

Faculty of Vocational Studies

SYLLABUS FOR

Bachelor of Vocation

(Artificial Intelligence and Data Science)

(Semester I-IV)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2021-22



The Heritage Institution

**KANYA MAHA VIDYALAYA
JALANDHAR**

(Autonomous)

PROGRAMME SPECIFIC OUTCOMES

On successful completion of B.Voc. Programme (Artificial Intelligence and Data Science) students will be able to:

PS 01: Get knowledge about various practical and professional tools required for data entry.

PS 02: Get knowledge about document writing and technical writing concepts

PS 03: Professional development in the field of AI and Data Science

PS 04: Get knowledge about basic and advanced data science tools (e.g, Python, R and Weka) while working collaboratively on real-world problems.

PS 05: Get knowledge about methods to collect, organize, manage, examine, prepare, analyze, cleaning, transformation, modeling and visualize data on student-driven data analysis projects.

Scheme and Curriculum of Examinations of Three Year Degree Programme
Bachelor of Vocation
(Artificial Intelligence and Data Science) Semester I
Session 2021-2022

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester I									
Course code	Course Title	Course Type	L-T-P	Total	Marks				mination time (in Hours)
					Total	Ext.		CA	
						L	P		
BVIL-1421/ BVIL-1031/ BVIL-1431	Punjabi(Compulsory)/ ¹ Basic Punjabi/ ² Punjab History and Culture	C	2-0-0	2	50	40	-	10	3
BVIL-1102	Communication Skills in English	C	4-0-0	4	50	40	-	10	3
BVIL-1113	Introduction to Computers and Information Technology	C	2-0-0	2	50	40	-	10	3
BVIL-1114	Introduction to Artificial Intelligence and Data Science	S	4-0-0	4	75	60	-	15	3
BVIL-1115	Office Fundamentals	S	2-0-0	2	50	40		10	3
BVIP-1116	Lab in Office Fundamentals	S	0-0-4	4	75	60		15	3
BVIP-1117	Field Visit and Report	S	0-0-4	4	75	-	60	15	3
BVID-1118	Minor Project -1	S	0-2-2	4	100	-	80	20	3
AECD-1161	*Drug Abuse: Problem, Management and Prevention (Compulsory)	AC	2-0-0	2	50	40	-	10	3
SECF-I492	*Foundation Course	AC	2-0-0	2	25	20	-	5	1
	Total			30	525				

Note: C – Compulsory, S – Skill Enhancement, AC-Audit Course

1. Special paper on lieu of Punjabi(Compulsory)
2. Special paper in lieu of Punjabi(Compulsory) for those students who are not domicile of Punjab
3. Grade points or grades of these courses will not be included in SGPA/CGPA of the Semester/ Programme

Scheme and Curriculum of Examinations of Three Year Degree Programme
Bachelor of Vocation
(Artificial Intelligence and Data Science) Semester II
Session 2021-2022

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester II									
Course code	Course Title	Course Type	L-T-P	Total	Marks				Examination time (in Hours)
					Total	Ext.		CA	
						L	P		
BVIL-2421/ BVIL-2031/ BVIL-2431	Punjabi(Compulsory)/ ¹ Basic Punjabi/ ² Punjab History and Culture	C	2-0-0	2	50	40	-	10	3
BVIL-2102	Communication Skills in English	C	3-0-1	4	50	25	15	10	3+3
BVIL-2113	Computational Problem Solving	S	3-0-0	3	75	60	-	15	3
BVIL-2114	Mathematical Foundation	C	2-0-0	2	50	40	-	10	3
BVIL-2115	Technical Writing	S	3-0-0	3	50	40		10	3
BVIL-2116	Data Collection and Analysis	S	4-0-0	4	50	40	-	10	3
BVIM-2117	Relational Database Management System	S	2-0-2	4	100	40	40	20	3+3
BVIP-2118	Computational Problem Solving Lab	S	0-0-2	2	50		40	10	3
BVID-2119	Minor Project-II	S	0-0-2	2	50		40	10	3
AECD-2161	* Drug Abuse: Problem, Management and Prevention (Compulsory)	AC	2-0-0	2	50	40	-	10	3
SECM-2502	*Moral Education	AC	2-0-0	2	25	20	-	05	3
	Total			30	525				

Note: C – Compulsory, S – Skill Enhancement, AC-Audit Course

1. Special paper on lieu of Punjabi(Compulsory)
 2. Special paper in lieu of Punjabi(Compulsory) for those students who are not domicile of Punjab
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Scheme and Curriculum of Examinations of Three Year Degree Programme
Bachelor of Vocation
(Artificial Intelligence and Data Science) Semester III
Session 2021-2022

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester III									
Course Code	Course Title	Course Type	Credits		Marks				Examination time (in hours)
					Total	Ext.		CA	
			L-T-P	Total		L	P		
BVIL-3111	Statistical Inference-I	C	4-0-0	4	75	60		15	3
BVIL-3112	Data Mining and Data Warehousing	S	4-0-0	4	75	60		15	3
BVIL-3113	Data Processing and Visualization	S	2-0-0	2	50	40		10	3
BVIL-3114	Entrepreneurship basics	C	2-0-0	2	50	40	-	10	3
BVIL-3115	Machine Learning-I	S	3-0-0	3	50	40		10	3
BVIP-3116	Lab on Data Processing and Visualization	S	0-0-2	2	50		40	10	3
BVIP-3117	Data Storytelling and Presentation	C	0-0-4	4	75		60	15	3
BVIP-3118	Lab on Machine Learning-I	S	0-0-3	3	50		40	10	3
BVID-3119	Minor Project-III	S	0-0-4	4	100		80	20	3
SECG-3532	*Gender Sensitization	AC	1-0-1	2	25	10	10	5	1
Total				30	575				

