object, Spatial, Multimedia, Text and Web Data:
Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the WorldWide Web.

Unit- VIII: Applications and Trends in Data Mining:
Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

Suggested Readings:

- Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2nd Edition, 2006.
- Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
- Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia
- Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
- The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley studentedition
- Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc, 2005.Data Mining Introductory and advanced topics – Margaret H Dunham, Pearson education
- Data Mining Techniques – Arun K Pujari, University Press.

Course Outcome:

- **Demonstrate Proficiency in Data Warehousing Concepts** – Design and implement data warehouse architectures, ETL processes, and OLAP operations.
- **Apply Advanced Data Mining Techniques** – Utilize classification, clustering, association rule mining, and anomaly detection to extract meaningful insights.

- **Integrate Big Data Analytics and Machine Learning** – Leverage AI-driven models and predictive analytics for large-scale data processing and decision-making.
- **Ensure Data Security, Privacy, and Ethical Compliance** – Implement robust security measures, privacy-preserving techniques, and adhere to ethical guidelines in data mining research.
- **Optimize Data-Driven Decision-Making** – Develop scalable and efficient data models to support business intelligence, research, and real-time analytics.
- **Contribute to Research in Data Warehousing and Mining** – Publish scholarly work, propose innovative methodologies, and advance the field of big data and knowledge discovery.

SYLLABUS
FOR
DEPARTMENT OF SCIENCES

Compulsory Paper- 1st

Name of Paper: Research Methodology

Paper Code: PDC-101

Course Objective:

- **Understand the Fundamentals of Research in IT** – Explore key research concepts, methodologies, and the significance of systematic inquiry in information technology.
- **Develop Proficiency in Research Design and Techniques** – Learn qualitative, quantitative, and mixed-method research approaches relevant to IT studies.
- **Apply Data Collection and Analysis Methods** – Utilize statistical tools, machine learning models, and big data analytics for IT research.
- **Ensure Ethical and Scholarly Integrity in Research** – Adhere to ethical guidelines, plagiarism prevention, and responsible data handling in IT research.

UNIT I: Meaning of Research:

Meaning, aims, nature and scope of research; Prerequisites of research; Types of research.

UNIT II: Research Problem:

Meaning of research problem; Sources of research problem; Characteristics of a good research problem; Hypothesis: Meaning and types of hypothesis; Research proposal or synopsis.

UNIT III: Methods of Research Studies:

Qualitative and Quantitative research methods.

UNIT IV: Review of Related Literature:

Purpose of the review; Identification of the related literature; Organizing the related literature.

UNIT V: Data Collection (Sampling):

Population and sample, Characteristics of a good sample; Techniques of sample Selection; Types of data in research.

UNIT VI: Tools of Data Collection:

Characteristics of good research; Types of data collection tools.

UNIT VII: Descriptive Statistics :

Tabulation, Organization, and Graphical Representation of Quantitative data; Measures of Central Tendencies: Mean, Median, Mode|; Measures of Variability: Range, Quartile Deviation, Standard Deviation.

UNIT VIII: Research Report:

Format of the research report; Style of writing the report

Suggested Readings:

- Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
- Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
- Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
- Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
- Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.

Course Outcome:

- **Demonstrate a Strong Understanding of Research Methodologies** – Apply qualitative, quantitative, and mixed-method approaches to IT research.
- **Develop Effective Research Designs** – Formulate well-structured research problems, hypotheses, and methodologies for IT-based studies.
- **Utilize Advanced Data Collection and Analysis Techniques** – Implement statistical tools, machine learning models, and big data analytics in IT research.
- **Ensure Ethical and Responsible Research Practices** – Adhere to academic integrity, plagiarism prevention, and ethical guidelines in IT research.
- **Enhance Academic Writing and Publishing Skills** – Produce high-quality research papers, technical reports, and conference publications in IT.
- **Apply Research Findings to Real-World IT Challenges** – Contribute to innovative solutions in software engineering, cybersecurity, artificial intelligence, and emerging technologies.

Compulsory Paper – 2nd

Name of Paper -Research and Publication Ethics

Paper Code: PDC-102

Course Objective:

- **Understand the Fundamentals of Research Ethics** – Explore ethical principles, integrity, and responsible conduct in IT research and scholarly publishing.
- **Identify and Prevent Research Misconduct** – Learn about plagiarism, data falsification, fabrication, and unethical authorship practices in IT research.
- **Examine Ethical Guidelines for Publishing** – Understand peer review processes, citation standards, open-access publishing, and intellectual property rights.
- **Ensure Compliance with Data Privacy and Security Regulations** – Apply ethical considerations related to cybersecurity, data protection laws, and responsible AI research

Unit –I Philosophy and Ethics:

Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Unit- II Scientific conduct:

Ethics with respect to science and research, Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications, salami slicing, Selective reporting and misrepresentation of data.

Unit-III Publication Ethics:

Publication ethics: definition, introduction and importance, Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc, Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Practice

Unit-IV : open access publication :

Open access publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal suggester

Unit-V: Publication misconduct

A. Group discussion: Subject specific ethical issues, FFP, authorship,Conflict of interest,Complaints and appeals: example and fraud from India and abroad

B. software tools - Use of plagiarism software like Turnitin, Urkund another open software tools

Unit -VI :Data Base and Research Matric

A .Data base: Indexing data base, Citation Data base: web of science, Scopus, research scholar, etc.

B. Research matrix : Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, altmetrics

Suggested Readings:

- Bird, A. (2006)Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics, London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized, ISBN: 978-9387480865.
- National Academy of Science, National Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press

Course Outcome:

• **Demonstrate a Strong Understanding of Research Ethics** – Apply ethical principles and responsible conduct in IT research and academic writing.

• **Identify and Prevent Research Misconduct** – Recognize and avoid plagiarism, data falsification, fabrication, and unethical authorship practices.

• **Follow Ethical Guidelines in Scholarly Publishing** – Adhere to peer review standards, citation norms, open-access policies, and copyright regulations.

• **Ensure Data Privacy and Security Compliance** – Implement ethical practices in handling sensitive IT research data, cybersecurity concerns, and AI-driven studies.

• **Enhance Integrity and Transparency in Research** – Uphold academic honesty, conflict-of-interest policies, and responsible reporting of research findings.

• **Contribute to High-Quality Research Publications** – Develop and publish ethical, well-structured research papers in reputed IT journals and conferences.

Compulsory Paper – 3rd

Name of Paper-Computer Applications
Paper Code: PDC-103

Course Objective:

- **Develop Advanced Computational Skills** – Gain proficiency in using programming languages, data analysis tools, and software applications for IT research.
- **Enhance Research Productivity with Digital Tools** – Utilize specialized software for literature review, reference management, and research documentation.
- **Apply Data Science and Machine Learning Techniques** – Use statistical and AI-driven tools for data processing, visualization, and predictive modeling in IT research.
- **Understand High-Performance Computing and Cloud Technologies** – Explore distributed computing, cloud platforms, and big data frameworks for large-scale IT research projects.

Unit-I: Basic Knowledge of Computer:

Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit-II: Computer Applications for Research –

Word processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defense Seminar).

Unit-III: Use of Different Software for Research:

Statistical Package for the Social Sciences (SPSS) and other statistical software for data analysis.

Unit-IV: Use of Internet in Research:

Introduction, Evaluating internet resources: Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC infonet, INFLIBNET and ERNET, What is

Plagiarism and how to avoid it?

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York.
- Rajaram V., Fundamentals of computers, Prentice Hall of India, New Delhi

Course Outcome:

- **Effectively Utilize Advanced Computing Tools** – Apply programming languages, data analytics software, and research-oriented applications in IT studies.
- **Enhance Research Efficiency with Digital Tools** – Use reference management, document automation, and collaboration platforms for academic research.
- **Analyze and Interpret Data Using Computational Methods** – Employ statistical software, machine learning models, and big data tools for IT research.
- **Implement Cloud and High-Performance Computing Solutions** – Utilize distributed computing, cloud services, and virtualization techniques in large-scale IT research.
- **Ensure Cybersecurity and Data Privacy Compliance** – Apply encryption, ethical hacking, and regulatory standards to safeguard research data.

PHYSICS
Elective paper – 1st

Name of Paper – Mathematical Methods in Physics

Paper Code- PDC-PHY_104

Course Objective:

- **Apply Linear Algebra:** Solve physical problems using vectors, matrices, and eigenvalues.
- **Use Differential Equations:** Model and analyze physical systems through ODEs and PDEs.
- **Master Complex Analysis:** Apply contour integration and residue theorems in physics.
- **Understand Fourier and Laplace Transforms:** Solve boundary value problems and signal analysis.
- **Develop Problem-Solving Skills:** Use mathematical tools to tackle advanced physics problems.

Unit –I

Matrices, Hamilton Caley equations, Eigen values and Eigen Vectors, Orthogonal, Hermitian, Unitary ,Null and Unit matrices, Singular and Non-singular matrices, Inverse of a matrix, Trace of a matrix, Vector Calculus.

Unit– II

Linear Differential Equations, Fourier series, Fourier and Laplace transforms;

Unit- III

Elements of Complex Analysis, Cauchy Riemann conditions, Cauchy's Theorem, Singularities, Residue theorem and applications

Unit-IV

Solution of Algebraic and Transcendental Equations: (1) Fixed-Point Iteration Method, (2) Bisection Method, (3) Secant Method, (4) Newton-Raphson Method and another new method (if applicable)

Unit-V

Interpolation: Forward and Backward Differences. Symbolic Relation. Differences of a Polynomial. Newton "Forward and Backward Interpolation Formulas. Divided Differences.

Suggested Readings:

- Mathematical Physics by B. D. Gupta
- Complex Analysis by Churchil

- Mathematical Methods for Physicist by Arfken and Weber
- Advanced Engineering Mathematics By H. K. Dass
- Mathews, J. H., Numerical Methods for Mathematics, Science and Engineering, Prentice-Hall, (2000).
- Introduction to Numerical Analysis, S. S. Sastry, PHI Learning Pvt. Ltd

Course Outcome:

- **Apply Advanced Mathematical Techniques in Physics** – Utilize linear algebra, differential equations, and tensor analysis to solve complex physical problems.
- **Analyze Physical Systems Using Computational Methods** – Implement numerical techniques and simulations to model real-world physics phenomena.
- **Utilize Special Functions and Transform Methods** – Employ Fourier transforms, Laplace transforms, and special functions in theoretical and applied physics.
- **Solve Problems in Quantum Mechanics and Electrodynamics** – Use mathematical tools to analyze wave functions, operators, and field equations.
- **Develop Analytical Models for Research Applications** – Formulate and solve mathematical models to support experimental and theoretical physics research.
- Contribute to Advanced Research in Mathematical Physics – Publish scholarly work and apply mathematical methods to new discoveries in physic

Elective Paper-2nd

Name of Paper- Basics in Theoretical Physics

Paper Code-PDC-PHY-105

Course Objective:

- **Apply Linear Algebra:** Solve physical problems using vectors, matrices, and eigenvalues.
- **Use Differential Equations:** Model and analyze physical systems through ODEs and PDEs.
- **Master Complex Analysis:** Apply contour integration and residue theorems in physics.
- **Understand Fourier and Laplace Transforms:** Solve boundary value problems and signal analysis.
- **Develop Problem-Solving Skills:** Use mathematical tools to tackle advanced physics problems.

Unit- I

Elements of Crystallography: Diffraction Methods for structure determination, bonding in solids, Lattice vibrations, thermal properties of solids, free electron theory, band theory of solids, metals, semi-conductors, insulators, conductivity, elements of superconductivity, Type I and type II superconductors, Meissner effect, London Equation.

Unit-II

Basics of radiation matter interaction, Basics of electron matter interaction, Elastic Scattering, Diffraction of electrons, photons and neutrons, Basic principle, advantages and limitations) X-ray diffraction, Scanning Electron Microscopy- Energy Dispersive X-ray Analysis, Extended X-ray Absorption Fine Structure, X-ray Fluorescence, etc.

Unit–III

Scanning Probe microscopy– (a) Atomic Force Microscopy:- Basic principle, Brief idea of setup– contact mode, tapping mode etc. Different modes of AFM and its importance.

(b) Scanning Tunneling Microscopy: - Basic principle, Brief idea of setup– details of components etc. Different modes of STM and its importance

Unit-IV

Solutions of electrostatic and magneto static problems including boundary value problems, dielectrics and conductors, Maxwell's equations, Scalar and Vector potentials, Poynting Vector

Unit-V

Laser fundamentals- Einstein's coefficients, gain coefficient, optical resonator, Q-factor and stability of optical resonator modes of laser resonator, Q-switching and mode locking. Properties of lasers-coherence, line width and divergence, Laser applications, Fibre

Optics-classification of fibres- step index, graded index fibres, Numerical aperture, modes in optical fibre, single mode and multimode fibre, V Parameter, evanescent modes, losses in fibres-bending and coupling losses, dispersion in fibers.

Suggested Readings:

- Solid State Physics- Charles Kittel
- Solid State Physics–S. O. Pillai
- Introduction to Electrodynamics, David J Griffiths, 2nd Edition, Prentice Hall India, 1989.
- Classical Electrodynamics, J D Jackson,4th Edition, John Wiley & Sons, 2005.
- Goodman J. W, Speckle phenomena in optics, Robert & company 2007
- Hariharan, Optical Holography, Academic Press, 1983
- Pal B. P, Fundamentals of fiber optics in telecommunication and sensor systems, Wiley Eastern,1994
- R P Khare, Fiber Optics and Optoelectronics, Oxford University Press, 2004
- S. C. Gupta, Optoelectronic Devices and Systems, PHI, 2005

Course Outcome:

- **Apply Advanced Mathematical Tools in Physics** – Utilize differential equations, linear algebra, and complex analysis to solve fundamental and applied physics problems.
- **Use Computational and Analytical Methods** – Implement numerical techniques, integral transforms, and special functions for solving complex physical equations.
- **Model Physical Systems Mathematically** – Develop mathematical models for quantum mechanics, electrodynamics, statistical mechanics, and general relativity.
- **Enhance Problem-Solving and Theoretical Skills** – Analyze and interpret physical phenomena using rigorous mathematical frameworks.
- **Contribute to Research in Mathematical Physics** – Apply mathematical methods in physics research, publish findings, and advance theoretical and applied physics.

Elective Paper - 3rd

Name of Paper- Photonics
Paper Code-PDC-PHY-106

Course Objective:

- **Understand the Fundamental Principles of Photonics** – Explore the behavior of light, wave optics, and quantum optics for advanced research applications.
- **Develop Expertise in Laser Physics and Optical Systems** – Study laser operation, nonlinear optics, and photonic devices used in scientific and industrial applications.
- **Apply Photonics in Advanced Technologies** – Investigate fiber optics, integrated photonics, and optoelectronic systems for communication and sensing applications.
- **Explore Computational and Experimental Photonics** – Utilize simulation tools and experimental techniques for designing and analyzing photonic systems.

Unit –I :

Fourier Optics: Propagation of light in free space- transfer function of free space, Optical Fourier Transform, Fourier transform using a lens, image formation and spatial frequency filtering.

Unit - II:

Polarization Optics: Polarization of Light, Optics of anisotropic media: The index ellipsoid, Optical activity and Faraday effect, Polarization devices: Wave retarders, rotators and optical isolators.

Unit -III:

Statistical Optics: Statistical properties of Light, Temporal Coherence and Spectrum, Degree of Coherence, Spatial coherence, Mutual coherence function, longitudinal coherence.

