

**Department of Computer Science and Applications**  
**Chaudhary Ranbir Singh University, Jind**

**Scheme and Course Structure for PhD Course Work**  
**w.e.f. Academic Session 2022-23**

Paper Code	Nomenclature	Credits	L:T:P	Max Marks (External)	Min Pass Marks (External)	Max Marks (Internal)	Min Pass Marks (Internal)	Max Marks (Total)	Min Pass Marks (Total)
22-PHD-1	Research Methodology	4	3:0:2	Th. 60 Pr. 20	40	Th. 15 Pr. 05	10	100	50
22-PHD-2	Research and Publication Ethics	2	1:0:2	Th. 24 Pr. 00	12	Th. 06 Pr. 30	18	60	30
22-PHD-3	Review of Literature	2	0:0:4	Th 24 Pr 00	12	Th. 06 Pr. 30	18	60	30
<b>Elective(To be opted any one)</b>									
22-PHD-4	Data Analytics	4	3:0:2	Th. 60 Pr. 20	40	Th. 15 Pr. 05	10	100	50
22-PHD-5	Blockchain Technology	4	3:0:2	Th. 60 Pr. 20	40	Th. 15 Pr. 05	10	100	50
22-PHD-6	Advance Database System	4	3:0:2	Th. 60 Pr. 20	40	Th. 15 Pr. 05	10	100	50

*Ushar*

*Ranbir Singh*

*Darsh*

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22-PHD-1 RESEARCH METHODOLOGY

(THEORY)

Time 3 Hours

Max Marks 75 (External 60, Internal 15)

Credits 3

**Examiner's Note:** Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 6 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 12 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 12 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting One question from each Unit.

**Course Objectives:**

1. Developing a hypothesis, a research problem and related questions
2. Framing the problem with the correct research methodology
3. Collecting data that accurately addresses the research problem
4. Studying applied descriptive statistics.
5. Designing & writing research report and Thesis.
6. Formatting, styling, presenting and referencing in research.

**Unit – I**

Introduction to The Process of Conducting Research, Steps in the Process of Research, Identifying a hypothesis and/or research problem, specifying a purpose, creating research questions, Reviewing literature, Draft a Research Proposal, Ethics of research and informed consent

Introduction to Qualitative Research, Essence of Qualitative Data, Sampling, Collection Techniques, Biography, Phenomenology, Grounded Theory, Ethnography, Case Study

Interpreting Qualitative Data, Qualitative Data Analysis Procedures, Coding, Thematic development

Introduction to Quantitative Research, Essence of Quantitative Data, Collection and Analysis Techniques Sampling Concepts, Defining the Target Population, Representative Sample, Potential Consequences of Unrepresentative Sampling (Gaming the System), Over Representative Subgroups/ Weighting Design Effect, Sampling Methods (Cluster, Stratified, Simple, Random)

**Unit – II**

Quantitative Data Collection Instruments, Choosing a good instrument, Interval and Ratio Scales

Introduction to Applied Statistics, Identifying the dependent and independent variables, Confidence levels, Math that manipulates data

Descriptive Statistics, Summarizing and describing a collection of data, univariate and bivariate analysis, Mean, mode and standard deviation, Percentages and Ratios, Histograms, Identifying randomness and uncertainty in data.

**Unit – III**

Inferential Statistics, Drawing inference from data, Modeling assumptions, Identifying Patterns, Regression analysis, T-test, Analysis of Variance, Correlations, Chi-square

Introduction to Mixed Methods Research, Advantages, Design Components, Explanatory Mixed Methods Framework, Exploratory Mixed Methods Framework

## Unit - IV

Introduction: Introduction to LaTeX, Paper Size and Margins, Orientation

Styling Pages: Inserting Header, Footer, Footnote, Endnote, Page Breaks; Creating Multicolumn documents, Reading Error Messages

Formatting Contents: Formatting Text, Coloring Text, Aligning Text, Spacing Text, Bullets and Numbering, Reading Error Messages Writing Mathematics