Note: C – Compulsory

S – Skill Enhancement

AC-Audit Course

* Grade points or grades of these courses will not be included in SGPA/CGPA of the Semester/Programme

Scheme and Curriculum of Examinations of Three Year Degree Programme
Bachelor of Vocation
(Artificial Intelligence and Data Science) Semester IV
Session 2021-2022

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester IV									
Course Code	Course Title	Course Type	Credits		Marks				Examination time (in hours)
			L-T-P	Total	Total	Ext.		CA	
						L	P		
BVIL-4111	Statistical Inference-II	C	4-0-0	4	50	40	-	10	3
BVIL-4112	Applied Statistical Programming	S	4-0-0	4	75	60		15	3
BVIL-4113	Non-Relational Databases	S	3-0-0	3	75	60		15	3
BVIL-4114	Workplace Management	C	2-0-0	2	75	60		15	3
BVIP-4115	Applied Statistical Programming Lab	S	0-0-4	4	100		80	20	3
BVIP-4116	Lab on Non-Relational Databases	S	0-0-3	3	100		80	20	3
BVID-4117	Minor Project-IV	S	0-0-4	4	100		80	20	3
AECE-4221	*Environmental Studies (Compulsory)	AC	3-0-1	4	100	60	20 (Project work)	20	3
SECS-4522	*Social Outreach	AC	0-0-2	2	25		20	05	1
Total				30	575				

Note: C – Compulsory S – Skill Enhancement AC-Audit Course

* Grade points or grades of these courses will not be included in SGPA/CGPA of the Semester/Programme

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1113

Introduction to Computers and Information Technology

COURSE OUTCOMES:

After Completing this course, the students will be able to:

CO1: Comprehend fundamentals of Computer and Software

CO2: Describe Information Technology and its Applications

CO3: Comprehend the concepts of I/O devices and memory.

CO4: Demonstrate the Introduction to Emerging Technologies: Big Data, IoT and Cloud

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1113

Introduction to Computers and Information Technology

L - T - P	Max. Marks: 50
2-0-0	Theory: 40
Time : 3 Hours	CA: 10

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts(not exceeding four).

Unit-I

Introduction to Information Technology: Basic concepts of IT, Data Processing: Data and Information.

Introduction to Computers and its Applications:

- Computer as a system, basic concepts, functional units and their interrelation.
- Milestones in Hardware and Software.
- Batch oriented / on-line / real time applications.
- Application of computers.

Unit-II

Software: System and Application Software, Utility packages, Configuration of Computer System.

Applications of Information Technology: Wide range of Applications in: Home, Education and Training, Entertainment, Science, medicine, engineering etc

Unit-III

Input Devices: Keyboard, mouse, pens, touch screens, Bar Code reader, joystick, source data automation, (MICR, OMR, OCR), screen assisted data entry: portable / handheld terminals for data collection, vision input systems.

Output Devices: Monitor, Serial line page printers, plotters, voice response units.

Data Storage Devices and Media: Primary storage (Storage addresses and capacity, type of memory), Secondary storage, Magnetic storage devices and Optical Storage Devices.

Unit-IV

Introduction to Emerging Technologies: Big Data: Characteristics, Architecture, Technologies and Applications, Edge Computing

Cloud: Predecessors technologies, characteristics, service models, Deployment models, benefits and challenges, Third Party Cloud Party Providers: GCP, AWS, MICROSOFT AZURE

IoT: History, characteristics, applications and Adoption barriers.

References/ Textbooks:

1. P.K.Sinha, “Computer Fundamentals”, Sixth Edition, BPB Publications,2004.
2. N. Subramanian, “Introduction to Computers”, First Edition, McGraw Hill Education India,2001.
3. Peter Norton, “Introduction to Computers”, First Edition, McGrawHill Education,2017.
4. Gurvinder Singh, Rachpal Singh, “Windows Based Computer Courses”, Third Edition, Kalyani Publishers,2017

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1104

Introduction to Artificial Intelligence and Data Science

COURSE OUTCOMES:

After completing this course the student will be able to:

CO1: Comprehend the concepts of Artificial Intelligence.

CO2: Demonstrate various concepts of Data Science domain and its difference with business intelligence.

CO3: Comprehend Data Science methodologies and steps involved in data analysis.

CO4: Apply learned techniques to solve problem associated with basic statistical operations on Real/Dummy data

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1114

Introduction to Artificial Intelligence and Data Science

L - T – P	Max. Marks: 75
4-0-0	Theory: 60
Time : 3 Hours	CA: 15

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

UNIT I

What is AI, How does it works, History of AI, AI- Intelligent Systems, benefits and Risk of AI, Challenges, Opportunities and Applications.AI its applications in data science, Problem Framing

UNIT II

Introduction to Data Science, Evolution of Data science, Need of Data Science, Components of Data Science, Data Science Process.

Difference between data science and business intelligence. Application Areas and Challenges in Data Science, Job Roles in Data Science domain

UNIT III

Data Science Methodologies, Steps Involved in Data Analysis (data collection, integration, management, modeling, analysis, visualization, prediction and informed decision making)

UNIT IV

Statistical description of data: Mean, Median and Mode.

Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation

References/ Textbooks:

1. J. Han, M. Kamber and J. Pei , “Data Mining: Concepts and Techniques”, Third Edition, Morgan Kaufmann Publishers,2011.
2. Nong Ye, “Handbook of Data Mining”, First Edition,2003.
3. Anshuman Sharma, “Fundamentals of Numerical Methods and Statistical Techniques”, Second Edition, Lakhanpal Publishers,2014.