Unit - IV:

Non-linear Optics: Pockels and Kerr Effect- Electro-optics of Anisotropic media, Phase and amplitude modulators. Non-linear optical media, second order non-linear optics- SHG.

Unit- V:

Three wave mixing. Third order non-linear optics, THG and self-phase modulation. Four wave mixing and Optical Phase conjugation.

Suggested Reading:

1. A. Ghatak & K. Thyagarajan : Optical Electronics (Cambridge University Press)
2. Fundamentals of Photonics: B.E.A. Saleh and M.C. Teich
3. A. Yariv : Quantum Electronics (Wiley, New York)
4. M. Young : Optics and Lasers (Springer Verlag)

Course Outcome:

- **Demonstrate a Deep Understanding of Photonics Principles** – Analyze and apply the fundamental concepts of wave optics, quantum optics, and light-matter interaction.
- **Apply Laser Physics and Nonlinear Optics** – Utilize laser technology, nonlinear optical effects, and advanced photonic systems in research and practical applications.
- **Design and Analyze Optical Communication Systems** – Develop and optimize fiber optics, integrated photonics, and optoelectronic devices for high-speed data transmission.
- **Utilize Computational and Experimental Techniques in Photonics** – Implement simulation tools and laboratory techniques for the characterization and development of photonic materials and devices.
- **Advance Research in Photonic Technologies** – Contribute to innovations in photonic sensing, imaging, and quantum technologies for interdisciplinary applications.
- **Publish and Present Research in Photonics** – Conduct high-impact research, publish in peer-reviewed journals, and present findings at international conferences in photonics and optical physics.

LIFE SCIENCES - (Zoology, Botany, Bio-Tech, Micro Biology)

ZOOLOGY

Elective Paper-1st

Name of Paper- Applications of Genetic Engineering
Paper Code-PDC-ZOO.-104

Course Objective:

- **Understand the Fundamental Principles of Genetic Engineering** – Explore the concepts of gene manipulation, recombinant DNA technology, and molecular cloning.
- **Develop Expertise in Advanced Genetic Engineering Techniques** – Study CRISPR, gene therapy, transgenics, and genome editing for biomedical and biotechnological applications.
- **Analyze the Applications of Genetic Engineering in Various Fields** – Investigate its role in medicine, agriculture, pharmaceuticals, and environmental science.
- **Ensure Ethical, Legal, and Safety Considerations** – Examine bioethics, biosafety regulations, and societal impacts related to genetic modifications.

Unit I:

Introduction to Genetic engineering, History of Genetic engineering, Scope and importance of Genetic Engineering.

Unit II:

Methods used in Genetic Engineering, Tools Used in Genetic engineering, Different enzymes used in Genetic engineering

Unit III:

DNA and Plasmid isolation from bacteria, Importance of plasmid as vectors, Importance of *E. coli*as host, different types of vectors used in Genetic Engineering

Unit IV:

Techniques employed to insert the gene of interest into the host, Agrobacterium mediated Gene Transfer in Plants, Identification and Selection of rDNA, construction of cDNA library.

Unit V:

PCR and its types, Creation of mutagenesis using PCR, Expression of cloned genes in host, purification of expressed proteins from host (Insulin).

Suggested Readings:

- Genetic Engineering: Concepts, Tools and Techniques, Mann R, Syrawood Publishing House, USA, 2016.
- An Introduction to Genetic Engineering, Nicholl DST, Cambridge University

Press, 2008.

- Molecular cloning 3rd Edition, A laboratory Manual, 1st edition, Maniatis T, Fritch E F& Sambrook L, Cold Spring Harbour Laboratory, New York, 2006.

Course Outcome:

- **Demonstrate a Comprehensive Understanding of Genetic Engineering** – Explain key concepts, tools, and techniques involved in gene manipulation and recombinant DNA technology.
- **Apply Advanced Genetic Modification Techniques** – Utilize CRISPR, gene therapy, and cloning methodologies for research and practical applications.
- **Analyze the Impact of Genetic Engineering in Various Fields** – Evaluate its applications in healthcare, agriculture, pharmaceuticals, and environmental sustainability.
- **Ensure Ethical and Regulatory Compliance** – Assess bioethical concerns, biosafety regulations, and societal implications of genetic modifications.
- **Develop and Optimize Genetic Engineering Approaches** – Conduct innovative research to enhance genetic engineering techniques for real-world challenges.
- **Contribute to Scientific Advancements in Genetic Engineering** – Publish research findings, present at scientific forums, and promote interdisciplinary applications of genetic technologies.

Elective Paper-2nd

Name of Paper-Applications of Techniques in Animal Sciences
Paper Code-PDC-ZOO-105

Course Objective:

- **Understand Advanced Techniques in Animal Sciences** – Explore molecular, cellular, and biotechnological methods used in animal research and management.
- **Develop Expertise in Genetic and Reproductive Technologies** – Study techniques such as artificial insemination, embryo transfer, and genetic modifications in animals.
- **Apply Modern Tools in Animal Health and Disease Research** – Utilize diagnostic techniques, immunological assays, and molecular biology tools for disease detection and prevention.
- **Analyze the Role of Animal Science in Agriculture and Biomedical Research** – Investigate applications in livestock improvement, conservation biology, and translational medicine.

Unit1:

Sampling technique, sterilization technique, various methods for isolation of pure culture. Methods for measurement of microbial growth, manipulation of environment, nutritional and genetic parameters, maintenance and preservation of microbes (pure culture).

Unit II:

Paper and TLC chromatography, Gel filtration chromatography, ion exchange chromatography,affinity chromatography, high performance liquid chromatography.

Unit III:

Southern, Northern and Western blotting techniques, Polymerase Chain reaction, sequencing of nucleic acids, measuring nucleic acid and protein interaction. Flow cytometry, FISH & GISH.

Unit IV:

SDS-PAGE, Agarose gel electrophoresis, Isoelectric focusing and two-dimensional gel electrophoresis, Centrifugation; Differential and density gradient centrifugation, analytical ultracentrifugation, separation of DNA/RNA using ultracentrifugation technique, determination of molecular weight and Sedimentation coefficient.

Unit V:

Principle and applications of tracer technique in biology: Radioactive Isotopes and half-life of isotopes; Effect of radiation on biological system; autoradiography; radiation dosimetry; scintillation counting, safety aspects

Suggested Readings:

- Prescott's Microbiology, 10th Edition, Willey J, Sherwood L & Woolverton C J, Mc-Graw-Hill, 2017.

- Microbiology: An Introduction, 12th Edition, Tortora G J, Funke B R, Case C L, Pearson, 2016.
- Principles of Genetics, 8th Edition, Gardner, Simmons & Snustad, 2005.

Course Outcome:

- **Demonstrate Proficiency in Advanced Animal Science Techniques** – Apply molecular biology, biotechnology, and diagnostic methods in animal research and management.
- **Utilize Genetic and Reproductive Technologies** – Implement artificial insemination, embryo transfer, and genetic engineering for animal breeding and conservation.
- **Analyze Animal Health and Disease Mechanisms** – Use immunological and molecular tools for diagnosing, preventing, and treating diseases in animals.
- **Integrate Animal Science with Agricultural and Biomedical Research** – Contribute to livestock improvement, veterinary science, and biomedical advancements using modern techniques.
- **Ensure Ethical and Sustainable Animal Research Practices** – Follow ethical guidelines, animal welfare regulations, and sustainability principles in scientific investigations.
- **Contribute to Innovations in Animal Sciences** – Conduct high-impact research, publish findings, and develop new techniques for improving animal health and productivity.

Elective Paper-3rd

Name of Paper-Molecular Genetics
Paper Code-PDC-ZOO-106

Course Objective
Understand Genetic Material: Explain the structure and function of DNA, RNA, and proteins.
Gene Expression and Regulation: Describe transcription, translation, and gene regulation mechanisms.
DNA Replication and Repair: Understand replication, mutation, repair, and recombination processes.
Molecular Techniques: Apply tools like PCR, electrophoresis, and gene sequencing.
Genetic Variation and Inheritance: Explain mutations, inheritance patterns, and their effects.
Critical Thinking: Analyze experimental data and design genetic studies.

Unit-I:

History and scope of molecular genetics. Identification of DNA as genetic material. Properties, storage and transmission of genetic information. Overview of Mendalism and deviations.

Unit-II:

DNA Replication: Semi conservative model of DNA. DNA polymerases and ligases. Events in replication fork. Discontinuous replication. Leading strand. Circular DNA and its replication.

Unit-III:

Transcription: Prokaryotic transcription. RNA polymerases. Transcription signals. Classes of RNA molecules-messenger, ribosomal and transfer. RNA modification: RNA- 5-cap formation, 3-end processing, polyadenylation, splicing, editing.

Unit-IV:

Translation: The genetic code. Structure of t- RNA.Translation in prokaryotes.The Wobble hypothesis. Gene Regulation: Operon model.Lac Operon and Tryptophan Operon.Auto regulation and feedback initiation.

Unit-V:

Mutation: Types of mutations. Biochemical bases of mutations. Mutagenesis-base analogue mutation, ultraviolet irradiation, intercalating substances and transposable elements.

References:

1. Atherly.A.G. Girten,J.R and Mcdonald, J.F. The Science of Genetics. Saunders College, 1999.
2. Gardner, E.J., Simmons, M.J and Snustad, D.P. Genetics IIIEd. John Willy & Sons, New York, 1990.
3. Stickberger, N.W. Genetics. MacMillan Publishing Co. New York, 1985.
4. Watson, J.D et al., Recombinant DNA. W.H.Freeman& Co, 1992.
5. Trevor,B.B and Julian Burke. Gene structure and transcription. Oxford Univ Press, 1998.
6. Benjamin Lewin. Genes Vols I-IV. Oxford Univ Press, 1995.

Course Outcome:

- **Demonstrate In-Depth Knowledge of Molecular Genetics** – Explain the mechanisms of gene expression, regulation, and inheritance at the molecular level.
- **Apply Advanced Genetic Techniques in Research** – Utilize PCR, gene sequencing, cloning, and genome editing tools for molecular analysis.
- **Analyze Genetic Variations and Their Implications** – Study mutations, epigenetic modifications, and their roles in genetic disorders and evolution.
- **Integrate Molecular Genetics with Biotechnology and Medicine** – Implement genetic engineering, gene therapy, and molecular diagnostics in healthcare and industry.
- **Ensure Ethical and Responsible Genetic Research** – Follow bioethical guidelines, regulatory frameworks, and best practices in genetic research and data management.

BOTANY

Elective Paper-1st

Name of Paper- Analytical Techniques in Plant Sciences

Paper Code- PDC-BOT-104

Course Objective:

- **Understand Advanced Analytical Techniques** – Explore various biochemical, molecular, and physiological methods used in plant science research.
- **Develop Proficiency in Instrumentation and Lab Techniques** – Gain hands-on experience with spectroscopy, chromatography, electrophoresis, and microscopy.
- **Analyze Plant Metabolism and Genetic Expression** – Utilize modern techniques to study plant biochemical pathways, gene expression, and stress responses.
- **Apply Analytical Tools for Plant Health and Productivity** – Investigate plant-microbe interactions, soil-plant relationships, and environmental stress tolerance.
- **Ensure Accuracy and Ethical Research Practices** – Follow standardized protocols, ethical guidelines, and best practices in plant science research.

Unit I.

Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy, Flow cytometry, Applications of fluorescence microscopy, Transmission and Scanning electron microscopy – sample preparation for electron microscopy, staining.

Unit II.

Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, analytical centrifugation, ultracentrifugation, marker enzymes.

Unit III.

Spectrophotometry: Principle and its application in biological research. Chromatography: Principle; Paper chromatography; Column chromatography, TLC, GLC, HPLC, Ion-exchange chromatography; Molecular sieve chromatography; Affinity chromatography.

Unit - IV

Characterization of proteins and nucleic acids: Mass spectrometry; Characterization of proteins and nucleic acids; Electrophoresis: AGE, PAGE, SDS-PAGE.

Unit- V.

Biostatistics: Statistics, data, population, samples, parameters; Representation of Data: Tabular, Graphical; Measures of central tendency: Arithmetic mean, mode, median; Measures of dispersion: Range, mean deviation, variation, standard deviation; Chi-square test for goodness of fit.

Unit- VI.

Techniques in Plant Sciences: Algal cell culture Fungal culture media, Protoplast and Spore culture, Plant cell Culture- Cellular totipotency, cyto-differentiation, Somatic embryogenesis, Preservation techniques, Molecular biological Techniques- Gene amplification and PCR, Molecular Probes, DNA fingerprinting

Suggested Readings:

- P.N. Arora and P.K. Malhan (1998). Biostatistics. Himalaya Publishing Bombay.
- P.S.G. Kumar (2004). Research methods and statistical techniques. B.R. publishing Academy, Udyapur.
- G.B.N. Chainy, G. Mishra and P.K. Mohanty (2004) Basic Biostatistics. Kalyani Publisher.
- N. Gurumani (2006). Research Methodology for Biological Sciences. MJP Publishing, Chennai.
- Banerjee, P.K. (2007). Introduction to Biostatistics. Rastogi publication, Meerut.
- Ruzin, S.E. (1999). Plant Microtechnique and Microscopy, Oxford University Press, New York. U.S.A.
- Ausubel, F., Brent, R., Kingston, R. E., Moore, D.D., Seidman, J.G., Smith, J.A., Struhl, K. (1995). Short Protocols in Molecular Biology. John Wiley & Sons. 3rd edition.
- Zar, J.H. (2012). Biostatistical Analysis. Pearson Publication. U.S.A. 4th edition.

Course Outcome:

- **Demonstrate Proficiency in Advanced Analytical Techniques** – Apply spectroscopy, chromatography, electrophoresis, and microscopy for plant science research.
- **Analyze Plant Metabolism and Biochemical Pathways** – Use modern tools to study photosynthesis, respiration, and secondary metabolite production.
- **Utilize Molecular Techniques in Plant Sciences** – Implement PCR, gene expression analysis, and molecular markers for plant genetic studies.
- **Investigate Plant-Environment Interactions** – Assess the impact of biotic and abiotic stresses on plant growth and development using analytical tools.
- **Apply Analytical Methods for Plant Improvement** – Contribute to crop enhancement, disease resistance, and stress tolerance research through precise data analysis.
- **Ensure Accuracy and Ethical Research Practices** – Follow standardized protocols, maintain data integrity, and adhere to ethical guidelines in plant science research.

Elective Paper -2nd

Name of Paper- Recent Trends in Biological Sciences

Paper Code-PDC-BOT-105

Course Objective

- **Explore Emerging Concepts:** Understand advancements in genomics, proteomics, and bioinformatics.
- **Learn Modern Techniques:** Apply tools like CRISPR and next-gen sequencing.
- **Interdisciplinary Approaches:** Study the role of AI and computational biology.
- **Environmental Impact:** Explore biotechnological innovations for sustainability.
- **Ethical Insights:** Discuss implications of genetic engineering and personalized medicine.

Unit - I

Enzymes: DNA polymerase, restriction endonucleases, topisomerase I and DNA ligase, reverse transcriptase, kinase, alkaline phosphatase, nuclease, RNAse.

Unit ll.

Vectors: plasmids; Cosmids, Bacteriophage, and synthetic plasmids. Application of gene technology.

Unit lll .

Cell and callus culture, Anther culture. Micro-propagation, somatic cell hybridization, protoplast fusion, Cybrids, artificial seeds, Agro-bacterium mediated gene transfer and use of Ti plasmid.

Unit IV.

Applications of plant tissue culture engineering, pathogen resistance (BT gene), and transgenic plants.

Unit V.