Tables and Images: Creating Tables, Table Borders, Merging Rows and Columns, Saviour for Large Tables, Table Environment, Reading Error Messages, Including Images, Image Properties, Working with Image Borders, Figures and Subfigures

### Suggested Readings:

1. John Creswell, *Research Design : Qualitative, Quantitative and Mixed Method Approaches*, SAGE Publications, Fourth Edition, 2013
2. George W. Snedecor and William G. Cochran, *Statistical Methods*, Wiley-Blackwell; 8th edition, 1989
3. Strunk W., Jr. and White, E.B. *The Elements of Style*. Allyn and Bacon, 1999
4. Stefan Kottwitz,, *LaTeX Beginner's Guide*, Packt Publishing, 2011

### (PRACTICAL)

Time 3 Hours

Max Marks 25 (External 20, Internal 05)  
Credits 1

- ❖ Candidate will be evaluated on the basis of Practical of Research article writing using LaTeX.

*Vishal* *Smiley* *[Signature]* *Daksh*

22-PHD- 2 RESEARCH AND PUBLICATION ETHICS

(THEORY)

Time 2 Hours

Max Marks 30 (External 24, Internal 06)  
Credit 1

**Examiner's Note:** Examiner will be required to set FIVE questions in all. Question Number 1 will consist of total 4 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 8 marks. In addition to the compulsory question there will be two units. Examiner will set two questions from each Unit of the syllabus and each question will carry 8 marks.

Student will be required to attempt THREE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt TWO more questions selecting One question from each Unit.

**Course Objectives:**

1. To understand Philosophy and Ethics
2. To learn Scientific Conduct
3. To know about Publication Ethics
4. To know about Open Access Publishing
5. To understand Publication Misconduct
6. To learn Databases and Research Metrics

**Unit – I**

Introduction to philosophy: definition, nature and scope, concept, branches

Ethics: definition, moral philosophy, nature of moral judgments and reactions.

Ethics with respect to science and research, Intellectual honest and research integrity, Scientific misconducts: falsification, fabrication, and plagiarism.

Redundant publications: duplicate and overlapping publications, salami slicing

Selective reporting and misrepresentation of data.

**Unit- II**

Publication ethics: definition, introduction and importance

Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest

Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, Violation of publication ethics, authorship and contributorship

Identification of publication misconduct, complaints and appeals, Predatory publishers and journals

**Suggested Readings:**

1. MuralidharK et. al., *Ethics in Science Education, Research and Governance*, Indian National Science Academy, 2019
2. Huma Praveen and NayeemShowkat, *Research Ethics*, e-PG Pathshala, 2017
3. Bird A, *Philosophy of Science*, Routledge, 2006
4. MacIntye, Alasdair, *A Short History of Ethics*, London, 1967
5. P. Chaddah, *Ethics in Competitive Research : Do not get scooped; do not get plagiarized*, ISBN: 978-9387480865 (Self Published)

*Unit 1*  
*2m 1/2y*  
*Yash*  
*Daksh*

(PRACTICAL)

Time 3 Hours

Max Marks 30 (External 00, Internal 30)  
Credit 1

Open access publications and initiatives, SHERPA/RoMEO Online resources to check publisher copyright and self-archiving policies, Software tool to identify predatory publications, Journal finder/ journal suggester tools

Ethical Issues related to Computer Science, FFP, authorship, conflict interest, complaints and appeals : examples and fraud from India and abroad.

Use of plagiarism detection software like Turnitin, Urkund and other open source software tools.

Indexing databases, Citation databases: Web of Science, Scopus, Thompson Reuter etc.

Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score.

Metrics: h-index, g index, i10 index, altmetrics.

Wishu

Smir

Yash

Daksh

22-PHD-6 ADVANCE DATABASE SYSTEM

(THEORY)

Time 3 Hours

Max Marks 75 (External 60, Internal 15)  
Credits 3

**Examiner's Note:** Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 6 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 12 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 12 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting One question from each Unit.