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1115

Office Fundamentals

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Comprehend basics and formatting concepts of word document.

CO2: Have knowledge of creating, customize Tables and working with Graphics in word.

CO3: Comprehend basics of presentation involved in text formatting, graphs and animation.

CO4: Comprehend basics of spreadsheet involved in creation, editing of graphs, sorting, querying and filtering of data.

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIL-1105

Office Fundamentals

L - T – P	Max. Marks: 50
2-0-0	Theory: 40
Time : 3 Hours	CA: 10

Instructions for the Paper Setter

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

Unit I

Basics of Word Document: Creating a New Document, Inserting and Deleting Text, Saving a Document, Opening a Document, Selecting and Replacing Text Using Undo, Redo and Repeat Navigating through a Document, Viewing a Document, Working with the Document, Window Viewing Multiple Document, and Windows Previewing and Printing a Document, Closing a Document

Formatting of a Word Document: Drop Caps, Add Shading to Draw Reader's Attention, Steps to Add Borders to a Document, work with Word Styles, Adjust the Horizontal Size of Characters, Insert and Prevent certain types of Page Breaks, Using the Word, Themes To Make a Professional Document look. Steps to Create, Modify or Attach a Template. Add, Edit or Delete Headers and Footers, Toolbars of word

Unit II

Creating and Customizing Tables: Methods to Create a Table, Steps to Create a Table that has Specific Column Widths. Deleting Column, Row or Entire Table in Word, Creating Table of Contents in word

Working with Graphics: Add, Crop, Change Pictures File Size and Wrap Picture with Text, Discover the Proper Steps to Add and Organize Clip Arts, Manipulating WordArt Effects to the Text

Unit III

Presentation: Introduction to PowerPoint, Exploring menus, starting a new slide, saving presentation, moving/rearranging slides, printing slides. Applying theme to presentation, Views (slide View, slide sorter, notes view, outline view), Formatting & enhancing text formatting. Creating a graph, displaying slide show, adding multimedia. Slide transitions, applying Animation, Timing slide display, adding movies & sounds. Using a pick look Wizards to change format.

Unit IV

Spreadsheet: Introduction to Worksheet/Spreads, Features of excel, Describe the excel Window, Creating a new workbook, different functions on different data in excel, creation of graphs, editing it and formatting, changing chart type to 2d chart or 3d chart, pivot table, creation of worksheet, adding, deleting, moving the text in worksheet, linking different sheets, sorting the data, querying the

data, filtering the data (auto and advance filters), What-if analysis, To open an already existing workbook, Saving workbook, printing a worksheet, Closing the workbook & exiting.

References/ Textbooks:

1. Joyce Cox, Joan Lambert and Curtis Frye, “Microsoft office Professional 2010 Step by Step”, First Edition, Microsoft Press, 2010.
2. Bucki Lisa A, “Office 2016 Bible”, First Edition, Wiley, 2013.
3. Weverka Peter, “Office 2016 All in One for Dummies”, First Edition, Wiley India, 2015.
4. Satish Jain, Kratika, M. Geetha, “MS–Office 2010”, First Edition, BPB Publications, 2012.

Bachelor of Vocation (Artificial Intelligence and Data Science) - Semester I

Course Code: BVIP-1116

Lab on Office Fundamentals

L - T – P	Max. Marks: 75
0-0-4	Practical: 60
Time : 3 Hours	CA: 15

Lab based on Office tools

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- I

Course Code: BVIP-1117

Field Visit and Report

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Understand and familiarize themselves with the work environment of companies.

CO2: Learn coordination and cooperation of various teams for the project

CO3: Develop skills necessary for structuring, managing, and carrying out projects within an organization/industry.

CO4: Describe the observations through report writing.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- I

Course Code: BVIP-1117

Field Visit and Report

L - T – P	Max. Marks: 75
0-0-4	Practical: 60
Time : 3 Hours	CA: 15

Note: The marks will be awarded to the candidate on the basis of report, presentation and seminar submitted.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- I

Course Code: BVID-1118

Minor Project – I

The primary objective of the course is to encourage students to learn various tools and to build AI/ Data Science based Model: This module is delivered using a combination of introductory lectures and participation activities by the students.

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Apply the tools and techniques learnt in the course to process and analyze data for problems associated with AI and Data science.

CO2: Apply their knowledge to work on assigned/self-identified project.

CO3: Work within defined time and resource constraints while working with real world applications.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- I

Course Code: BVID-1118

Minor Project – I

L - T – P	Max. Marks: 100
0-2-2	Practical: 80
Time : 3 Hours	CA: 20

Instructions to the examiner:

The students will be working on a project based on the subjects studied in the course. The students need to submit the self-made project at the end of the semester. The marks will be awarded to the student on the basis of Technical knowledge, Project reports and performance in viva-voce.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester II

Course Code: BVIL-2113

Computational Problem Solving

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Comprehend the concepts of computation problem, data and expressions

CO2: Demonstrate the usage of algorithms under several categories like list, string, dictionary and control structures

CO3: Implement various problems associated with functions and file handling using related languages

CO4: Comprehend the concepts of Object Oriented Programming and Database using related programming language

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester II

Course Code: BVIL-2113

Computational Problem Solving

L - T – P	Max. Marks: 75
3-0-0	Theory: 60
Time : 3 Hours	CA: 15

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT-I

Introduction to Python: Process of Computational Problem Solving, Python Programming Language

Data and Expressions: Literals, Variables and Identifiers, Operators, Expressions, Statements and Data Types

Control Structures: Boolean Expressions (Conditions), Logical Operators, Selection Control, Nested conditions, Debugging

UNIT-II

Lists: List Structures, Lists (Sequences) in Python, Iterating Over Lists (Sequences) in Python

Dictionaries: Dictionaries and Files, Looping and dictionaries, Advanced text parsing

Iteration: While statement, Definite loops using for, Loop Patterns, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion

UNIT-III

Functions: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments

Files: Opening Files, Using Text Files, String Processing, Exception Handling

UNIT-IV

Introduction to Data Scraping with Python: Scrapy Library

Objects and Their Use: Introduction to Object Oriented Programming

Modular Design: Modules, Top-Down Design, Python Modules

Using Databases and SQL: Database Concepts, SQLite Manager Firefox Add-on, SQL basics summary, basic Data Modelling, Programming with multiple tables.