Southern, Northern and Western blotting technique. PCR: its principles and uses. Gene concepts and

biology of gene. Transcription and translation in prokaryotes and eukaryotes. Nitrogen fixing and genes and their genetic manipulation.

Unit Vl.

Biotechnology and society, socio-economic aspects. Uses of cloned genes in agriculture, medicine and industry. Transgenic plants: Production and applications.

Plant biotechnology and Intellectual Property rights (IPR).

Unit VII.

Bioinformatics applications: Agriculture, Molecular biology, Environment and Biotechnology.

Suggested Reading:

- Sambrook J, Fritsch E. F. and Maniatis (1989) Molecular cloning, vol. I, II, III, IInd edition, Cold spring harbor laboratory press, New York.
- DNA Cloning : A practical approach D.M. Glover and D.B. Hames, RL Press, Oxford, 1995
- Molecular Biotechnology, 2nd Ed. S. B. Primrose, Blackwell Scientific publishers, Oxford, 1994
- Molecular and cellular methods in Biology and Medicine, P.B. Kaufman, W. Wu , D. Kim and L.J. Cseke, CRC Press Florida 1995
- Biotechnology: Current Progress Volume 1 by P. N. Cheremisinoff and L. M. Ferrante. Technomic Publishing Co. Inc
- Advances in Applied Microbiology volumes 6, 10, 17 by D. Perlman and Umbreit (eds). Academic Press.
- Introduction to Bioinformatics, (Atwood, T. K. and Parry-Smith, D. J)

Course Outcome:

- **Understand Emerging Concepts in Biological Sciences** – Analyze advancements in genomics, proteomics, synthetic biology, and bioinformatics.
- **Apply Cutting-Edge Techniques in Research** – Utilize modern molecular biology, genetic engineering, and computational tools for biological investigations.
- **Evaluate the Role of Biotechnology in Health and Environment** – Explore applications in medical research, agriculture, and environmental sustainability.
- **Analyze the Impact of Climate Change and Ecology on Biodiversity** – Assess recent ecological trends and conservation strategies using scientific methodologies.
- **Integrate Interdisciplinary Approaches in Biology** – Combine knowledge from various biological subfields, such as microbiology, nanobiotechnology, and neuroscience, to address complex scientific problems.
- **Contribute to Scientific Innovation and Ethical Research** – Conduct and publish high-impact research while adhering to ethical guidelines in biological sciences.

Elective-3rd

Name of Paper- Phytochemistry & Herbal Biotechnology
Paper Code-PDC-BOT-106

Course Objective:

- **Understand the Fundamentals of Phytochemistry** – Explore the chemistry, biosynthesis, and classification of plant secondary metabolites.
- **Develop Expertise in Herbal Biotechnology** – Study biotechnological approaches for plant-based drug development, tissue culture, and genetic modification.
- **Analyze Techniques for Extraction and Characterization** – Learn advanced methods such as chromatography, spectroscopy, and metabolomics for studying plant compounds.
- **Evaluate the Therapeutic Potential of Medicinal Plants** – Investigate the pharmacological properties, bioavailability, and efficacy of herbal compounds.
- **Ensure Quality Control and Ethical Practices** – Apply standardization techniques, regulatory guidelines, and ethical considerations in herbal research and biotechnology.

Unit I

Introduction to Phytochemistry; Types of phytochemicals; Application of phytochemicals in industry and healthcare. Current scenarios (local, regional & global) of herbal & phytochemical products.

Unit II

Steps, solvents & equipments used for phytochemical analyses; Techniques used for extraction, seperation, purification and in vitro and in vivo analyses of phytochemicals.

Unit III

Methods of drug evaluation (morphological, microscopic, physical & chemical); Material balance on herbal & phytochemical processing.

Unit IV

Methods to identify adulterants in herbal medicines, drug adulteration - Types of adulterants.

Methods of analysis and detection of adulterants in herbal medicines; (RAPD, SSR, SCAR and RFLP)

Suggested Readings:

1. Pharmacognosy, CK Kokate, AP Purohit, SB. Gokhale (1996), Nirali Prakashan, 4th Ed.
2. Natural Products in Medicine: A Biosynthetic approach (1997), Wiley, UK
3. Cultivation & Processing of MedicinalPlants, L Hornok (ed.) (1992), John Wiley & Sons, Chichister, UK.
4. Herbal Biotechnology & Pharmocognosy, V Kumaresan (2015), Saras Publication.

Course Outcome:

- **Demonstrate Expertise in Phytochemical Analysis** – Identify, extract, and characterize bioactive compounds from medicinal plants using advanced analytical techniques.
- **Apply Biotechnological Approaches in Herbal Research** – Utilize tissue culture, genetic modification, and bioprocessing for the sustainable production of plant-derived compounds.
- **Evaluate the Pharmacological Potential of Herbal Compounds** – Assess the bioavailability, efficacy, and therapeutic applications of plant-based medicines.
- **Ensure Quality Control and Standardization** – Implement regulatory guidelines and standardization techniques for herbal formulations and plant-based drugs.
- **Contribute to Ethical and Sustainable Herbal Research** – Conduct research that adheres to ethical standards, promotes biodiversity conservation, and supports sustainable practices in herbal biotechnology.

MATHEMATICS

Elective-1st

Name of Paper--Linear Algebra
Paper Code- PDC-MATH-104

Course Objective:

- **Understand Vector Spaces:** Explain vectors, subspaces, basis, and dimension.
- **Solve Linear Equations:** Apply matrix methods like Gaussian elimination and inverses.
- **Work with Matrices:** Understand determinants, eigenvalues, and eigenvectors.
- **Perform Linear Transformations:** Describe and apply transformations and their matrices.
- **Apply Orthogonality:** Use dot products, projections, and orthogonalization techniques.

Unit – I

Vector space, Bases and dimension, change of base and change of coordinates, Sums and direct sum.

Unit–II

Linear transformation, Properties of linear transformation, Change of basis, Matrix representation of linear transformation, Rank and nullity.

Unit-III

Eigen value & Eigen vectors, Cayley-Hamilton theorem, Inner product space, Length and orthogonality, Orthonormal bases, Gram-Schmidt process, Least squares problems.

Unit-IV

Minimal polynomials, Elementary canonical forms: Diagonalization, Triangulation, Primary decomposition etc.

Unit-V

Bilinear forms, Quadratic forms, Reduction to quadratic forms, Symmetric, Skew symmetric, Positive & Semi-positive forms etc.

Suggested Reading:

- Linear algebra and its Application: Gilbert Strang, C engage Learning
- Linear algebra a Modern introduction: David Poole, Brooks/Cole
- Linear algebra and its Application: By David C. Lay
- Linear algebra and its Application: Judi J. McDonald

Course Outcome:

- **Demonstrate a Deep Understanding of Vector Spaces** – Analyze vector spaces, subspaces, bases, and dimensions in abstract and applied settings.
- **Apply Matrix Theory and Linear Transformations** – Utilize matrices for solving systems of equations, eigenvalues, eigenvectors, and diagonalization problems.
- **Explore Advanced Topics in Linear Algebra** – Investigate inner product spaces, orthogonality, and singular value decomposition for real-world applications.
- **Utilize Computational Tools for Linear Algebra** – Implement algorithms and software (such as MATLAB or Python) to solve complex linear algebra problems.
- **Apply Linear Algebra in Interdisciplinary Research** – Use linear algebra methods in fields like machine learning, quantum mechanics, and data science.
- **Develop Analytical and Problem-Solving Skills** – Strengthen logical reasoning and mathematical modeling capabilities for theoretical and applied research.

Elective-2nd

Name of Paper- Advanced Complex Analysis

Paper Code- PDC-MATH-105

Course Objective

- **Understand Complex Functions:** Explain limits, continuity, and differentiability of complex functions.
- **Apply Cauchy's Theorems:** Use Cauchy's integral theorem and formula in problem-solving.
- **Work with Series Expansions:** Analyze functions using Taylor and Laurent series.
- **Evaluate Complex Integrals:** Apply residue theory to compute contour integrals.
- **Understand Conformal Mapping:** Use mappings to solve boundary value problems.
- **Develop Analytical Skills:** Solve advanced problems using techniques of complex analysis.

Unit- I

Conformal Mapping: Definition of conformal and Bilinear transformation, Cross ratio, The mapping from disc to disc, Disc to half plane and half plane to half plane. Mapping of elementary transformation.

Unit-II

Analytic Function: Zeroes of analytic functions, Jensen's theorem, meromorphic functions, their zeroes and poles, Poisson-Jensen's formula. Revisit to Argument principle, Rouche's theorem.

Unit–III

Entire function: order and genus of entire functions, Hadamard's factorization theorem, Coefficient formula for the order, The derived function, Exceptional values, Borel's theorem, Little Picard and Great Picard theorem.

Unit-IV

Harmonic function: harmonic function in the disc, Mean value property, Maximum and Minimum Principle, Harnack's inequality, Harnack's theorem, The Dirichlet problem.

Unit-V

Analytic continuation:

Definition and uniqueness of analytic continuation, Standard method of analytic continuation using power series, The principle of reflection, Hadamard multiplication theorem, Monodromy theorem, Riemann surfaces. Homology and homotopy versions of Cauchy's theorem, simply connected regions.

Suggested Reading:

- L.V. Ahlfors, Complex analysis, third edition, McGraw-Hillbook, New York, 1978.
- J. B. Conway, Functions of one complex variable, second edition, Graduate Texts in mathematics, 11, Springer-Verlag, New York,1978.
- T. W. Gamelin, Complex analysis, Undergraduate texts in mathematics, Springer-Verlag, New York, 2001.R. E. Greene and S. G. Krantz, Function theory of one complex variable, third edition, Graduate studies in Mathematics, 40, American Mathematical Society, Providence, RI, 2006.
- S. Lang, Complex analysis, fourth edition, Graduate texts in Mathematics,103, Springer-Verlag, New York, 1999.
- R. Narasimhan and Y. Nievergelt, Complex analysis in one variable, Second edition, Birkhauser Boston, Inc, Boston, MA, 2001.

Course Outcome:

- **Demonstrate Mastery of Complex Functions** – Analyze the properties of complex functions, including analyticity, singularities, and multivalued functions.
- **Apply Contour Integration Techniques** – Utilize Cauchy's integral theorem, residue theorem, and Laurent series for evaluating complex integrals.
- **Explore Conformal Mapping and Its Applications** – Study transformations and their application in physics, engineering, and mathematical modeling.
- **Analyze the Behavior of Special Functions** – Investigate gamma functions, zeta functions, and other advanced complex functions used in research.
- **Utilize Complex Analysis in Applied Mathematics** – Apply advanced theorems to problems in fluid dynamics, quantum mechanics, and signal processing.
- **Develop Analytical and Research Skills** – Strengthen mathematical reasoning and problem-solving abilities for tackling advanced research problems in complex analysis.

Elective- 3rd

Name of Paper- Advanced Calculus
Paper Code- PDC-MATH-106

Course Objective:

- **Develop a Deep Understanding of Mathematical Analysis** – Explore the foundations of limits, continuity, differentiability, and integrability in higher dimensions.
- **Study Multivariable and Vector Calculus** – Analyze partial derivatives, multiple integrals, vector fields, and their applications in real-world problems.
- **Understand Advanced Theorems in Calculus** – Examine key results such as Green's theorem, Stokes' theorem, and the Divergence theorem with rigorous proofs.
- **Apply Advanced Calculus in Mathematical Modeling** – Utilize calculus techniques to solve problems in physics, engineering, and applied sciences.

Unit I:

Differentiation – Basic Theorems – Partial derivatives – Derivatives of Inverse Functions

Unit II:

Implicit functions -- Integration --- Measure zero and content zero – Integrable Functions

Unit III:

Fubini's theorem—Partitions of Unity --- Change of variables

Unit IV:

Integration on chains – Algebraic preliminaries – Fields and Forms –Geometric preliminaries— The fundamental theorem of Calculus

Unit V:

Manifolds – Fields and Forms on Manifolds – Stokes' theorem on Manifolds—The volume element – The classical theorems

Text book:

Calculus of Manifolds by Michael Spivak, The Benjamin/ Cummings Publishing Company

References:

(1) Mathematical Analysis by Tom M. Apostol, Narosa Publishing Company.
(2) Advanced Calculus by Gerald B. Folland, Pearson Publishing Company.

Course Outcome:

- **Demonstrate Mastery of Multivariable Calculus** – Analyze functions of several variables, partial derivatives, and multiple integrals with theoretical and practical applications.
- **Apply Vector Calculus Theorems** – Utilize Green's theorem, Stokes' theorem, and the Divergence theorem for solving complex problems in physics and engineering.
- **Explore Advanced Topics in Real Analysis** – Investigate sequences, series of functions, uniform convergence, and their implications in mathematical research.
- **Solve Differential and Integral Equations** – Use advanced calculus techniques to address real-world problems in scientific and engineering disciplines.
- **Utilize Calculus in Mathematical Modeling** – Apply differential and integral calculus concepts to formulate and analyze models in applied sciences.
- **Develop Logical and Analytical Thinking Skills** – Strengthen the ability to construct rigorous proofs and solve abstract mathematical problems relevant to research.

SYLLABUS

FOR

DEPARTMENT OF ARTS, HUMANITIES AND SOCIAL SCIENCES

Compulsory Paper: 1st

Name of Paper- Research Methodology

Paper Code-PDC-101

Course Objective:

- **Understand the Foundations of Research** – Explore key concepts, philosophies, and methodologies in arts and humanities research.
- **Develop Skills in Qualitative and Quantitative Research** – Learn various research designs, data collection techniques, and analytical approaches.
- **Formulate and Structure Research Problems** – Identify research gaps, frame research questions, and design appropriate methodologies.
- **Enhance Critical Thinking and Theoretical Analysis** – Apply theoretical frameworks and interpretive methods relevant to arts and humanities disciplines.
- **Ensure Ethical and Rigorous Research Practices** – Follow ethical guidelines, citation norms, and academic integrity in scholarly work.

Unit -I

Definition and Scope of Research, Types of Research - Quantitative, Qualitative, Analytical, etc. ,Basic Principles of Research, Features of a Research

Unit -II

Materials and Tools of Research, Use of Primary and Secondary data, Print: Books, Journals, Articles, Magazines, etc, Audio-visual resources: Pictures, Motion Pictures, Documentaries, Audio Tapes, etc, Interviewing, Field Studies, Questionnaires/ Surveys, Web resources, e-Library/ Library as a resource

Unit -III.

Selection of Topic: Area of Research: Genre, Period, Region, Author, Texts, Approach, Interdisciplinary approaches, Current Trends in Research, Background Study, Studies of Literatures, Real Life Observations,, Framing of Topic

Unit –IV

Writing Research Proposal/Research Paper/Thesis, Topic Statement, Abstract, Keywords for Research Paper, Motivation, Aims and Objectives, Research Problem, Hypothesis, Scope and Limitations, Data Collection, Methodology, Review of Literature, Identifying a Research Problem/Research Gap, Planning-Chapter Division ,Drafting, Revising, Editing, Citations and Bibliography, The Problems faced by a Research Scholar, Role of Research Supervisor and Advisory Committee.