**Course Objectives:**

1. To understand the advances of database and database management system.
2. To provide the detail of various data models.
3. To understand the relational calculus.
4. To understand the effects of transaction processing methods.
5. To gain knowledge to prepare case study for database research.

**Unit – I**

Database System: Definition, Characteristics, Relational data models, Schemas, Instances, Three schema architecture and data independence.

Data modeling: Enhanced – Relationship model's items: Entity, Entity type, Entity set, Attributes, Keys, Relationship types, Relationship Sets, Roles and Structural Constraints, Weak entity type, Naming convention for ER diagram, Design issues, Subclass, Super class,

Inheritance, Specialization & Generalization.

**Unit – II**

Relational Algebra: Select, Project, Join, Division, Union, Intersection, Minus, Cartesian product.

Relational Calculus: Tuple variable, Range relations, Expressions, Formulas, Existential &

Universal Quantifiers & their transformation, Using the Universal Quantifier, Safe expression,

Domain relational calculus.

**Unit – III**

Transaction Processing: Introduction, Single User, Multiuser, Read and Write Operation, Lost update problem, Temporary update, Incorrect summary problem, Traversal states, System log, Commit point of a transaction, Desirable properties, Serial, Non serial & Conflict Serializable schedule, Testing of Conflict Serializability of a schedule, View equivalence & View serializability.

**Unit – IV**

Emerging Database Technologies and Case Study: Preparing case study on Geographical Information System: Components of GIS Systems, Characteristics of Data in GIS, Conceptual Data Models for GIS, GIS standards and Operations, GIS Applications and Future Works.

Genome Data Management: Characteristics of Biological Data, The Human Genome projects and existing biological database.

*Unit 2*  
*Prabir Kumar*

**Suggested Readings:**

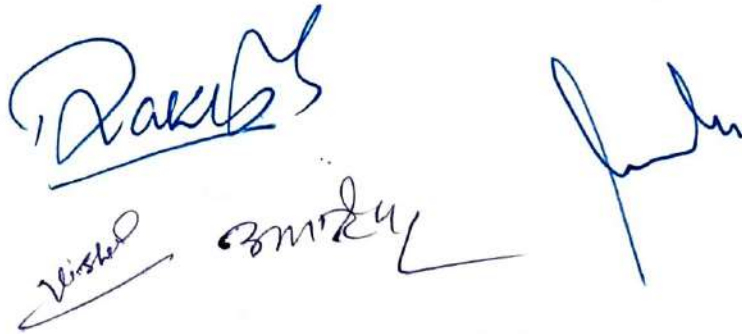
1. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Pearson.
2. 2. SilberschatzAbraham, "Database System Concept", Tata McGraw Hill.
3. 3. C. J Date, "Introduction to Database Systems", Pearson Education.
4. 4. Krishnan Ram and Gehrke, "Database Management System", Tata McGraw Hill.
5. 5. Byrosslvan, "Oracle 10 G The Database with HTML Database", BPB publication.

**(PRACTICAL)**

Time 3 Hours

Max Marks 25 (External 20, Internal 05)  
Credits 1

- ❖ Candidate will be evaluated on the basis of Practical using SQL, ORACLE.

The image shows three handwritten signatures in blue ink. The top signature is the most prominent, appearing to be 'Ramesh'. Below it, there are two more signatures, one on the left and one on the right, which are less legible but appear to be 'Vishal' and 'Smita' respectively.

22-PHD-4 DATA ANALYTICS

(THEORY)

Time 3 Hours

Max Marks 74 (External 60, Internal 14)

Credits 3

**Examiner's Note:** Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 6 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 12 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 12 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting One question from each Unit.

**Course Objectives:**

1. To understand Big Data Platform and its usage.
2. To provide an overview of Apache Hadoop.
3. To provide HDFS concepts and interfacing with HDFS.
4. To understand MapReduce jobs.
5. To understand how to report analysis and results.