References/ Textbooks:

1. Charles Severance, “Python for Informatics: version0.0.8-d2”, Amazon Digital Services, Second Edition, 2013.
2. Charles Dierbach, “Introduction to Computer Science Using Python: A Computational Problem-Solving Focus”, First Edition, John Wiley & Sons, 2013.
3. GUTTAG JOHN V, “Introduction to Computation and Programming Using Python”, Second Edition, PHI,2014.
4. Jeeva Jose, Sojan P.Lal, “Introduction to Computing & Problem Solving Through Python”, First Edition, Khanna Publishers,2015.
5. Mark J. Guzdial, Barbara Ericson, “Introduction to Computing and Programming in Python”, First Edition, Pearson Education,2015.
6. Kenneth Lambert, “Fundamentals of Python”, First Edition, Cengage Learning,2015.
7. Mark Lutz, “Learning Python”, Fifth Edition, O'Reilly Media,2013.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- II

Course Code: BVIL-2114

Mathematical Foundation

COURSE OUTCOMES:

After passing this course the student will be able to reflect on

CO1: Set and operations on sets

CO2: Relation, Representation of Relation, Types of Relation and their Properties

CO3: To encode information in form of logical sentences through propositional and predicate logic

CO4: Concept of Duality law, Algebra of propositions, Propositional Functions, Predicates, Quantifiers, Negation of Quantified Statements

B.Voc (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIL-2114

Mathematical Foundation

L - T - P	Max. Marks: 50
2-0-0	Theory: 40
Time : 3 Hours	CA: 10

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

UNIT-I

Definition of Set, Representation of Sets, Types of Sets,

Operations on Sets – Intersection, Union, Complement, Set Difference, Symmetric Difference.

Problems on Cardinality of Sets, Venn diagram, Laws of Set theory, Countable and Uncountable sets, Cartesian product, Partition of Set, Minset, Maxset, Normal Forms.

UNIT-II

Definition of Relation, Representation of Relation, Types of Relation, Properties of Relation – Reflexive, Symmetric, Anti-Symmetric, Asymmetric, Transitive, Equivalence, Irreflexive, POSET,

Representation of relation: Digraph, Matrix and ordering diagram

UNIT-III

Proposition and Compound Propositions, basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Implication, Logical Equivalence,

UNIT IV

Duality law, Algebra of propositions, Arguments, Propositional Functions, Predicates and Quantifiers, Negation of Quantified Statements.

References/ Textbooks:

1. Lipschutz S., Lipson M., “Discrete Mathematics”, Revised Third Edition, Schaum’s outlines Series, 2017.
2. Kolman, Busby “Discrete Mathematical structures for Computer Sciences”, Second Edition, PHI, 1987.
3. Alan Doerr, “Applied Discrete Structures for Computer Science”, First Edition, Galgotia Publications, 1991.
4. Trambley J.P., “Manohar R., Discrete Mathematical Structures with Applications to Computer Science”, First Edition, O’Reilly, 2002.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIL-2115

Technical Writing

COURSE OUTCOMES:

After completing this course the students will be able to:

CO1: Write effective reports, proposals and papers.

CO2: Correspond effectively through different modes of written communication.

CO3: Present himself/ herself professionally through effective resumes and interviews.

CO4: Understand different technical writing style and concept of editing.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIL-2115

Technical Writing

L - T - P	Max. Marks: 50
3-0-0	Theory: 40
Time : 3 Hours	CA: 10

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

UNIT-I

Technical Communication Overview: Meaning of Technical Writer, Role of Technical Writer, Evolution of Technical Communication Characteristics of Technical Communication, Essential Skills of Technical Communication.

UNIT-II

Goals of Technical Writing, Process of Technical Writing – Prewriting, writing and Re-writing. Audience Analysis: Basic Classification of Readers, Types of Audiences, Audience Analysis.

UNIT-III

Research Interviews: Research Tools, Conducting Interviews: Pre-Interview, During Interview, After the Interview, Validation.

Technical Writing Style: Concise Communication, Common Errors while constructing sentences. Clarity and Precision: Guidelines to clear and specific writing.

UNIT-IV

Technical Communication Editing: Meaning, Types of Editing, Role of a Technical Editor. Proof Reading: Proof reading symbols, Abbreviations.

Technical Communication Ethics: What is Legal & Ethical? Ethical Issues in Technical Communication.