Unit –V

Technicalities of Writing Thesis/Research Papers/Articles, Paper margin, spacing, heading and title, font and its size, page numbers, Footnotes and

Endnotes, correction and insertion, indentations, and how to make Power-point Presentation

Suggested Readings:

- Allison, B. The Students' Guide to Preparing Dissertations and Theses. London: Kogan Page. 1997. Print.
- Altick. Richard D. and John J. Fenstermaker. The Art of Literary Research. 4th ed. New York: Norton, 1993. Print.
- Gibaldi, Joseph. MLA Handbook for Writers of Research Papers. 8th ed. New Delhi: East-West Press, 2009
- Kothari, C.R. Research Methodology: Methods and Techniques. New Delhi: New Age International Ltd, 1985.
- Rahim, F. Abdul. Thesis Writing: A Manual for Researchers. New Delhi: New Age International Pvt Ltd, 1996.
- *MLA Handbook, 9th Edition.* Modern Language Association of America, 2021.

Course Outcome:

- **Demonstrate a Strong Understanding of Research Paradigms** – Apply qualitative, quantitative, and mixed-method approaches in arts and humanities research.
- **Formulate Research Problems and Hypotheses** – Identify research gaps, develop critical questions, and construct well-defined research objectives.
- **Utilize Appropriate Data Collection and Analysis Techniques** – Implement interviews, surveys, textual analysis, and other relevant methods for data gathering and interpretation.
- **Apply Theoretical and Conceptual Frameworks** – Integrate philosophical, historical, and sociocultural perspectives into research analysis.
- **Ensure Ethical and Rigorous Research Practices** – Adhere to ethical guidelines, academic integrity, and plagiarism-free writing in scholarly work.
- **Develop High-Quality Research Outputs** – Write well-structured theses, dissertations, and research papers contributing to the academic discourse in arts and humanities.

Endnotes, correction and insertion, indentations, and how to make Power-point Presentation

Suggested Readings:

- Allison, B. The Students' Guide to Preparing Dissertations and Theses. London: Kogan Page. 1997. Print.
- Altick. Richard D. and John J. Fenstermaker. The Art of Literary Research. 4th ed. New York: Norton, 1993. Print.
- Gibaldi, Joseph. MLA Handbook for Writers of Research Papers. 8th ed. New Delhi: East-West Press, 2009
- Kothari, C.R. Research Methodology: Methods and Techniques. New Delhi: New Age International Ltd, 1985.
- Rahim, F. Abdul. Thesis Writing: A Manual for Researchers. New Delhi: New Age International Pvt Ltd, 1996.
- *MLA Handbook, 9th Edition*. Modern Language Association of America, 2021.

Course Outcome:

- **Demonstrate a Strong Understanding of Research Paradigms** – Apply qualitative, quantitative, and mixed-method approaches in arts and humanities research.
- **Formulate Research Problems and Hypotheses** – Identify research gaps, develop critical questions, and construct well-defined research objectives.
- **Utilize Appropriate Data Collection and Analysis Techniques** – Implement interviews, surveys, textual analysis, and other relevant methods for data gathering and interpretation.
- **Apply Theoretical and Conceptual Frameworks** – Integrate philosophical, historical, and sociocultural perspectives into research analysis.
- **Ensure Ethical and Rigorous Research Practices** – Adhere to ethical guidelines, academic integrity, and plagiarism-free writing in scholarly work.
- **Develop High-Quality Research Outputs** – Write well-structured theses, dissertations, and research papers contributing to the academic discourse in arts and humanities.

Compulsory Paper – 2nd

Name of Paper -Research And Publication Ethics

Paper Code: PDC-102

Course Objective:

- **Understand the Fundamentals of Research Ethics** – Explore ethical principles, integrity, and responsible conduct in academic research.
- **Develop Awareness of Plagiarism and Academic Misconduct** – Learn about different types of plagiarism, citation norms, and tools for detecting unethical practices.
- **Explore Ethical Guidelines in Research Publication** – Study authorship criteria, peer review processes, and conflicts of interest in academic publishing.
- **Analyze Legal and Ethical Aspects of Intellectual Property** – Understand copyright laws, patents, and fair use policies in research and publishing.
- **Enhance Skills in Responsible Data Management** – Learn proper data collection, storage, and sharing techniques while maintaining research transparency.
- **Promote Ethical Decision-Making in Research** – Apply ethical reasoning to case studies and real-world scenarios to uphold academic integrity.

Unit –I

Philosophy and Ethics: Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions

Unit- II

Scientific conduct: Ethics with respect to science and research, Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications , salami slicing, Selective reporting and misrepresentation of data

Unit-III

Publication Ethics: Publication ethics: definition, introduction and importance, Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc, Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Unit-IV :

Open access publication -- open access publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal suggester

Unit-V: Publication misconduct

A. **Group discussion:** Subject specific ethical issues, FFP, authorship,Conflict of interest,Complaints and appeals: example and fraud from India and abroad

B. **Software tools -** Use of plagiarism software like Turnitin, Urkund another open software tools

Unit -VI :Data Base and Research Matric

A .**Data base:** Indexing data base, Citation Data base: web of science, Scopus, research scholar, etc.

C. **Research matrix :** Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, altmetrics

Suggested Readings:

- Bird, A. (2006)Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics. London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized, ISBN: 978-9387480865.
- National Academy of Science, national Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press

Course Outcome:

- **Demonstrate Ethical Research Practices** – Apply principles of integrity, honesty, and transparency in conducting academic research.
- **Identify and Prevent Plagiarism** – Utilize plagiarism detection tools and adhere to proper citation and referencing standards.
- **Understand the Ethics of Authorship and Publishing** – Follow ethical guidelines related to authorship, peer review, and conflict of interest in scholarly publications.
- **Analyze Intellectual Property Rights and Copyright Laws** – Understand legal aspects of research, including patents, copyrights, and open-access publishing.
- **Maintain Responsible Data Management** – Ensure ethical collection, storage, and dissemination of research data while maintaining confidentiality and accuracy.
- **Make Informed Ethical Decisions in Research** – Critically evaluate ethical dilemmas in academia and apply best practices to uphold research integrity.

Compulsory Paper – 3rd

Name of Paper-Computer Applications

Course Code: PDC-103

Course Objective:

- **Develop Proficiency in Research-Oriented Software Tools** – Learn to use advanced software for data analysis, document preparation, and reference management.
- **Enhance Computational and Programming Skills** – Apply programming languages and computational techniques relevant to research in various disciplines.
- **Utilize Data Analysis and Visualization Techniques** – Implement statistical and graphical tools to interpret research data effectively.
- **Explore Digital Resources and Online Research Databases** – Access academic journals, digital libraries, and citation management tools for literature review and referencing.
- **Understand Cybersecurity and Ethical Computing Practices** – Learn best practices for data privacy, research ethics in computing, and intellectual property rights.

Unit-I:

Basic Knowledge of Computer –Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit-II:

Computer Applications for Research –

Word processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defense Seminar).

Unit-III:

Use of Different Software for Research– Statistical Package for the Social Sciences (SPSS) and other statistical software for data analysis.

Unit-IV:

Use of Internet in Research- Introduction, Evaluating internet resources:

Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC infonet, INFLIBNET and ERNET, What is Plagiarism and how to avoid it?

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York.
- Rajaram V., Fundamentals of computers, Prentice Hall of India, New Delhi

Course Outcome:

- **Utilize Digital Tools for Research and Writing** – Apply word processing, reference management, and document formatting software such as LaTeX, MS Word, and Zotero for academic writing.
- **Analyze and Interpret Data Using Software** – Use qualitative and quantitative data analysis tools like NVivo, ATLAS.ti, or SPSS for research in arts and humanities.
- **Access and Manage Digital Archives and Online Databases** – Efficiently search, retrieve, and organize information from digital libraries, journals, and open-access resources.
- **Enhance Research Presentation and Visualization Skills** – Create professional presentations, infographics, and digital storytelling using tools like PowerPoint, Canva, and visualization software.
- **Ensure Ethical and Secure Use of Digital Resources** – Apply best practices in digital ethics, plagiarism detection, and intellectual property rights in academic research.

HISTORY

Elective Paper -1st

Name of Paper- Historical Methods And Research
Paper Code- PDC-HIST-104

Course Objective:

- **Understand the Fundamentals of Historical Research** – Explore key concepts, sources, and methodologies in historical studies.
- **Develop Skills in Source Criticism and Analysis** – Learn how to evaluate primary and secondary sources for authenticity, reliability, and relevance.
- **Master Various Historical Research Methods** – Apply qualitative, quantitative, comparative, and interdisciplinary approaches in historical research.
- **Enhance Historical Writing and Interpretation** – Develop the ability to construct well-structured, evidence-based historical narratives and arguments.
- **Ensure Ethical and Academic Integrity in Historical Research** – Follow ethical guidelines, proper citation practices, and responsible use of historical data.

UNIT – I:

Meaning, kinds and Nature of History: Meaning of History – Definition of History – Scope and purpose of History – Important study of History – Uses and Abuses of History – History and Allied subjects.

UNIT – II:

Historiography in Ancient, Medieval and Modern period

UNIT – III:

Philosophy of History & Research Methodology; Meaning and Philosophy of History – Definition Development of Philosophy of History. Choice of Topic – Historical Surveys – Primary Sources – Secondary Sources – Problem faced by the scholar and Historians – Collection of sources

UNIT –IV:

Writing of History: Objectivity in Historical Writing – Analysis of Sources.

UNIT V:

Methodology of Teaching Teachings –Objectives of Teaching, Phase of Teaching,Teaching Methods: Letcture Method, Discussion Method, Discovery Learning, Inquiry, Problem Solving Method, Project Method, Seminar.

Suggested Readings:

- Mahalingam, T.V., Early South Indian Palaeography.
- Majumdar R.C – Historiography in Modern India, Bombay, 1970.
- Malcolm Williams, Science and Social Science – An Introduction (Londonand New York : Routeldege, 2000) Manickam, S.
- Theory of History and Methods of Research, Madurai, 2000.
- Nagasamy, R., Kalvettiyal Rajayyan, K., History in Theory and Method,Madurai, 1993
- Ralph De Sola Microfilming. Rowse, A.L., The use of History, London, 1963
- Sailan Ghose Archives in India Sastri, K.A.N., Historical Method,Mysore,1956.
- Schallenberg, T.R., Modern Archives – Principles and Techniques SheikAli, B.,
- History: It"s Theory and Method, Madras, 1991.
- Sircar, D.C., Indian Epigraphy Sivaramamurthi, C., Indian Epigraphyand Indian Scripts.
- South India Historians: K.K.Pillai, K.A.N. K Rajayan Sreedharan, E.A.,
- Text book of Historiography 500 BC to 2000 A.D. Delhi

Course Outcome:

- **Demonstrate Mastery of Historical Research Methods** – Apply qualitative, quantitative, and interdisciplinary approaches in historical inquiry.
- **Critically Analyze Primary and Secondary Sources** – Evaluate historical documents, archival records, and literary sources for authenticity and reliability.
- **Construct Evidence-Based Historical Narratives** – Develop well-structured arguments using diverse historical sources and interpretative methods.
- **Apply Theoretical Frameworks in Historical Studies** – Utilize historiographical approaches to analyze historical events, trends, and cultural shifts.
- **Utilize Digital Tools and Archives for Research** – Effectively access and manage historical databases, digital archives, and research software.
- **Maintain Ethical and Academic Integrity in Historical Writing** – Adhere to ethical research practices, citation norms, and responsible data handling.

Elective Paper -2nd

Name of Paper- Historical Thought and Development
Paper Code-PDC-HIST-105

Course Objective:

- **Explore the Evolution of Historical Thought** – Examine key historiographical traditions, from ancient to modern historical interpretations.
- **Understand Major Historical Theories and Philosophies** – Analyze perspectives such as positivism, Marxism, postmodernism, and other schools of historical thought.
- **Evaluate the Impact of Social, Political, and Cultural Factors** – Assess how historical narratives are shaped by societal influences and changing ideologies.
- **Develop Critical Thinking in Historical Interpretation** – Compare and contrast different historical approaches and their relevance to contemporary research.
- **Enhance Research and Writing Skills in Historiography** – Apply historiographical methods to construct well-argued, evidence-based academic research.

UNIT – I

STATE AND SOCIETY IN ANCIENT INDIA UPTO HARSHA

Origin and evolution of state and society. Four important theories of state: Evolution theory, Force theory, Mystical theory and the contract theory, Kautilya"s theory of State. Fudalizam.

UNIT-II

ECONOMIC HISTORY OF INDIA (1800-1947 A.D)

Three phases of economic exploitation. Drain of wealth, de-industrialization, ruralization of indian economy, commercialization of indian agriculture, Rise of modern industrise, Experiments in land revenue administration.

UNIT-III

HISTORY OF ART AND ARCHITECTURE

Definition – origin and growth – nature - scope – importance – various styles of architecture – Nagara, Vesara, Dravida and their features. Indian painting.

UNIT-IV

CONTEMPORARY HISTORY OF INDIA (1947 – 1991A.D)

Partition and its fallout .Making of Indian Constitution ,Basic features of Indian Constitution – Principles of India Foreign Policy – Merger of Princely States with Indian Union – Re-organization of States on Linguistic basis. Five Year Plans , War with China (1962) and Pakistan (1974) – Contrasting pictures of famines and Green Revolution, Regionalism and regional politics. formation of

Bangladesh, Total revolution by Jayaprakash Narayan – Punjab Crisis and Operation Blue Star .

UNIT-V

ECOLOGICAL HISTORY OF INDIA (1865- 2000 A.D)

Evolution of the Eco-System: Foundation of Biosphere- Process of Evolution from Azoic Age to Quaternary Period, Demographic Spread: Settled Agriculture and Population Growth. Colonialism and Disruption of Ecology,British policy on forest management Social conflicts and their consequences. Industrialization and Green Revolution ,Polution and Ecological Degradation. Capitalist mode of development and its impact on Eco System: Change in land use pattern, Displacement of People and Conservation from the below-Chipco movement and Narmada Bachao Andalan- Towards Environmental Awareness.

Suggested Readings:

- Alfred W. Crossby, Ecological Imperialism, OUP, 1986
- Madhav Gadgil and Ramachandra Guha, This Fissured Land: AnEcological History of India, OUP, 1993
- C.J. Baker, An Indian Rural Economy, 1880-1955, OUP, 1995
- Joy Tivy, Agricultural Ecology, Longman, 1990.
- Ramachandra Guha, The Unquiet Woods, Orient BlackSwan, 2013.
- Mahesh Rangarajan, Fencing the Forest, Conservation and Ecological Change in India's Central Provinces, OUP, 1996
- Mahesh Rangarajan and Sivaramakrishnan, India's EnvironmentalHistory: A Reader, Orient Black Swan, 2013
- Romila Thapar, The Penguin Early India, 2012.
- R. S. Sharma, India"s Ancient Past, Orient Black Swam, 2014.
- Padma Charan Dhal, Indian Society and Culture Atlantic Publishers (P)Ltd. A.L.Basham,
- The Wonder that was India Rupa & Co, Calcutta, 1998.
- A Cultural History of India, Oxford Press, 2004.
- Basham, A.L. (1975). History of India. New Delhi, Oxford University Press. Mohideen Badusha, A. H. (2009).
- History of Indian Architecture. Tirunelveli, Sultans Publications
- Dutt, R. C. The Economic History of India, Vols. I & II, Publication Division, Govt. Of India, 1970
- Radha Kamal Mukherjee & H.L. Dey, eds. Economic Problems of ModernIndia, 2 vols., Macmillan, 1941.
- Bipan Chandra, Nationalism and Colonialism in Modern India, Vikas, 1979.