**Unit – I**

Introduction to Big Data, Nature of Big Data, Risks of Big Data, Structure of Big Data, Exploring Big Data, Filtering Big Data, Mixing Big Data with traditional data

Web Data, Importance of Web Data, Web Data in Action

**Unit – II**

Value of Telematics Data, Value of Text Data, Value of Time and Location Data, Value of Radio Frequency Identification Data, Value of Smart Grid Data, Value of Casino Chip Tracking Data, Value of Sensor Data, Value of Telemetry Data, Value of Social Network Data

Introduction to Scalability, Convergence of Analytics and Data Environments, Massively Parallel Processing Systems, Cloud Computing, Grid Computing, Map Reduce

**Unit – III**

The Analytic Sandbox, Analytic Data Set, Enterprise Analytic Dataset, Embedded Scoring

Evolution of Analytical Methods, Evolution of Analytical Tools

**Unit – IV**

Analysis vs Reporting, Core Analytics vs Advanced Analytics, Framing the Problem Correctly, Statistical Significance vs Business Importance, Sample vs Population, Making Inferences vs Computing Statistics.

**Suggested Readings:**

1. Franks Bill, *Taming The Big Data Tidal Wave*, John Wiley & Sons, 2012
2. Glenn J. Myatt, *Making Sense of Data: A Practical Guide to Exploratory Data Analysis and Data Mining*, Wiley – Blackwell, 2006
3. Franks Bill, *97 Things About Ethics Everyone in Data Science Should Know*, O'Reilly, 2020

*Wishu*  
*Darab*  
*Smiley*  
*John*

(PRACTICAL)

Time 3 Hours

Max Marks 26 (External 20, Internal 06)  
Credits 1

- ❖ Candidate will be evaluated on the basis of Practical using Data Analysis tools like Hadoop, R, Python.

Rakesh

Wishal

Smiley

Janhvi

(THEORY)

Time 3 Hours

Max Marks 75 (External 60, Internal 15)

Credits 3

**Examiner's Note:** Examiner will be required to set NINE questions in all. Question Number 1 will consist of total 6 parts (objective type/short-answer type questions) covering the entire syllabus and will carry 12 marks. In addition to the compulsory question there will be four units i.e. Unit-I to Unit-IV. Examiner will set two questions from each Unit of the syllabus and each question will carry 12 marks.

Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting One question from each Unit.

**Course Objectives:**

1. To learn elements of Blockchain technology
2. To understand Cryptocurrency-Bitcoin
3. To know the characteristics of a Smart Contract
4. To understand the Security concept of Blockchain
5. To learn Blockchain Platform using Go Language

**Unit – I**

Fundamentals of Blockchain: introduction, Origin of Blockchain, Blockchain Solution, components of Blockchain, block in Blockchain, the Technology and the future, Blockchain Types and Consensus Mechanism: Decentralization and Distribution, types of Blockchain, consensus Protocol, Cryptocurrency-Bitcoin, Altcoin and Token: Bitcoin and the Cryptocurrency, Cryptocurrency Basics, Types of Cryptocurrency, Usage, Public Blockchain System: Public Blockchain, Popular Public Blockchains, The Bitcoin Blockchain, Ethereum Blockchain.

**Unit – II**

Smart Contracts: Introduction, Characteristics of a Smart Contract, Types of Oracles, Smart contracts in Ethereum, Smart Contracts in Industry, Private Blockchain System: Key Characteristics of private Blockchain, Private blockchain Examples, private Blockchain and Open sources, E-commerce Site Example, Various Commands in E-commerce Blockchain, Smart Contracts in Private Environment, State Machine, Different Algorithms of Permissioned Blockchain, Byzantine Fault, Multichain, Consortium Blockchain: introduction, Key characteristics of Consortium Blockchain, need of Consortium Blockchain, Hyperledger platform, Overview of Ripple Overview of Corda, Initial Coin Offering (ICO):Blockchain Fundraising Methods, Launching an ICO, Investing an ICO, Pros and cons of initial Coin Offerings, Evolution of ICO,ICO Platform.