References/Textbooks:

1. Elizabeth Tebeaux, Sam Dragga, “The Essentials of Technical Communication”, First Edition, OUP USA, 2012.
2. Alan S. Pringle, Sarah S. O’Keefe, “Technical Writing 101”, First Edition, Scriptorium Publishing Services, Inc., 2009.
3. Mike Markel, “Technical Communication”, First Edition, Bedford Publishers, 2009.
4. Sheryl Lindsell-Roberts, “Technical Writing For Dummies”, First Edition, Wiley Publishers, 2011.
5. Kieran Morgan, SanjaSpajic, “Technical Writing Process”, First Edition, Better On Paper Publications, 2015.
6. Phillip A. Laplante, “Technical Writing: A Practical Guide for Engineers and Scientists”, Second Edition, CRC Press, 2014.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- II

COURSE CODE: BVIL-2116

Data Collection and Analysis

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Comprehend the term Data Collection and Analytics and Data Collection methods

CO2: Describe the application of basic Data Analysis Tools.

CO3: Understand the process of Data Analysis along with its applications.

CO4: Comprehend Data Analysis using spreadsheet software and Data Analysis tools.

B.Voc. (Artificial Intelligence and Data Science) Semester- II

COURSE CODE: BVIL-2116

Data Collection and Analysis

L - T – P	Max. Marks: 50
4-0-0	Theory: 40
Time : 3 Hours	CA: 10

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

UNIT I

Introduction to the terms: Data Collection and Data Analytics.

Data Collection sources, Data collection methods – Primary data collection methods and Secondary data collection methods.

UNIT II

Data Collection Tools – online and offline.

Understanding Data Analytics: Why Data analytics Matter, Characteristics of Data Analysis, Types- Descriptive, Predictive, Diagnostic, Prescriptive.

UNIT III

Process of Data Analysis, Applications of Data Analysis. Technical Skills of a data Analyst. Exploratory and Confirmatory Data Analysis

UNIT IV

Data Analysis using spreadsheet. Creating Complex Formulas , Working with Basic Functions - to find values for a range of cells. Data Analysis tools: Analyze, Detect, Fill from, Forecast, Scenario tool, Google tools: google sheet, forms, collaborations

References/ Textbooks:

1. Patricia Pulliam Phillips, Cathy A. Stawarski, “Data Collection: Planning for and Collecting All Types of Data”, Wiley Publisher, First Edition, 2008.
2. Roger Sapsford, Victor Jupp, “Data Collection -and Analysis”, Second Edition, Sage Publishing, 2006.
3. Uwe Flick, “The SAGE Handbook of Qualitative Data Collection”, First Edition, Sage Publishing, 2018.

4. A. Maheshwari, "Data Analytics Made Accessible", Third Edition, McGraw Hill India, 2020.
5. John Walkenbach, "Excel 2010 Bible" First Edition, Wiley, 2010.
6. Wayne L. Winston, "Microsoft Excel Data Analysis and Business Modeling" First Edition, Microsoft Press, 2017.

B.Voc. (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIM-2117

Relational Database Management System

COURSE OUTCOMES:

After completing this course, the students will be able to:

CO1: Understand the various terms like database, database models and ER diagrams.

CO2: Comprehend Relational Algebra and Relational Calculus

CO3: Explain the concept of database normalization and its various forms

CO4: Demonstrate the use of SQL to create basic to intermediate level of databases

CO5: Comprehend the concept of Cursors and Triggers

B.Voc (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIM-2117

Relational Database Management System

L - T – P	Max. Marks: 100
2-0-2	Theory: 40, Practical:40
Time : 3 Hours	CA: 20

Instructions for the paper setter:

Eight questions of equal marks (8 marks each) are to be set, two in each of the four Sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be subdivided into parts (not exceeding four).

UNIT-I

Introduction to Data, Field, Record, File, Database, Database Management System. Structure of database system, Advantages and Disadvantages, levels of database system, Relational model, Hierarchical model, Network model, comparison of models, E-R diagram, different keys used in a relational system, DBA, responsibilities of DBA.

UNIT-II

Codd's Rules, Relational Algebra, Relational Calculus - Domain and Tuple relational calculus,

UNIT-III

Introduction to normalization – need and advantages of normalization, 1NF, 2NF, 3NF, BCNF, 4NF and 5NF, Introduction to transaction management – ACID Properties, concurrency control and its management, protection, security, recovery of database

UNIT-IV

SQL: Introduction to SQL–DDL, DML, DCL, Join methods & sub query, Union Intersection, Minus, Built in Functions, Views, Security amongst users, sequences, Indexing

Introduction to PL/SQL: Cursors – Implicit and Explicit, Procedures, Functions, Introduction to Triggers

Practical to be implemented:

1. Introduction to SQL.
2. Data Types, Creating Tables, Retrieval of Rows using Select Statement, Conditional Retrieval of Rows, Alter and Drop Statements.
3. Ordering the Result of a Query, Aggregate Functions, Grouping the Result of a Query, Update and Delete Statements.
4. Set Operators, Nested Queries, Joins, Sequences.
5. Views, Indexes, Database Security and Privileges: Grant and Revoke Commands, Commit and Rollback Commands.

6. PL/SQL Architecture, Assignments and Expressions, Writing PL/SQL Code, Referencing Non-SQL parameters.
7. Stored Procedures
8. Triggers and Cursor Management in PL/SQL.

Note for the Practical Examiner:

- a) Practical Exam is based on the syllabus covered in the subject.
- b) The question paper will be set on the spot by the examiner.

References / Textbooks:

1. Parteek Bhatia, Gurvinder Singh, "Simplified Approach to DBMS", Eighth Edition, Kalyani Publisher, 2016.
2. C.J. Date, "An Introduction to Database System", Eighth Edition, Pearson, 2015.
3. B.C. Desai, "Database Management System", Revised First Edition, Galgotia Publication, 2012.
4. Silberschatz, Henry F. Korth, S. Sudarshan, "Database Concepts", Seventh Edition, McGraw Hills, 2016.
5. Ivan Bayross, "Oracle – Developer – 2000", Third Edition, BPB Publishers, 2010.