Course Outcome:

- **Demonstrate Knowledge of Historiographical Traditions** – Understand the evolution of historical thought from ancient to modern times.
- **Analyze Major Schools of Historical Interpretation** – Critically examine theories such as positivism, Marxism, structuralism, and postmodernism.
- **Evaluate the Influence of Social and Political Contexts** – Assess how historical narratives are shaped by cultural, ideological, and political factors.
- **Apply Theoretical Frameworks in Historical Research** – Utilize different historiographical perspectives to interpret historical events and developments.
- **Develop Independent and Critical Thought** – Compare, contrast, and critique various historical methodologies and interpretations.
- **Contribute to Academic Discourse in Historiography** – Produce well-researched, evidence-based scholarly work in the field of historical studies.

Elective 3rd

Name of the Paper: History of India (Dawn to 1757 A.D.)

Paper Code-PDC-HIST-105

Course Objective:

- **Understand the Early Civilizations of India** – Explore the origins, development, and contributions of the Indus Valley Civilization and Vedic society.
- **Examine the Rise and Fall of Major Dynasties** – Analyze the political, social, and economic structures of Maurya, Gupta, Chola, Delhi Sultanate, and Mughal empires.
- **Assess the Impact of Religious and Cultural Movements** – Study the influence of Buddhism, Jainism, Bhakti, and Sufi traditions on Indian society.
- **Investigate Trade, Economy, and Urbanization** – Evaluate the evolution of India's economic systems, maritime trade, and urban centers during different periods.
- **Critically Analyze the Colonial Impact up to 1757** – Understand the arrival of European powers, their trade policies, and the factors leading to British dominance in India.

Unit-I

Foundation of Indian culture and Civilization, Indus Valley Civilization, Vedic Culture, Sangam Age

Unit -II

The Mauryan Empire, Mauryan Polity, Society, economy (Chandragupta Maurya and Ashoka's Dhamma)

Unit- III

Political and Social Conditions, Origins of Rajputs

Unit- IV

Gupta-Vakataka Age: Development of Sanskrit Language and Literature, Development in Science, Technology and Astronomy

Unit-V

The Indo-Islamic Culture, Bhakti Movement, Sufism, Rise of the Sikhs, Guru Nanak, Arjun etc.

Suggested Readings:

- Thapar, Romila, History of Early India.
- Allchin, F.R. and B, Origins of a Civilization: The Prehistory and Early Archaeology of South Asia.
- Jha, D.N, Ancient India in Historical Outline, 1998 Ed.
- Kosambi, D.D, Culture and Civilization of Ancient India.

- Chandra, Satish, Medieval India from Sultanat to the Mughals, Vols. I, II
- Tripathy, R. P, Rise and fall of the Mughal Empire
- Majumdar, R.C. (ed), The History and Culture of the Indian People, Vols. VI
- Asraf, K.M, Life and Conditions of the People of Hindusthan Chitnis,
- K.N, Socio- Economic History of Medieval India
- Habib, M & Nizami, Comprehensive History of India, Vol.V
- Mehta, J.L, Advanced Study in History of Medieval India, Vol. I & II
- Nizami, K.A, Studies in Medieval Indian History and Culture
- Rashid, A, Society and Culture in Medieval India
- Rizvi, S.A.A, The Wonder that was India, Part-II
- Irfan Habib, The Agrarian System of Mughal India 1556-1707,
- M. Athar Ali, Mughal Nobility under Aurangzeb.
- Shireen Moosvi, The Economy of the Mughal Empire
- S.A.A.Rizvi, Muslim Revivalist Movements in Northern India during 16th and 17th Centuries.
- R.P. Tripathi, The Rise and Fall of the Mughal Empire, 2 vol. I.
- H. Siddiqui, Some Aspects of Afghan Despotism.
- Kesvan Veluthat, Political Structure of Early Medieval South India.
- P.J. Marshall, The Eighteenth Century in Indian History.
- Stewart Gordon, The Marathas 1600-1818. Percy Brown, Islamic Architecture.

Course Outcome:

- **Demonstrate a Comprehensive Understanding of Early Indian History** – Analyze the political, social, and economic developments from ancient to early modern India.
- **Evaluate the Contributions of Major Dynasties** – Assess the governance, administration, and cultural achievements of the Maurya, Gupta, Chola, Delhi Sultanate, and Mughal rulers.
- **Analyze the Role of Religion and Cultural Movements** – Examine the impact of Buddhism, Jainism, Bhakti, and Sufi traditions on Indian society.
- **Investigate Economic and Trade Developments** – Understand the evolution of trade networks, agriculture, and urbanization in different historical periods.
- **Critically Assess the European Influence on India** – Examine the arrival of European powers, their trade practices, and the events leading to British dominance by 1757.
- **Develop Research and Analytical Skills in Indian History** – Apply historiographical methods to interpret historical events and debates with a critical perspective.

ENGLISH
Elective-1st
Name of Paper- English Literature
Paper Code- PDC-ENG-104

Course Objectiv

- **Understand Literary** Genres: Explore poetry, drama, fiction, and non-fiction.
- **Analyze Literary Works:** Interpret themes, symbols, and styles in classic and modern texts.
- **Develop Critical Thinking:** Evaluate texts through various literary theories and perspectives.
- **Enhance Communication Skills:** Express ideas clearly through discussions and writing.
- **Appreciate Cultural Contexts:** Understand the historical and social influences on literature.

Unit- I

Postcolonial Theory and Literature, Diaspora Theory and Literature, Postmodernism, Postcolonial Criticism, Feminism and the Subversion of Identity.

Unit -II

Formalism, Structuralism, Post Structuralism, Poetics and Linguistics.

Unit -III

Literary Criticism and Literary Theory---Historical Survey from Plato to contemporary trends, Schools and Approaches, Relation between Literary Theory and Literary Criticism.

Unit- IV

Post Independent writers: Nirad C. Chaudhuri, Maha Swetha Devi, Vikram Seth and Amitav Ghosh, Mulk Raj Anand, Raja Rao, Anita Desai, Salman Rushdie, and other contemporary Writers of Post Independent writers.

Unit -V

Major Trends in English Language Teaching----Approaches in English Language Teaching, Methods of Teaching English, Techniques of Teaching English.

Suggested Readings:

- Ashcroft, Bill, et al. eds. Key Concepts in Post-Colonial Studies. London: Routledge,2004.
- The Empire Writes Back: Theory and Practice in Post-Colonial Literatures. Routledge, 2002.
- Bassnett, Susan. Comparative Literature: An Introduction. Blackwell,1993.
- Dev, Amiya. The Idea of Comparative Literature in India. Calcutta: Papyrus, 1984.
- Gifford, Henry. Comparative Literature: Concepts of Literature. Routledge, 1969.
- Glover, David and Cora Kaplan. Eds. Genders. Routledge, 2008.
- Habib, M.A.R. A History of Literary Criticism and Theory: From Plato to the Present.
- London: Wiley-Blackwell, 2012.

- Huggan, Graham and Helen Tiffin. Post-Colonial Ecocriticism: Literature, Animals, Environment. Routledge, 2009.
- Paranjape Makarand. In Diaspora: Histories, Texts, Theories. Delhi: India log, 2002.
- Postmodernism and the Contemporary Novel: A Reader. Ed. Bran Nicol,
- Gyan Prakash. —Subaltern Studies as Postcolonial Criticism.‖
- Nicol, Bran, ed. Postmodernism and the Contemporary Novel: A Reader. Edinburg: Edinburg University Press, 1992.
- Lodge, David, ed. Modern Criticism and Theory: A Reader. London: Longman, 1988.
- Barker, Chris. Cultural Studies: Theory and Practice. London: Sage, 20Ph.
    - Course Work/ M. Phil (English)
- Christopher Caudwell Illusion and Reality.
- David Lodge and Nigel Wood Modern Literary Theory and Criticism: AReader
    - Donald Hall Queer Theories.
- Edward Said Orientalism.
- Ellis Hansen Out Takes: Essays on Queer Theory and Film.
- George Lukacs Studies in European Realism.

Course Outcome:

- **Demonstrate In-Depth Knowledge of Literary Theories and Movements** – Analyze key literary periods, genres, and critical approaches in English literature.
- **Critically Evaluate Canonical and Contemporary Texts** – Engage in close reading and interpretation of classical and modern literary works.
- **Apply Interdisciplinary Approaches to Literary Studies** – Integrate insights from history, philosophy, psychology, and cultural studies in literary analysis.
- **Develop Advanced Research and Analytical Skills** – Conduct independent research, synthesize diverse perspectives, and contribute original insights to the field.
- **Examine the Role of Literature in Society** – Assess how literature reflects and influences social, political, and cultural contexts across different eras.
- **Produce Scholarly Writing and Academic Contributions** – Publish research papers, participate in literary discourse, and contribute to academic discussions in English literature.

Elective-2nd

Name of Paper-English Language Teaching

Paper Code-PDC-ENG-105

Course Objective

- **Understand Teaching Methods**: Explore approaches like grammar-translation, direct, and communicative methods.
- **Develop Lesson Plans:** Design effective lessons for language skills — listening, speaking, reading and writing.
- **Apply Language Theories:** Use linguistic and pedagogical principles in teaching.
- **Enhance Classroom Techniques:** Implement interactive and student-centered teaching strategies.
- **Assess Language Skills:** Create and evaluate assessments for language proficiency.

Unit- I

Approaches and Techniques in ESL pedagogy. Issues related to ESL/EFL pedagogy Learner centred practices, including autonomy, blended learning, feedback, interaction, Role of Teacher and Learner in ESL/EFL classroom.

Unit II:

Curriculum Development and Syllabus Design for English Teaching.

Factors to be taken into Account in Curriculum Development and their implications for Syllabus Design in English language Teaching, RecentTrends and Developments in Syllabus and Course Design. The Contribution of Linguistic and Allied Studies to Syllabus and Course Design.

Unit III:

Curriculum Development in Language Teaching

The origin of Language Curriculum Development, Syllabus Design to Curriculum Development, Needs analysis.

Unit IV:

Developing Programs and Materials for Language Learning.

The Scope of a Communicative Syllabus, Focusing on language content in a communicative Syllabus, Focusing on process: materials that deal with socio cultural appropriateness.

Unit V:

Teaching English as a Second Language.

Suggested Readings:

- Abbott, G. & Wingard, P. (eds.) (1992) Teaching of English as anInternational Language. A Practical Guide. Surrey: Nelson. Celce- Murcia, M. M. (ed.) (1991) Teaching English as a Second or Foreign Language. Rowley, MA: Newbury House.
- Crystal, David. (1987) The Cambridge Encyclopedia of Language. Cambridge, England: Cambridge University Press
- David Nunan. (1998) Language Teaching Methodology. NJ: Prentice Hall
- Desmond M. Allison. (1999) Language Testing and Evaluation: An Introductory Course.
- Singapore: World Scientific Publishing Company
- Doff, Adrian. (1988) Teach English – A Training Course for Teachers. Cambridge, England: Cambridge University Press
- Raghubir Sahai Gupta, Kapil Kapoor. (1991) English in India, Issues and Problems. New Delhi: Academic Foundation
- Richards J. and R o d g e r s T.(2002) Approaches and Methods in Language Teaching. Cambridge: CUP
- Thirumala, M.S. (2002) An Introduction to TESOL, Mysore: Central Institute of Indian Languages.
- Crystal, D. (1987).The Cambridge Encyclopedia of Language.Cambridge:CUP.
- Harmer, J. (2007).The Practice of Teaching English, 4th edition. Pearson Longman.
- Scrivener, J. (1994). Learning Teaching: A Guidebook for English Language Teachers. Oxford:
- Heinemann.
- Ur, Penn. (1996). A Course in Language Teaching: Practice and Theory. Cambridge: CUP
- Richards C. J. &Rodgers S. T. (2001) Approaches and Methods in Language Teaching, CUP.
- Yule, G. (2010) The Study of Language, 4th edition. CUP.

Course Outcome:

- **Demonstrate Understanding of Language Teaching Theories** – Analyze key linguistic and pedagogical theories relevant to English language teaching.
- **Apply Effective Teaching Methodologies** – Utilize communicative, task-based, and learner-centered approaches for teaching English.
- **Evaluate Language Assessment and Testing Techniques** – Design and implement appropriate assessment tools for measuring language proficiency.
- **Integrate Technology in Language Teaching** – Use digital tools, multimedia, and online platforms to enhance language learning.
- **Develop Curriculum and Teaching Materials** – Design syllabi, lesson plans, and instructional materials tailored to diverse learner needs.
- **Engage in Research and Innovation in Language Teaching** – Conduct empirical studies and contribute to the advancement of English language teaching methodologies.

Elective-3rd

Name of Paper- American Literature

Paper Code-PDC-ENG-106

Course Objective

- **Understand Key Movements:** Explore major periods like Puritanism, Transcendentalism, and Modernism.
- **Analyze Literary Works:** Interpret themes, styles, and cultural contexts of American texts.
- **Study Influential Authors:** Examine works of writers like Whitman, Dickinson, Hemingway, and Morrison.
- **Develop Critical Thinking:** Apply literary theories to analyze American literature.
- **Enhance Communication:** Express ideas clearly through discussions and analytical writing.

Unit- I

History of American Literature- Major Trends, Plot, techniques, Aspects of American Literature, Political Condition, Narration

UNIT II

American Novels - Themes - Narrative Techniques
Ernest Hemingway – The Old Man and Sea
Mark Twain- The Adventures of Huckleberry Finn
Tony Morrison – The Bluest Eye

UNIT III

American Drama – Nature – Characteristics – Plot
Tennessee Williams – The Glass Menagerie
Arthur Miller- All My Sons
Eugene O' Neil – The Hairy Ape

UNIT IV

American Poetry –
Robert Frost- Mending Wall, Stopping by the Woods on a snowy Evening
Ezra Pound--- The Cantos
Sylvia Plath—Mirror
Emily Dickson---Hope is the Thing with Feathers

Suggested Readings:

- Knipping , Alpana Sharma, New Immigrant Literatures in the United States: a source book to our Multicultural Literary Heritage. Westport, CT Greenwood press, 1996

- Miller, Arthur: Collected Plays, Bombay: allied Publishers, 1973
- 틁 ascoigne, Bamber 20th century Drama, London: Huthinson University Library,1974
- Morrison Toni, Sula, Badford:traid,1980
- O'Neil, Eugene Desire Under the Elms and Great God Brown, Great Britain,NonathonCape,1925
- Robert Frost : Poems, New York; Washington Square Press,1969
- Hemingway, Ernest, Old Man and the Sea New York, Charles Scribner's Sons 1952
- Peck, David R American Ethnic Literatures: Native American, African American, and other their background, Selam press, 1992.
- Peck,John & Martin Coyle, Literary Terms and Criticism, NewYork: palgrave Macmillan,2002
- Walker, Alice,: In search of Our Mother's Garden, New York:Harvest 1983.

Course Outcome:

- **Analyze Major Literary Movements in American Literature** – Examine key periods such as Puritanism, Transcendentalism, Realism, Modernism, and Postmodernism.
- **Critically Evaluate American Literary Texts** – Interpret and assess works from diverse genres, including poetry, fiction, drama, and essays.
- **Understand the Social and Cultural Contexts of American Literature** – Explore themes such as race, identity, gender, the American Dream, and democracy in literary works.
- **Apply Theoretical Frameworks in Literary Analysis** – Utilize literary and cultural theories to study American literature from multiple perspectives.
- **Conduct Advanced Research in American Literary Studies** – Engage in scholarly discourse, contribute original insights, and produce high-quality research publications.