**Unit – III**

Security in Blockchain: Introduction , Securities Aspects in Bitcoin, Security and Privacy Challenges of Blockchain in General, Performance and Scalability, Identity Management and Authentication, Regulatory Compliance and Assurance ,Safeguarding Blockchain Smart Contract (DApp), Security Aspects in Hyperledger Fabric, Applications of Blockchain: Blockchain in Banking and Finance, Blockchain in Education, Blockchain in Energy, Blockchain IN Healthcare, Blockchain in Real-estate, Blockchain in Supply Chain, Blockchain and IoT, Limitations and challenges of Blockchain, Blockchain Case Studies.

**Unit – IV**

Blockchain Platform using Go Language: Introduction, learn to execute GoLang Program in Atom, Basic Programming, Packages, Creating Simple Blockchain using GoLang ,Creating Simple Blockchain with Proof of Work using GoLang, Connecting to Ethereum using GoLang, BlockchainEthereum Platform

*Nishant*

*Smriti*

*Darsh*



using Solidity: introduction, Remix IDE, Structure of Smart Contract Program, modifiers, events, Array in Solidity, Function Visibility, Variable Visibility, Function Modifier Keyword, Fallback Function, Contract Inheritance, contract Communicating with Another Contract, External Libraries, ERC20 Token transfer, Error Handling in Solidity, Application Binary Interface, Swarm, Whisper, Blockchain platform using Python, Blockchain platform using Hyperledger Fabric.

**Suggested Readings:**

1. Imran Bashir, *Mastering Blockchain*, 2nd Edition, Packt Publishing, 2018.
2. Alan Wright, *Blockchain*, House of Books, 2021.
3. Daniel Drescher, *Blockchain Basics*, Apress, 2017
4. Roger Wattenhofer, *The Science of Blockchain*, Inverted Forest Publishing; 1st edition, 2016
5. Malanie Swan, *Blockchain: Blueprint for a New Economy*, O'Reilly, 2015
6. Jon Bodner, *Learning Go: An Idiomatic Approach to Real-World Go Programming*, O'Reilly, 2021
7. Alan A. A. Donovan and Brian W. Kernighan, *The Go Programming Language*, Addison-Wesley Professional; 1st edition, 2015

**(PRACTICAL)**

Time 3 Hours

Max Marks 25 (External 20, Internal 05)  
Credits 1

- ❖ Candidate will be evaluated on the basis of Practical using Go Language and Couch DB.



**22-PHD-3      REVIEW OF LITERATURE  
(THEORY)**

Time 2 Hours

Max Marks 30 (External 24, Internal 06)  
Credit 2

**Course Objectives:**

1. To know about the methodology to review the literature
2. To find out the domain for latest research in Computer Science.
3. To study the research gap
4. To understand problem definition for research to be conducted.
5. To find out objectives for research work.

The candidate will review at least 25 research papers on his proposed research area.

To understand and apply the rules / methods for effective oral presentation of reports.

Presentation using Beamer: Introduction, Blocks and Columns, Overlays, Customize Basic Information, Customize Themes, Aspect Ratio.

To prepare a research paper.

**Suggested Readings:**

1. Sharma, R.C. and K. Mohan. 2016. *Business Correspondence and Report Writing*. Fifth Edition. New Delhi: Tata McGraw Hill.
2. Raman, Meenakshi and Sangeeta Sharma, 2011. *Technical Communication: Principles and Practice*. Second Edition. New Delhi: Oxford University Press.
3. Gerson, Sharon J and Stern M. Gerson. 2000. *Technical Writing: Process and Product*. Third Edition. India: Pearson Education Asia.
4. Mohan, Krishna and Meenakshi Raman. 2010. *Advanced Communicative English*. New Delhi: Tata McGraw Hill.