B.Voc (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIP-2118

Computational Problem Solving Lab

L - T – P	Max. Marks: 50
0-0-2	Practical:40
Time : 3 Hours	CA: 10

Lab based on Computational Problem solving

B.Voc (Artificial Intelligence and Data Science) Semester- II

Course Code: BVID-2119

Minor Project-II

Course Outcomes:

After completing this course, the students will be able to:

CO1: Apply the tools and techniques learnt in the course to process and analyze data for problems associated with AI and Data science.

CO2: Apply their knowledge to work on assigned/self-identified project.

CO3: Demonstrate an ability to work in teams and manage the conduct of the research study.

CO4: Describe the observations through project report submission.

B.Voc (Artificial Intelligence and Data Science) Semester- II

Course Code: BVIP-2118

Minor Project-II

L - T – P	Max. Marks: 50
0-0-2	Practical:40
Time : 3 Hours	CA: 10

Note: The students need to submit the self-made project at the end of the Semester. The marks will be awarded to the student on the basis of quality showcased in the project to build AI/ Data Science based Model.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3111
Statistical Inference-I

Course Outcomes:

After completion of this course, the students will be able to:

CO1:Comprehend the concepts of random variables.

CO2: Implement Laplace theorem.

CO3:Identify various probability distributions and sampling distributions.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III

Course Code: BVIL-3111

Statistical Inference-I

L-T-P	Max.Marks: 75
4-0-0	Theory:60
Time:3Hours	CA: 15

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT-I

Cumulative distribution function, Two dimensional random variables, joint distribution, marginal and conditional distributions, Stochastic independence, Introduction to function of random variables.

UNIT-II

Mathematical expectations and moments, moment generating function and its properties, Chebyshev's inequality and its application, central limit theorem (Laplace Theorem)

UNIT-III

Discrete Probability Distributions: Binomial, Poisson, Geometric, Continuous probability distributions: Uniform, Exponential, Gamma, Beta, Normal distributions.

UNIT-IV

Sampling Distributions: Chi-square, t and F-distributions with their properties, distribution of sample mean and variance. Introduction to Estimators, Types of Estimators

References/Textbooks:

1. Hogg R.V., McKean, J.W. and Craig A.T. : Introduction to Mathematical Statistics
2. Gupta S.C. and Kapoor V.K. : Fundamentals of mathematical statistics
3. Goon,A.M.,Gupta M.K. & Dasgupta B. : Fundamental of statistic, Vol. I
4. Goon,A.M.,Gupta M.K. & Dasgupta B. : An outline of statistical theory, Vol. I

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3112

Data Mining and Data Warehousing

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend Data Mining, Data Warehousing concepts and techniques.

CO2: Comprehend various classification and clustering algorithms.

CO3: Study basic concepts of OLAP.

CO4: Describe frequent pattern mining and its applications.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3112

Data Mining and Data Warehousing

L-T-P	Max. Marks: 75
4-0-0	Theory:60
Time:3 Hours	CA: 15

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT-I

Introduction to Data Mining Systems, Knowledge Discovery Process, Data Mining Techniques, Issues, Applications, Information Retrieval, Web search engines, Frequent pattern mining.

UNIT-II

Data Mining Techniques-association, classification, clustering, prediction, sequential patterns and decision tree. Classification- Distance based algorithms, K-nearest neighbours, Euclidean distance, city block distance, Tangent distance, Clustering Algorithms, Cluster analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods.

UNIT-III

Introduction to Data Warehousing: Evolution of Data Warehousing, Data Warehousing concepts, Benefits of Data Warehousing, Problems of Data Warehousing, Data Warehousing Architecture, OLAP

UNIT-IV

Types of Data Warehouses- Host based, single stage, LAN based, Multistage, stationary distributed & virtual data-warehouses, Data warehouse tools and technologies

References/ Textbooks:

1. Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill, Thirteenth Edition, Reprint 2008.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
3. Parteek Bhatia, "Data Mining and Data Warehousing: Principals and Practical Techniques", Cambridge University Press,First Edition, 2019.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3113

Data Processing and Visualization

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend various types of data processing methods.

CO2: Identify different data formats and their conversion involved in a dataset.

CO3: Comprehend human perception in visualization of data.

CO4: Apply various visualization tools such as Histograms, Bar Charts, Pie Charts, Box Plots, Scatter Plots, etc.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3113

Data Processing and Visualization

L-T-P	Max. Marks:50
2-0-0	Theory: 40
Time: 3 Hours	CA: 10

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT-I

Introduction: Data, Characteristics of Data, Prerequisite for Data Processing, Problems associated with raw data, Data cleansing methods, Principles of Data Processing, Data Processing Systems, Data Processing Cycle, Role of Data Processing.

UNIT-II

Types of Data Processing (Batch Processing, Real-time Processing, Online Processing, Distributed Processing, Multiprocessing and Time-sharing). Methods of Data Processing (Manual Data Processing, Mechanical Data Processing, Electronic Data Processing), Applications of Data Processing, Different data formats, Conversion and Aggregation.

UNIT-III

Data Visualization: Introduction of Data Visualization, Importance of Data Visualization, Data Visualization project, User psychology of Visualization, UX in Data Visualization, Introduction to DIKW hierarchy, Goals of Data Visualization. User interface design principles based on Human perception.

UNIT-IV

Basic Visualization tools - Area Plots, Histograms, Bar Charts, Specialized Visualization tools - Pie Charts, Box Plots, Scatter Plots, Bubble Plots. Charts and their applicability for different data types. Advanced Visualization tools - Waffle Charts, Word Clouds.