POLITICAL SCIENCE

Elective Paper-1st

Name of Paper-Key Concepts in Comparative Political Analysis
Paper Code-PDC-POL.SCIE-104

Course Objective:

- **Develop a Comprehensive Understanding of Comparative Politics** – Explore the fundamental theories, frameworks, and methodologies used in comparative political analysis.
- **Examine Political Institutions and Systems** – Analyze the structure and functioning of different political systems, including democracies, autocracies, and hybrid regimes.
- **Understand Political Culture and Behavior** – Investigate how political ideologies, public opinion, and participation shape governance across nations.
- **Analyze Policy-Making and Governance Models** – Compare policy formulation, implementation, and evaluation in different political contexts.
- **Assess the Impact of Globalization on Political Systems** – Explore how international organizations, transnational movements, and global trends influence domestic politics.
- **Apply Comparative Methods in Political Research** – Develop critical thinking and analytical skills to conduct independent research in comparative political studies.

UNIT I- Understanding Comparative Political Analysis:

Introduction of Comparative Analysis, Importance of Comparison, Forms of Comparative Analysis, Importance of Comparative political analysis in the study of the Third World, Limits of Comparative political Analysis

UNIT II- Nation and Nationalism:

Understanding Nation, Nationalism and Nation States, Forms of Nationalism, Major debates on Nationalism, Future of Nationalism.

UNIT III- Democracy and Processes of Democratization:

What is democracy? Dimensions of democratization, Processes of transition and consolidation, Future of Democracy and democratization

UNIT IV- Development and its Critiques:

The Concept of Development: Theories of Development; Marxist and Neo Marxist Theories, State and the Economy: Role of the State in Economic Development. Democracy and Development

UNIT V- Social Movements and Revolutions:

The Concept of Social Movement, Meaning and Types: Reform, Revival, Revolution; Social Movements and Social Change; Schisms and Splits; Counter-Movements; Leadership and Social Movements; Media and Social Movements, Theories of Social Movements Structural Functional; Marxist; Weberian; Contemporary, New Social Movements, Differentiating Social Movements and Revolutions, Contentious Politics: Intersection of Social

Movements and Revolutions.

Suggested Readings:

- M. Mohanty, (1975) „Comparative Political Theory and Third World Sensitivity", in Teaching Politics, Nos. 1 and 2, pp. 22-38
- N. Chandhoke, (1996) „Limits of Comparative Political Analysis „, in Economic and Political Weekly, Vol. 31 (4), January 27, pp.PE 2-PE2- PE8.
- Heywood, (2002), „The State", in Politics. New York: Palgrave, pp. 85-102
- T. Landman, (2003) „Transition to Democracy", in Issues and Methods of Comparative Methods: An Introduction. London: Routledge, pp. 185-215.
- J. Haynes, (1999) „State and Society", in The Democratization. Oxford: Blackwell, pp. 20-38; 39-63.
- B. Smith, (2003) „Democratization in the Third World", in Understanding Third World Politics: Theories of Political Change and Development. London: Palgrave Macmillan, pp.250-274.
- M. Radhakrishnan, and Debasmita, (2003) „Nationalism is a Great Menace: Tagore and Nationalism" in P. Hogan, Colm and L. Pandit, (eds.) Rabindranath Tagore: Universality and Tradition, London: Rosemont Publishing and Printing Corporation, pp. 29-39.
- Omahe, K. (2004) „The End of the Nation State", L. Lechner, F. J and Boli, J. (eds.) The Globalization Reader. Oxford: Blackwell.
- N. Menon, (2008) „Power", in R. Bhargava and A. Acharya (eds), Political Theory: An Introduction, Delhi: Pearson, pp.148-157.
- B. Parekh, (1997) „The Critique of Modernity", in Gandhi: A Brief Insight, Delhi: Sterling Publishing Company, pp. 63-74.
- D. Hardiman, (2003) „Narmada Bachao Andolan", in Gandhi in his Time and Ours. Delhi: Oxford University Press, pp. 224- 234.
- Ray, (1996) „Civil Rights Movement and Social Struggle in India", in Economic and Political Weekly, XXI (28). pp. 1202-1205.
- Roy, (2010) „The Women"s Movement", in N.Jayal and P. Mehta (eds.) The Oxford Companion to Politics in India, New Delhi: Oxford University Press, pp.409-422.
- P. Bardhan, (2005) The Political Economy of Development in India, 6th impression, Delhi: Oxford University Press.
- R, Ray and M. Katzenstein, (eds.), (2005) Social Movements in India, Delhi: Oxford University Press.
- Dunleavy, P. and O'Leary, B. (1987) Theories of the State. London: Routledge.
- Sen, A.(1998) Development as Freedom. New Delhi: Oxford University Press, pp. 87-110.
- Benedict Anderson, Imagined Communities: Reflections on the Origin and Spread of Nationalism, London, Verso, 1991
- Wolfgang Sachs (eds), The Development Dictionary, Orient Longman, Delhi, 1997
- Ghanshyam Shah (ed.), Social Movements and the State, Sage, New Delhi, 2002.
- Chatterjee Partha, Nationalist thought and the Colonial World: A

Derivative Discourse, Zed Books for United Nations University, London, 1986.

Course Outcome:

- **Demonstrate an In-Depth Understanding of Comparative Political Theories** – Analyze key frameworks and methodologies used in comparative political analysis.
- **Critically Evaluate Political Institutions and Systems** – Compare and contrast governance structures, electoral systems, and political ideologies across different nations.
- **Assess the Role of Political Culture and Public Opinion** – Examine how societal values, identity politics, and civic engagement influence political behavior.
- **Analyze Policy-Making and Governance in a Comparative Perspective** – Investigate policy formulation, implementation, and outcomes across diverse political settings.
- **Conduct Independent Research in Comparative Politics** – Apply theoretical and methodological tools to study political phenomena and contribute to academic discourse.

Elective Paper-2nd

Name of Paper-Introduction to Contemporary Political Philosophy
Paper Code-PDC-POL.SCIE-105

Course Objective:

- **Understand Core Concepts in Contemporary Political Philosophy** – Explore fundamental ideas such as justice, democracy, liberty, equality, and rights in modern political thought.
- **Analyze Major Political Theorists and Schools of Thought** – Examine key philosophers like John Rawls, Robert Nozick, Michel Foucault, and Jürgen Habermas.
- **Evaluate the Ethical and Philosophical Foundations of Governance** – Assess the moral and theoretical justifications of political authority, power, and state legitimacy.
- **Examine Contemporary Debates in Political Philosophy** – Explore issues such as multiculturalism, identity politics, global justice, and human rights from diverse philosophical perspectives.
- **Develop Critical Thinking and Argumentation Skills** – Engage in logical reasoning, construct well-founded arguments, and apply philosophical concepts to contemporary political challenges.

UNIT I – Utilitarianism

Introduction to Utilitarianism, Elements and Types of Utilitarianism, Arguments for Utilitarianism, Theories of Well-being, Objections to Utilitarianism and Responses.

UNIT II- Liberalism

What is liberalism? Forms of Liberalism: Classical and Modern, Liberalism and Libertarianism, Liberalism in Global Age.

UNIT III- Marxism

Understanding Marxism, Dialectical Materialism, Historical Materialism, The Theory of Class Struggle, Class Revolution, Communism, Socialism and Capitalism, Critical Theory, Marxism vs. Neo-Marxism

UNIT IV- Multiculturalism

Origin and Development, The claims of Multiculturalism, Politics of Recognition, Politics of Difference, Critique of Multiculturalism

UNIT V- Feminism

Origin and Development, The Politics of Personal, Liberal Feminism, Socialist Feminism, Radical Feminism, Recent Developments

Suggested Readings;

- Knowles, Dudley. (2001) Political Philosophy, London: Routledge.
- Seaglow, Jonathan. (2003) „Multiculturalism" in Bellamy, Richard and

Mason, Andrew (eds.). Political Concepts. Manchester: Manchester University Press.

- Mookherjee, Monica, „Multiculturalism", in Mckinnon, Catriona. (ed.)Issues in Political Theory. New York: Oxford University Press.
- C. Mc Cann and S. Kim (eds), The Feminist Reader: Local and Global Perspectives, New York: Routledge Shinde, Tarabai (1993)
- „Stri-Purush Tulna", in Tharu, Susie & Lalita, K. (eds.) Women Writing in India, 600 BC to the Present. Vol. I. New York: Feminist Press.
- V Geetha, (2002) Gender, Kolkata, Stree, pp. 1- 20
- Sandel, Michael, 1982, Liberalism and the Limits of Justice, Cambridge: Cambridge University Press Taylor, Charles, et al, 1994, Multiculturalism: Examining The Politics of Recognition, Princeton: Princeton University Press.
- Bina Agarwal (ed.), Structures of Patriarchy: State, Community and Household in Modernizing Asia, Kali for Women, New Delhi, 1988. Scott, Joan and Judith Butler edited.
- Feminists Theorize the Political. London, Routledge, 1992.
- Iris Marion Young, Polity and Group Difference: A critique of the Ideal of Universal Citizenship, Ethics 99 (2), 1989
- Will Kymlicka, Multicultural Citizenship (Chapter 9 & Conclusion, pp.173-95), Oxford: Clarendon Press, 1995
- Ivison, Duncan.(2002) Postcolonial Liberalism, Cambridge, CUP.

Course Outcome:

- **Demonstrate a Deep Understanding of Contemporary Political Theories** – Analyze key philosophical concepts such as justice, liberty, equality, and democracy.
- **Critically Engage with Major Political Thinkers** – Evaluate the contributions of theorists like John Rawls, Robert Nozick, Michel Foucault, and Jürgen Habermas.
- **Analyze the Philosophical Foundations of Political Institutions** – Examine the ethical and theoretical underpinnings of governance, state power, and political legitimacy.
- **Evaluate Contemporary Political Issues through a Philosophical Lens** – Apply political philosophy to debates on human rights, multiculturalism, identity politics, and global justice.
- **Develop Independent Research and Analytical Skills** – Conduct rigorous philosophical analysis and contribute original perspectives to the field of political philosophy.
- **Enhance Critical Thinking and Argumentation Abilities** – Construct well-reasoned arguments and critique contemporary political ideas with logical precision.

Elective Paper-3rd

Name of Paper- Indian Government and Politics
Paper Code-PDC-POL.SCIE-106

Course Objective:

- **Understand the Foundations of the Indian Political System** – Explore the historical evolution, constitutional framework, and core principles of Indian democracy.
- **Analyze the Structure and Functioning of Government Institutions** – Examine the roles of the legislature, executive, judiciary, and other constitutional bodies.
- **Evaluate Political Processes and Electoral Dynamics** – Study party systems, voting behavior, federalism, and the impact of social movements on Indian politics.
- **Assess Key Policies and Governance Challenges** – Investigate issues such as economic reforms, social justice, regionalism, and the role of bureaucracy in policy implementation.
- **Develop Research Skills in Indian Political Studies** – Engage in critical analysis, comparative approaches, and empirical research on contemporary political developments in India.

Unit I Nature of the State in India

Emergence of Modern State in India, The Structural and Functional Evolution of State, Issues before the Indian State

Unit II Indian Constitution

Making of the Constitution of India, Basic Features, Debates on Fundamental Rights and Directive Principles.

Unit III Institutional Functioning

Union and State Legislatures, Executive, Judiciary
Local Governance- Rural and Urban

Unit IV Parties and Party Systems in India

Political Parties, Party Systems, Interest Groups and Pressure Groups

Unit V Power Structure in India

Caste, Class and Patriarchy

Unit VI Religion and Politics

Debates on Secularism and Communalism

Suggested Readings:

1. Rajani Kothari, Politics in India, Orient Longman, 1970.
2. D.Basu, An Introduction to the Constitution of India, New Delhi, Prentice Hall, 1980.

3. Austin, The Indian Constitution: Corner Stone of a Nation, Oxford University Press, 1966.
4. P. Bhambhari, The Indian state,: fifty years, New Delhi, Shipra; 1997.
5. V.Pylee, Constitutional Government in India, Bombay, Asia Publishing house,1977.
6. C.Johri, Indian politics, Vishal publication Agra.
7. Weiner, Party Politics in India, Princeton University Press, 1957.
8. Niraja Gopal Jayal and Pratap Bhanu Mehta. (2011) The Oxford Companion to Politics in India, Oxford University Press, India.
9. Bidyut Chakrabarty and Rajendra Kumar Pandey. (2008) Indian Government and Politics, Sage Publication, India.
10. Himanshu Roy and Mahendra Prasad Singh. (2012) Indian Political System, 4th Edition, Pearson India.
11. Pravin Kumar Jha. (2012) Indian Politics in Comparative Perspective, Pearson Education India.
12. Abhay Prasad Singh and Krishna Murari. (2019) Political Process in Contemporary India, Pearson Education India.
13. Niraja Gopal Jayal. (2007) Democracy in India (Themes in Politics), Oxford University Press.
14. Neera Chandhoke & Praveen Priyadarshi. (2011) Contemporary India – Economy, Society, Politics, PEARSON India.
15. Rajni Kothari. (2012) Politics in India, 2nd Edition, , Orient BlackSwan, India.
16. Granville Austin. (1999) The Indian Constitution: Cornerstone of A Nation, Oxford University Press.

Course Outcome:

- **Demonstrate a Deep Understanding of India's Political System** – Analyze the historical evolution, constitutional framework, and foundational principles of Indian democracy.
- **Critically Assess the Functioning of Government Institutions** – Evaluate the roles and interactions of the legislature, executive, judiciary, and federal structures.
- **Analyze Electoral Processes and Political Dynamics** – Study party systems, electoral trends, coalition politics, and voter behavior in India.
- **Examine the Impact of Social and Political Movements** – Assess how caste, religion, gender, and regionalism shape Indian political discourse and policymaking.
- **Evaluate Key Governance Challenges and Policy Issues** – Investigate contemporary political challenges such as corruption, economic reforms, social justice, and center-state relations.
- **Develop Research and Analytical Skills in Indian Politics** – Conduct independent research, engage in comparative political analysis, and contribute to academic discussions on Indian governance.

HINDI

Paper Code –PDC-HINDI-104

पी.एच.डी. पाठ्यक्रम

वैकल्पिक - 1

हिन्दी भाषा और उसकी संरचना

इकाई 1 : हिन्दी भाषा - ऐतिहासिक परिपेक्ष्य

1.1 अपभ्रंश, अवहट्ठ और पुरानी हिन्दी

1.2 हिन्दी ध्वनियों का विकासात्मक अध्ययन

1.3 संयोगात्मक और वियोगात्मकता से अभिप्राय और हिन्दी भाषा की प्रकृति

1.4 हिन्दी भाषा की प्रमुख व्याकरणिक विशेषताएँ

1.5 हिन्दी भाषा की प्रयुक्तियों का सामान्य परिचय

इकाई 2 : हिन्दी भाषा की शब्द-संरचना

2.1 हिन्दी की शब्द-रचना: रूढ़, यौगिक, योगरूढ़

2.2 संधि, समास; उपसर्ग, प्रत्यय (संस्कृत, फारसी, अरबी और हिन्दी)

2.3 अर्थ-विकास, आगत शब्दावली और कोड-मिश्रण

2.4 विभिन्न प्रयुक्तियों के लिए शब्द-निर्माण : दशा और दिशा

2.5 शब्द और संस्कृति

इकाई 3 : हिन्दी भाषा की वाक्य-संरचना

3.1 पद, पदक्रम, पदान्वय

3.2 सरल, संयुक्त और मिश्र वाक्य

3.3 तान, अनुतान, लय, स्वराघात, बलाघात

3.4 प्रभावी वाक्य-रचना और मुहावरे

3.5 विशिष्ट सांस्कृतिक अभिव्यक्तियाँ और वाक्य-गठन

इकाई 4 : हिन्दी भाषा - व्यावहारिक प्रयोग

4.1 कथात्मक, वर्णात्मक, विवेचनात्मक, आलोचनात्मक, गवेषणात्मक एवं सर्जनात्मक भाषा

4.2 काव्य-भाषा

4.3 गद्य-भाषा

4.4 आलोचना की भाषा (व्यावहारिक प्रयोग)

4.5 शोध की भाषा (व्यावहारिक प्रयोग)

Paper Code-PDC HINDI-106

तृतीय पेपर

इकाई 1:

हिंदी भाषा का विकास--

अपभ्रंश, अवहट्ठ, प्रारंभिक हिंदी , मध्यकाल में व्रज और अवधि का साहित्य भाषा के रूप में विकास, हिंदी भाषा और नागरी लिपि , सिद्ध - नाथ साहित्य,
खड़ी बोली का प्रारंभिक स्वरूप.

इकाई 2:

भारतीय संघ की राजभाषा हिंदी ---

हिंदी भाषा का वैज्ञानिक और तकनीकी विकास , हिंदी की प्रमुख बोलियां और उनका परस्पर संबंध , नागरी लिपि की प्रमुख विशेषताएं .

इकाई 3—

हिंदी साहित्य का इतिहास

हिंदी साहित्य की प्रासंगिकता, हिंदी साहित्य का महत्व, इतिहास लेखन की परंपरा.

इकाई 4—

मानक हिंदी --

देवनागरी लिपि का मानक स्वरूप, तकनीक की भाषा के रूप में हिंदी का विकास ,
मानक हिंदी की विशेषताएं

Paper Code-PDC HINDI-105

पी.एच.डी. पाठ्यक्रम

वैकल्पिक - 2

आधुनिक हिन्दी कविता

इकाई 1 : आधुनिकता की अवधारणा

1.1 19वीं शताब्दी का उत्तरार्ध : औद्योगिक विकास, शहरीकरण और सामाजिक ढाँचे में परिवर्तन

1.2 व्यक्ति, समाज और इतिहास

1.3 संस्कृति और सभ्यता

1.4 परम्परा और आधुनिकता

1.5 आधुनिकता और आधुनिकता-बोध

इकाई 2 : आधुनिक कविता की भाव-भूमि

2.1 मनुष्य केंद्रिकता, राष्ट्र भावना

2.2 आदर्श, रोमन और यथार्थ

2.3 व्यक्तिपरकता, वैयक्तिकता और व्यक्तिवाद

2.4 मानववाद, नव-मानववाद और मानवीय अस्मिता

2.5 असंतोष, मोहभंग, विद्रोह और मुक्ति की आकांक्षा

इकाई 3 : आधुनिक कविता की रूप-चेतना

3.1 वस्तु और रूप

3.2 पारम्परिक छंद-ग्रहण, परिवर्तन और अस्वीकार; गीत के विभिन्न रूप

3.3 मुक्तछंद और छंदमुक्त कविता

3.4 प्रबंधात्मक कविता और लम्बी कविता

3.5 बिम्ब, प्रतिक, मिथक और फैंटेसी

इकाई 4 : काव्य-भाषा

4.1 काव्य-भाषा के रूप में खड़ी बोली

4.2 इतिवृत्तात्मकता, लाक्षणिकता

4.3 बिम्बात्मकता, व्यंग्यात्मकता

4.4 काव्य-भाषा चिंतन: छायावाद, प्रगतिवाद, तार सप्तक

4.5 सपाट बयानी, जान-भाषा, भदेसपन

SYLLABUS
OF
DEPARTMENT OF COMMERCE & MANAGEMENT

Compulsory Paper: 1st

Name of Paper- Research Methodology
Paper Code: PDC-101

Course Objective:

- **Develop a Strong Foundation in Research Principles** – Understand the fundamental concepts, significance, and scope of research in commerce and management.
- **Explore Various Research Designs and Methodologies** – Learn qualitative, quantitative, and mixed-method approaches for conducting business and management research.
- **Enhance Skills in Data Collection and Analysis** – Utilize appropriate tools and techniques for data gathering, processing, and statistical interpretation.
- **Understand Ethical and Legal Aspects of Research** – Ensure integrity, transparency, and ethical compliance in academic and corporate research.
- **Apply Research Findings to Business and Management Decision-Making** – Use research-based insights to solve real-world business challenges and contribute to policy development.

Unit-I:

Introduction Meaning and Definitions Concept, Construct definitions, Operational Definition, Objectives of Research; Sources of knowledge, Research Process, Positivism, Interpretation, Ontological Consideration. Concept of process, types, approaches, Research Problem: Identification and formulation, criteria for good research problem, Preparation of research proposal, Components of Research Design, Hypotheses; Types, qualities of workable hypotheses, usefulness of hypotheses in business research

Unit-II:

Sampling and Data Collection Sampling: Principles, Methods (Probability and Non- Probability), Characteristics, Sampling Distribution and Errors. Data Collection Sources (Primary, Secondary), techniques: Observation, Interview, Schedules, and Questionnaire.

Unit-III:

Data Analysis Data preparation: Editing, Coding, and preliminary arrangement, Univariate and Bi-Variate. Statistical Estimation and Testing: Statistical testing - hypotheses and errors; test of attributes and variables, z - test, t - test, and f – test. Non-Parametric Tests: Chi-square test; Sign test; Wilcoxon Signed -Rank test; Wald-Wolfowitz test; Kruskal-Wallis Test, Mann Whitney U Test. Interpretation of Statistical Results

Unit-IV:

Advanced Methods of Empirical Analysis: Factor Analysis; Multidimensional Scaling; Structural Equation model, Data Envelope Analysis. Panel Data Regression Model: Reasons for using Panel Data, Examples of Panel; Methods of Estimation, The Fixed Effects Approach and Random Effect Approach.
Research Report Writing Meaning, Definitions and types, preparation, Context, and format, presentation, Referencing, Citation

Unit-V:

Application of Computer Software in Social Sciences Research: SPSS, E-Views, STATA, MS-EXCEL.

Suggested Readings:

- Hair, Anderson & Others: Multivariate Data Analysis, PHI
- Koutsoyannis A: Theory of Econometrics, ELBS
- Kendal and Stuart: Advanced Theory of Statistics, PHI
- Conover W.J: Practical Non-Parametric Statistics, John Willey
- Gupta SC: Fundamentals of Statistics, Hamalaya Publishing HouseBox. Jenkin & Reinsl: Time Series Analysis, Pearson
- J. Johnston Econometric methods
- D.N. Gujrati and Sangeetha Basic Econometrics
- R. Ramanathan An Introduction to Data Envelopment Analysis
- Kothari Research Methodology
- Brooks Chris: Introductory Econometrics for Finance, Cambridge University Press

Course Outcome:

- **Demonstrate a Comprehensive Understanding of Research Methods** – Apply qualitative, quantitative, and mixed-method research techniques in commerce and management studies.
- **Formulate and Develop Research Problems** – Identify gaps in existing literature and construct well-defined research questions relevant to business and management.
- **Collect, Analyze, and Interpret Data Effectively** – Utilize appropriate statistical tools and software for data-driven decision-making in research.
- **Ensure Ethical Standards in Research Practices** – Adhere to ethical guidelines, plagiarism norms, and academic integrity in scholarly publications.
- **Apply Research Insights to Business and Management Issues** – Use empirical evidence to support strategic decision-making and policy formulation in corporate and academic settings.

Compulsory Paper – 2nd

Name of Paper - Research & Publication Ethics
Paper Code: PDC-102

Course Objective:

- **Understand the Fundamentals of Research Ethics** – Gain knowledge of ethical principles, integrity, and responsible conduct in academic and business research.
- **Ensure Academic Honesty and Plagiarism Awareness** – Learn about plagiarism detection tools, citation practices, and the importance of originality in research.
- **Explore Ethical Guidelines in Publishing** – Understand authorship criteria, peer review processes, and best practices for publishing in reputed journals.
- **Address Misconduct and Ethical Violations** – Identify issues like data falsification, fabrication, and predatory publishing, and learn how to prevent them.
- **Apply Ethical Standards in Business and Management Research** – Integrate ethical considerations in data collection, analysis, and dissemination of research findings for academic and corporate use.

Unit-I:

Philosophy and Ethics: Introduction to philosophy: Definition, nature and scope, concept, branches. Ethics: Definition, moral philosophy, nature of moral judgments and reactions.

Unit-II:

Scientific conduct: Ethics with respect to science and research. Intellectual honesty and research integrity Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP) Redundant publications: Duplicate and overlapping Publications ,salami slicing. Selective reporting and misrepresentation of data

Unit-III:

Publication Ethics: Publication ethics: definition, introduction and importance. Best practice/ standards setting initiatives and guidelines: COPE, WAME, etc., Conflicts of interest, Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types, Violation of publication ethics, authorship and contributorship, Identification of publication misconduct, complaints and appeals, Predatory publishers and journals.

Unit-IV:

Open Access Publication - Open Access Publication and initiatives, SHERPA/ RoMEO online resource to check publisher copy, write and self-archiving policies, software tool to identify predatory publications develop by SPPU, journal finder/journal suggestion tools viz. JANE,ELSEVIER journal finder, springer journal suggester

Unit-V: Publication misconduct

A. Group Discussion: Subject specific ethical issues, FFP, authorship, Conflict of interest, Complaints and appeals: example and fraud from India and abroad

B. software tools - Use of plagiarism software like Turnitin, Urkund another open software tools

Unit-VI:

Data Base and Research Matric

A. Data base: Indexing data base, Citation Data base: web of science, Scopus, research scholar, etc.

B. Research matrix : Impact of journals as per journal citation report, SNIP,SJR,IPP, Cite score, Matrix: h-index, g- index, i 10 index, altmetrics

Suggested Readings:

- Bird, A. (2006)Philosophy of science. Routledge.
- Macintyre, Alasdair (1967) A short history of ethics, London.
- P. Chaddah (2018) Ethics in competitive research: Do not get plagiarized,
- ISBN: 978-9387480865.
- National Academy of Science, National Academy of Engineering and institute of medicine (2009) On being a scientists: A guide to responsible conduct in research: third Edition. National academy press

Course Outcome:

- **Demonstrate an Understanding of Ethical Research Practices** – Apply principles of integrity, transparency, and academic honesty in research.
- **Identify and Prevent Plagiarism** – Utilize plagiarism detection tools and adhere to proper citation and referencing techniques.
- **Follow Ethical Guidelines in Publishing** – Comply with authorship norms, peer review processes, and journal selection criteria for responsible publication.
- **Recognize and Address Research Misconduct** – Identify unethical practices such as data falsification, fabrication, and predatory publishing, and adopt preventive measures.
- **Ensure Ethical Compliance in Business and Management Research** – Implement ethical standards in data collection, analysis, and dissemination of research findings for academic and industry applications.

Compulsory Paper – 3rd

Name of Paper - Computer Applications
Paper Code: PDC-103

Course Objective:

- **Develop Proficiency in Business-Oriented Software Tools** – Gain hands-on experience with essential software applications for data analysis, financial modeling, and business management.
- **Enhance Data Management and Analysis Skills** – Learn to use database management systems, spreadsheets, and statistical software for effective decision-making.
- **Understand the Role of IT in Business Research** – Explore the impact of emerging technologies like AI, big data, and cloud computing in management research.
- **Improve Research Efficiency Through Digital Tools** – Utilize reference management software, plagiarism checkers, and document formatting tools for scholarly writing.
- **Apply Computational Techniques in Business Problem-Solving** – Use data visualization, forecasting models, and simulation tools to support strategic decision-making.

Unit–I:

Basic Knowledge of Computer – Definition of Computer, Block diagram of computer, classification of computer, role of computer in Education, Components of Computer Hardware (CPU, Monitor, Keyboard etc.), Software, Operating system(OS), Functions of OS.

Unit– II:

Computer Applications for Research

Word Processing: Introduction of word processor, creating & saving documents, Formatting of document, Steps in writing report, layout of research report, types, precautions, Presentation of research report.

Data Processing: Introduction to excel, need of spreadsheet, creating, opening & saving workbook, editing worksheet, using links, applying different views, Types of functions, Use of statistical tool and their presentation in the form of charts and graphs, Use of EXCEL in synthesizing and summarizing

Power Point: Introduction of Power Point for presentation-preparation of slides, Designs & Animation, Use of Power Point in preparing the presentation on Research Work (PhD Progress Report, PhD Semester Registration, PhD Pre-Submission Seminar and PhD Defence Seminar).

Unit–III:

Use of Different Software for Research– Statistical Package for the Social Sciences (SPSS) and other statistical software for data analysis.

Unit-IV:

Use of Internet in Research- Introduction, Evaluating internet resources: Authority, Accuracy and objectivity, Brief note on ebooks and virtual library, UGC info net, INFLIBNET and ERNET, What is Plagiarism and how to avoid it?

Suggested Readings:

- Sanders D. H., Computer Today, McGraw Hill, New York.
- Ā aram V., Fundamentals of computers, Prentice Hall of India, New Delhi

Course Outcome:

- **Utilize Advanced Software for Data Analysis** – Apply statistical and analytical tools such as SPSS, R, or Python for business research and decision-making.
- **Effectively Manage and Organize Research Data** – Use database management systems and spreadsheet applications to store, process, and analyze large datasets.
- **Integrate IT Solutions in Business Research** – Leverage digital tools like AI, big data analytics, and cloud computing for management studies.
- **Enhance Research Productivity Using Digital Tools** – Employ reference management software, plagiarism detection tools, and document formatting techniques for academic writing.
- **Develop Business Forecasting and Modeling Skills** – Implement computational models, simulations, and financial modeling techniques for business applications.
- **Apply Data Visualization Techniques** – Create reports, dashboards, and graphical representations of data to support business strategy and policy-making.

Elective- 1st

(COMMON IN COMMERCE&MANAGEMENT)

(COMMON FOR HR, FINANCE, MARKETING)
Name of Paper-General Accounting and Management
Paper Code-PDC-MNGT-104

Course Objective:

- **Develop a Strong Foundation in Accounting Principles** – Understand fundamental accounting concepts, financial statements, and the role of accounting in business decision-making.
- **Enhance Financial Analysis and Reporting Skills** – Learn to interpret financial statements, conduct ratio analysis, and evaluate the financial health of organizations.
- **Understand Managerial Accounting Techniques** – Explore cost accounting, budgeting, and performance evaluation methods for effective business management.
- **Integrate Accounting with Strategic Decision-Making** – Apply accounting insights to managerial decision-making, financial planning, and corporate governance.
- **Explore Contemporary Trends in Accounting and Management** – Analyze emerging trends such as forensic accounting, sustainability reporting, and the impact of digital transformation on financial management.

Unit I:

Accounting as an information system, the users of financial accounting information and their needs. Qualitative Characteristics of Accounting, Functions, Advantages and Limitations of Accounting, Branches of Accounting. Bases of accounting; Nature of financial accounting principles –Concepts and Conventions, Financial Accounting standards: Concept, benefits, procedure for issuing accounting standards in India.

Unit II:

Recent Trends in Accounting: International Financial Reporting Standards (IFRS)- Need and procedures, Convergence to IFRS, Distinction between Indian Accounting Standards (Ind ASs) and Accounting Standards (ASs). Accounting for intangibles, Environmental Accounting and auditing, Forensic Accounting, Balanced scorecard.

Unit III:

Management: History, approaches- development of various schools of thought, from scientific management to post-modern management (current). Shortcomings, pitfalls, strengths and threats of various management approaches. The trend during and after the post-liberalization era.