References/ Textbooks:

1. Satish Jain, "Computer Fundamental & Data Processing", BPB Publications, First Edition, 2010.
2. T F Fry, "Data Processing", Elsevier, First Edition, 1983
3. E. Tufte, "The Visual Display of Quantitative Information", Graphics Press, 2nd Edition, 2001.

4. Andy Kirk, "Data Visualization: A Handbook for Data Driven Design" SAGE Publications Ltd, First edition, 2016
5. Kieran Healy, "Data Visualization: A Practical Introduction" Kindle Edition, Princeton University Press, First edition, 2018.
6. Claus O. Wilke, "Fundamentals of Data Visualization", O'Reilly Publishers, First Edition, 2019

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3114

Entrepreneurship basics

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Examine the challenges associated with defining the concepts of entrepreneur and entrepreneurship.

CO2: Comprehend the concepts of entrepreneurial uniqueness, entrepreneurial personality traits.

CO3: Understand the process of building a Start Up.

CO4: Comprehend the concepts of Business Intelligence and its importance.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III

Course Code: BVIL-3114

Entrepreneurship basics

L-T-P	Max. Marks:50
2-0-0	Theory: 40
Time: 3 Hours	CA: 10

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT-I

Introductory terms: Entrepreneurs and Entrepreneurship, Entrepreneurship and innovation, Profit making, Growth, Risk and uncertainty, market demand, Understanding customers.

UNIT-II

Entrepreneurship Uniqueness: Personality Traits, Behavioural traits, Skills required to be a successful Entrepreneur. Forms of Entrepreneurship: Social, Business and Techno Entrepreneurship

UNIT-III

General Venturing Script: Searching, Idea Screening, Planning and Financing, Set-Up, Start-Up, Ongoing Operations, Harvest, Artificial Intelligence as an Entrepreneurship enabler.

UNIT-IV

Introduction to Business Intelligence, Importance of Business Intelligence, Process of Business Intelligence, Business Intelligence tools and applications.

References/ Textbooks:

1. Tom Fawcett, "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking", O'Reilly, First Edition, 2013
2. Swain Scheps, "Business Intelligence for Dummies", Wiley, First Edition, 2008
3. Jeremy M. Kolb, "Business Intelligence in Plain Language: A Practical Guide to Data Mining and Business Analytics" CreateSpace Independent Publishing Platform, First Edition, 2013.
4. Eric Ries "The Lean Startup" Crown Publishing Group, First Edition, 2011

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL- 3115

Machine Learning-I

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend the Machine Learning Techniques.

CO2: Describe Linear Regression and Multiple Linear Regressions.

CO3: Identify Clustering and Classification Techniques.

CO4: Comprehend various machine learning models.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIL-3115

Machine Learning-I

L-T-P	Max. Marks: 50
3-0-0	Theory:40
Time:3Hours	CA: 10

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

Unit I

Introduction:

Foundations for ML, ML Techniques, Validation Techniques, Basic definitions, types of learning, hypothesis space and inductive bias, Boolean Functions: Boolean Algebra

Unit II

Linear Regression:Regression basics: Relationship between attributes using Covariance and Correlation, Relationship between multiple variables: Regression (Linear, Multivariate) in prediction. **Multiple Linear Regressions** Polynomial Regression, Regularization methods, Categorical Variables in Regression.

Unit III

Clustering: Distance measures, Different clustering methods (Distance, Density, Hierarchical), Iterative distance-based clustering.

Classification: Naïve Bayes Classifier, Model Assumptions, Probability estimation, Required data processing

Unit IV

Latest Machine Learning models in trend.

References/ Textbooks:

1. EthemAlpaydin, "Introduction to Machine Learning", MIT Press, Second Edition, 2010
2. Judith Hurwitz, Daniel Kirsch"Machine learning for dummies", Wiley, First Edition, 2018
3. Parteek Bhatia, "Data Mining and Data Warehousing: Principals and Practical Techniques", Cambridge University Press, First Edition, 2019
4. Miroslav Kubat, "An Introduction to Machine Learning", Springer, First Edition, 2015

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIP-3116

Lab on Data Processing and Visualization

L-T-P	Max. Marks:50
0-0-2	Practical: 40
Time: 3 Hours	CA: 10

Lab based on Data Visualization Tool.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Data Storytelling and Presentation

Course Code: BVIP-3117

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Understand importance of Data Storytelling.

CO2: Identify various graphs and plots.

CO3: Present a data story.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Data Storytelling and Presentation

Course Code: BVIP-3117

L-T-P	Max. Marks: 75
0-2-2	Practical:60
Time:3 Hours	CA: 15

Activity 1:

Group discussion on following topics:

- What is Data Storytelling
- Importance of Data Storytelling
- Vital components of Data Storytelling
- Differentiate between data exploration and data storytelling

Activity 2:

- Discuss various graphs and plots used in data visualization and storytelling.
- Discuss the anatomy of a data story.

Activity 3:

- Craft your own data story.

References/Textbooks:

1. Cole NussbaumerKnaflic “Storytelling with Data: Let's Practice”, Kindle edition, Wiley, 2019
2. John Truby, “The Anatomy of Story: 22 Steps to Becoming a Master Storyteller”, First Edition, Faber & Faber, 2007
3. Will Storr, “The Science of Storytelling: Why Stories Make Us Human and How to Tell Them Better”, First Edition, Abrams Press, 2019.
4. Cole NussbaumerKnafl, “Storytelling with Data- A Data Visualization Guide for Business Professionals”, First Edition, Wiley, 2015

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVIP-3118

Lab on Machine Learning-I

L-T-P	Max. Marks: 50
0-0-3	Practical:40
Time:3Hours	CA: 10

Lab based on Machine Learning tools (SCIKIT)

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVID-3119

Minor Project-III

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Apply machine learning techniques on various datasets.