Unit IV:

Strategy leads to structure: Types of organizational structures. Organizational Design, Chart and Departmentalization, Span of control, Authority-

responsibility, centralization-decentralization, delegation, Theories of organizations, Boundary less and structure less organization, Empowering and authority-reasonability functions.

Unit V:

Management Today: Ethical issues in Management, Competitive Advantage SWOT analysis- Compliance & quality audit. Core competence and Business Process Out sourcing (BPO), Re-Engineering, Internationalization of business, TQM and employee work culture, Boundary less organization, Performance of outsourcing, Future trends.

Suggested Readings:

- Koontz, Hand Wechrich. H. Management,10th ed., New York, McGraw Hill.
- Luthans, F. Organizational Behaviour, 7th ed., New York, McGraw Hill.
- Robbins, S. P. Management, 5th ed., New Jersey, Englewood. Cliffs, prentice Hall of Inc.
- Robbins, S. P. Organizational Behaviour, 7th ed., New Delhi, Prentice Hall of India.
- Singh, Dalip Emotional Intelligence at work, Response Books, Sage Publications, Delhi.
- Peter F. Drucker, Principles and Practice of Management Practice Hall Ltd., New Delhi.
- L.M. Prasad (2008), Management Principles and Practice, Himalayas Publishing House, New Delhi.
- Christorphor Lovelock, Services Marketing, Pearson Education, Delhi.
- Jawahar Lal, Accounting Theory and profile, Taxmenn Publication, New Delhi.
- I. M. Pandey, Financial Management, Vikas Publishing House, New Delhi.

Course Outcome:

- **Analyze and Interpret Financial Statements** – Assess financial health using balance sheets, income statements, and cash flow analysis.
- **Apply Managerial Accounting Techniques** – Utilize cost analysis, budgeting, and performance measurement tools for business decision-making.
- **Integrate Accounting Information into Business Strategy** – Use financial data to guide strategic planning, investment decisions, and risk management.
- **Evaluate Emerging Trends in Accounting and Management** – Understand developments such as forensic accounting, sustainability reporting, and digital accounting tools.
- **Conduct Research in Accounting and Management** – Apply academic research methodologies to explore advanced topics in financial and managerial accounting.

Elective Paper- 2nd (Marketing)

Name of Paper-Advanced Marketing
Paper Code-PDC-MNGT-105

Course Outcome:

- **Understand Marketing Strategies:** Analyze advanced concepts like segmentation, targeting, and positioning.
- **Apply Digital Marketing Tools:** Use data-driven techniques and online platforms for market outreach.
- **Develop Brand Management Skills:** Create strategies for building and maintaining strong brands.
- **Analyze Consumer Behavior:** Interpret market research to understand customer needs and trends.
- **Formulate Marketing Plans:** Design and implement effective, result-oriented marketing campaigns.

Unit- I

Marketing– Basics, Present day importance of marketing in national and global context; Consumer Behaviour– Decision Making Perspectives, Improving the judgement process, Models of consumer behaviour; Marketing Information System– Marketing Research System and Marketing Decision Support System.

Unit -II:

Research Methods in Marketing– Quantitative and Qualitative Research in Marketing, Attitude Measurement and Scaling Techniques, Product Research, Test Marketing, Advertising Research, Media Research, Motivation Research.

Unit -III:

Strategic Marketing– Customer, Competitor and Environmental Analysis; SWOT Analysis, BCG Framework model, Porter's Model, GE Model, McKinsey Model, Market Leader, Challenger, Follower and Nicher Strategies; Market Entry/Exit Decision; Marketing Mix Strategies; Sustaining Competitive Advantage and Core Competence.

Unit -IV:

Logistics and Supply Chain Management; Retail Merchandising–Retailers' Marketing Mix, Product Merchandising and Display, Vendor Relations, Pricing and Mark Downs, e-retailing, Customer Relationship Management – Customer Life Time Value Customer Acquisition Development and Retention, Brand and Customer Equity.

Unit -V:

Entrepreneurial Marketing – New Venture Initiation, Low budget or no budget Market Research, Alternatives to high cost advertising. Multinational Marketing– Overseas Market Research, Legal Dimensions of Multinational Marketing, New Techniques, The Social Impact of Marketing – Social Impact Analysis.

Suggested Readings:

- Kotler, P., Marketing Management; Analysis, Planning, Implementation and Control, New Delhi, MacMillan
- Schiffman, L. G. and Kanuk, L. L., Consumer Behaviour, New Delhi, PHI.
- Belch. E. & Belch, M. A., Introduction to Advertising and Promotion, Chicago, Irwin.
- Porter, M. E., Competitive Advantage: Creating, Sustaining Superior Performance, New York, Free Press.
- Keegan, W., Global Marketing Management, Englewood Cliffs, New Jersey, PHI.
- Levy, M &Barton, A. W., Retailing Management, Irwin, London

Course Outcome:

- **Critically Analyze Advanced Marketing Theories** – Evaluate contemporary marketing concepts, models, and frameworks in a global business context.
- **Develop Data-Driven Marketing Strategies** – Apply analytical tools and consumer insights to formulate effective marketing plans and decision-making processes.
- **Examine Digital and Technological Innovations in Marketing** – Explore the role of AI, big data, and automation in modern marketing strategies.
- **Assess Consumer Behavior and Market Trends** – Utilize behavioral science and market research methodologies to understand customer preferences and industry trends.
- **Apply Ethical and Sustainable Marketing Practices** – Integrate ethical considerations, corporate social responsibility, and sustainability in marketing strategies.

Elective Paper- 2nd (Finance)

Name of Paper-Advanced Accounting and Finance

Paper Code-PDC-MNGT-105

Course Objective:

- **Master Financial Reporting:** Prepare and analyze complex financial statements.
- **Apply Accounting Standards:** Implement IFRS, GAAP, and other regulatory frameworks.
- **Manage Corporate Finance:** Make informed decisions on capital structure, budgeting, and investments.
- **Analyze Financial Performance:** Use ratio analysis, cash flow, and profitability metrics.
- **Develop Strategic Insights:** Formulate financial strategies for growth and risk management.

Unit- I

Fundamentals of Investment management- Basics of Investment, Introduction, need for Investment, investment versus speculation, Financial Markets. Investment alternatives and their comparison on various parameters as safety, liquidity and growth, the investment triangle. Introduction to asset classes debt, equity, mutual fund schemes, and derivatives, types of Risk and Measurement of risk & returns i.e. Sharpe, Treynor, Jensen CAPM etc.

Unit II:

Capital Structure Theories - Capital Structure Designing, Financial Leverage, Operating Leverage, Combined Leverage, Approaches of Financial Management, Modigliani Millar Approach, Modern Approach to Corporate Finance in an Improvement on the Traditional, Dividend Decisions, Relevance vs Irrelevance of Dividends.

Unit III:

Cost of Capital- Cost of Capital, Cost of Debt, Irredeemable Debenture (Perpetual Debenture), Redeemable Debenture, Common Stock, Preferred Stock or Preference Shares, Weighted Average Cost of Capital, Limitations of WACC, Considerations in Calculating WACC.

Unit IV:

International Financial system – An overview, Exchange Rate Determination, International parity theorems and fisher effect, Management of Foreign Exchange Exposure through forwards, money market instruments and options.

Unit V:

International Accounting and Reporting, International Accounting–Importance and Scope, foreign transactions– recording and translations, consolidation of foreign financial statements, foreign

Suggested Readings:

- M. Pandey, Financial Management, Vikas Publishing House Pvt. Ltd., New Delhi.
- V.K. Bhalla, Financial Management and Policy, Anmol Publications Pvt. Ltd., New Delhi.
- Brealey, Richard A. and Myers Stewart C., Principles of Corporate finance, Tata McGraw Publishing Company Ltd., New Delhi.
- Van Horne, James C., Financial Management and Policy, Prentice Hall of India Ltd., New Delhi.
- Prasanna Chandra, Financial Management: Theory and Practice, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- Introduction to Financial Accountings Charles T. Horngren, Gary L. Sundem & John A. Elliott, Pearson Education, Asia.
- Advance Accountancy- R. L. Gupta & M. Radhaswami, Sultan Chand & sons, New Delhi.
- Needless, Belverd, etc. Financial and Management Accounting, Boston, Houghton, Miffin Company.
- International Accounting-A. K. Das Mohapatra., Prentice Hall

Course Outcome:

- **Analyze Complex Financial Statements and Reports** – Interpret financial data using advanced accounting principles for strategic decision-making.
- **Apply Financial Management Techniques** – Utilize capital budgeting, risk assessment, and financial forecasting models in corporate finance.
- **Evaluate Investment and Portfolio Management Strategies** – Assess financial markets, investment instruments, and portfolio optimization techniques.
- **Examine Contemporary Trends in Accounting and Finance** – Explore forensic accounting, sustainability reporting, and the impact of fintech innovations.
- **Integrate Ethical and Regulatory Frameworks** – Apply corporate governance, financial regulations, and ethical principles in accounting and finance practices.
- **Conduct Research in Accounting and Financial Management** – Utilize quantitative and qualitative research methodologies to contribute to the field of finance and accounting.

Elective Paper- 2nd (HR)

Name of Paper-Advanced Human Resource Management and Organizational Behaviour

Paper Code-PDC-MNGT-105

Course Objective:

- **Develop an In-Depth Understanding of HRM Theories and Practices** – Explore advanced concepts in human resource management, including talent acquisition, performance management, and strategic HR planning.
- **Analyze Organizational Behavior at Individual, Group, and System Levels** – Examine psychological and sociological factors that influence employee behavior and organizational dynamics.
- **Integrate HR Strategies with Business Goals** – Learn how HRM contributes to organizational success through workforce planning, leadership development, and change management.
- **Evaluate Contemporary Trends in HRM and OB** – Investigate emerging topics such as workplace diversity, emotional intelligence, artificial intelligence in HR, and employee engagement strategies.
- **Apply Research Methods to HR and Organizational Studies** – Utilize qualitative and quantitative research techniques to study HRM challenges and propose evidence-based solutions.

Unit- I:

An overview of Human Resource Management: Framework of HRM in the present-day corporate sector; environmental scanning, HRM in the Global Context. Challenges of HRM. Strategic HRM. Talent Management– The Changing dynamics of talent acquisition, talent development and talent retention.

Unit- II:

Performance Management and Development Performance management, Balanced score card, Competency mapping, Succession planning, Compensation and Reward management, Training and Development and Organizational Outcomes, Career planning and development, Leadership development, Human Resources Development.

Unit -III:

Organizational Behaviour Personality, Emerging HR practices and Employee perception, Motivation, Employee job satisfaction, commitment and intention to stay, Work life balance, Employee Engagement, Employee empowerment,

Employee welfare, Employee value proposition, Emotional intelligence, Work stress, Employee flexibility.

Unit -IV:

Organizational Dynamics and Challenges of HRM & IR Organizational Culture, HRIS, Change management, Global HRM, Current Challenges of HRM, Cross Cultural Management, Work-force diversity, Employer branding, Team and organizational effectiveness, Trade union, Worker's participation in Management, Collective Bargaining, Discipline, Grievance Redressal.

Unit -V:

Ethical Issues in Human Resource Management: Need and Implications of Ethics for Human Resource Management. Corporate Social Responsibility. Indian Ethos, Values, Human Values in HRM. HRD: HRD Practices, HRD Audit, HRD Culture & Climate, Strategic HRD.

Suggested Readings:

- Robbins, S. P., Sanghi, S. & Judge, T. A. (2015). Organizational Behavior. New Delhi: Pearson Education.
- P. SUBBA Rao (2018) Essential of human resource management and industrial relations, Himalaya publications.
- Luthans, F. (2010). Organizational Behaviour. New Delhi: Tata McGraw-Hill.
- Dessler, G. (2015). Human Resource Management. New Delhi: Pearson Education.
- Rao, N. S. (2017). Compensation System and Performance Management: New Delhi: Himalaya Publishing House.
- Mead, R. (2015). International Management Crosscultural Dimension. UK: Blackwell.
- Henry, L. Maznevski, J. and Dietz. (2009). International Management Behavior: Leading with a Global Mindset. Chichester. UK: Wiley.

- NOTE: Student can choose any one subject from elective two according to their specialization.

Course Outcome:

- **Critically Evaluate HRM Theories and Practices** – Analyze and apply advanced human resource management concepts to enhance organizational effectiveness.
- **Assess Organizational Behavior at Multiple Levels** – Examine how individual, group, and organizational dynamics influence workplace performance and culture.
- **Develop Strategic HRM Policies and Leadership Models** – Design HR strategies that align with business objectives and foster leadership development.
- **Analyze the Impact of Emerging Trends in HRM and OB** – Investigate the effects of AI, digital transformation, diversity, and employee engagement on modern workplaces.
- **Conduct Research in HRM and Organizational Behavior** – Apply qualitative and quantitative research methods to explore and address complex HR and organizational challenges.

Elective Paper 3rd

Name of the Paper: Principles and Practices of Management

Paper Code-PDC-MNGT-106

Course Objective:

- **Develop a Strong Foundation in Management Theories** – Explore classical and modern management principles, frameworks, and their applications in organizational settings.
- **Enhance Decision-Making and Strategic Thinking Skills** – Learn how to apply managerial concepts in planning, organizing, leading, and controlling business operations.
- **Understand Leadership and Organizational Dynamics** – Analyze leadership styles, motivation theories, and team management techniques for effective organizational performance.
- **Examine Contemporary Business Challenges and Solutions** – Investigate real-world management issues, including globalization, technological advancements, and ethical decision-making.
- **Apply Research-Based Approaches to Management Practices** – Utilize quantitative and qualitative research methodologies to contribute to the field of management and organizational development.

Unit 1: Introduction to Management:

The Emergence of American Management thought. Historical background, Contribution of F.W. Taylor and Henry Fayol (including Scientific Management & 14 Principles); the emergence of Human Relation and Behavioural Science and its relationship with scientific Management.

Unit 2:

Management Function: Planning, Organising, Staffing, Decision Making, Direction, Communication, and Control. Management by Objectives (MBO).

Unit 3:

Organizational Structure and Modern Management Theories: Structures (Functional, Matrix, Network, Divisional, Project, Organic), Formal and Informal Organization, Line and Staff Function, Delegation of Authority and Responsibility, Japanese Style of Management.

Unit 4:

Management in the Indian Context: Quality of work life and Work Ethics-their foundation in the theory and method of work in the Indian Context, Stress Management.

Unit 5:

Corporate Governance: Concept of Corporate Governance & Stakeholders,

Mechanism, Principles including 4 P's of Corporate Governance, Expectation of Stakeholders, Rules of Corporate Governance, Corporate Social Responsibility of Business.

Recommended Books:

- Management by Robbins S.P., Coulter Mary and Niharika Vohra, Pearson Education (10th edition), 2010.
- Ethics in Management by S.A. Sherlekar, Himalayan Publishing.

Course Outcome:

- **Develop a Strong Foundation in Management Theories** – Explore classical and modern management principles, frameworks, and their applications in organizational settings.
- **Enhance Decision-Making and Strategic Thinking Skills** – Learn how to apply managerial concepts in planning, organizing, leading, and controlling business operations.
- **Understand Leadership and Organizational Dynamics** – Analyze leadership styles, motivation theories, and team management techniques for effective organizational performance.
- **Examine Contemporary Business Challenges and Solutions** – Investigate real-world management issues, including globalization, technological advancements, and ethical decision-making.
- **Apply Research-Based Approaches to Management Practices** – Utilize quantitative and qualitative research methodologies to contribute to the field of management and organizational development.

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