CO2: Apply their knowledge to work on Machine Learning related project.

CO3: Work within defined time and resource constraints while working with real world applications.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- III
Course Code: BVID-3119

Minor Project-III

L-T-P	Max. Marks: 100
0-0-4	Practical:80
Time: 3 Hours	CA: 20

Instructions to the examiner:

The students will be working on a project based on Machine learning concepts. The students need to submit the self-made project at the end of the semester. The marks will be awarded to the student on the basis of Technical knowledge, Project reports and performance in viva-voce.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL-4111
Statistical Inference-II

Course Outcomes:

After completion of this course, the students will be able to:

- CO1:** Discuss various Basic Estimators.
- CO2:** Apply various sampling distributions.
- CO3:** Comprehend basic hypothesis techniques.
- CO4:** Comprehend One way and Two way ANOVA

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL-4111

Statistical Inference-II

L-T-P	Max. Marks: 50
4-0-0	Practical:40
Time:3Hours	CA: 10

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

Unit-I

Basics of Estimators: Properties of unbiasedness, consistency, sufficiency, efficiency, completeness, uniqueness (Without Proofs)

Unit-II

Applications of Sampling Distributions: Test of mean and variance in the normal distribution, Tests of single proportion and equality of two proportions, Chi-square test, t-test, F-test.

Unit-III

Statistical Hypothesis: Null hypothesis, Alternate hypothesis, Level of Significance, simple and composite hypothesis Steps in solving Testing of hypothesis problem, Neyman Pearson Lemma.

Unit-IV

Introduction to ANOVA (Analysis of variance), One way Analysis of variance, Two way Analysis of variance. Problem based on ANOVA.

References/Textbooks:

1. Hogg R.V., Mckean, J.W. and Craig A.T.: Introduction to Mathematical Statistics
2. Gupta S.C. and Kapoor V.K.: Fundamentals of mathematical statistics
3. Goon,A.M.,Gupta M.K. & Dasgupta B. : Fundamental of statistic, Vol. I
4. Goon,A.M.,Gupta M.K. & Dasgupta B. : An outline of statistical theory, Vol. I

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL- 4112

Applied Statistical Programming

Course Outcomes:

After passing this course the student will be able to:

CO1: Comprehend basics of Statistical Computing and role of constructs like control statements, string functions, array, list, etc in programming language.

CO2: Create, operate and manage data frames.

CO3: Simulate various descriptive and analytical algorithms using programming language.

CO4: Apply programming on statistical concepts.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL- 4112

Applied Statistical Programming

L-T-P	Max.Marks: 75
4-0-0	Theory:60
Time:3 Hours	CA:15

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT I

Statistical Computing: Introduction, Role of Programming and Statistical Software. Data, Statistics: Sampling, Cumulative statistics, Statistics for Data frames, matrix objects and lists, Introduction to R, Help functions in R, Vectors, Common Vector Operations, Using all and any function, subletting of vector, Creating matrices, Matrix operations, Applying Functions to Matrix Rows and Columns, Adding and deleting rows and columns.

UNIT II

Lists, Creating lists, general list operations, Accessing list components and values, applying functions to lists, recursive lists Creating Data Frames – Matrix-like operations in frames , Merging DataFrames, Applying functions to Data frames, Factors and Tables, factors and levels, Common functions used with factors, string operations

UNIT III

Input/ Ouput: scan() , readline() Function, Printing to the Screen Reading and writing CSV and text file. Control statements: Loops, Looping Over Non vector, Sets, if-else, writing user defined function, scope of the variable, R script file.

UNIT IV

Descriptive Statistics, Data exploration (histograms, bar chart, box plot, line graph, scatter plot) ,Qualitative and Quantitative Data, Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Measures: Quartile and Percentile, Inter-quartile Range, Relationship between attributes: Covariance, Correlation Coefficient.

References/ Textbooks:

1. Andrie de Vries and Joris Meys, “R Programming for Dummies”, Wiley, 2nd Edition, 2016
2. Sandip Rakshit, “Statistics with R Programming”, McGraw Hill Education, 1st Edition, 2018
3. Garrett Golemund, “Hands on Programming with R”, O’Reilly, 1st Edition, 2014
4. Mark Gardener, “Beginning R: The Statistical Programming Language”, Wiley, 1st Edition, (2013)
5. Tilman M. Davies, “The Book of R: A first Course in Programming and Statistics”, No Strach Press, 1st Edition. 2016

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL-4113

Non-Relational Databases

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend fundamental concepts of Big Data and learn about various components of Hadoop ecosystems

CO2: Comprehend concepts of MapReduce framework.

CO3: Comprehend various types of databases in NoSQL.

CO4: Execute CRUD: Create, Update, Delete and Query operation on database

CO5: Implement indexing, projection, aggregation, etc on existing database.

B.Voc. (Artificial Intelligence and Data Science) Semester- IV

Course Code: BVIL-4113

Non-Relational Databases

L-T-P	Max.Marks: 75
3-0-0	Theory:60
Time:3Hours	CA: 15

Instructions for Paper Setter

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT I

Introduction to Big Data: History of Big data, Career prospects, Advantages, Disadvantages, Applications, Types of Digital Data, Characteristics of Data, Evolution of Big Data, Challenges with Big Data - 3Vs of Big Data.

UNIT II

Introduction to Hadoop: Features, Advantages, Versions, Overview of Hadoop Eco systems and its components, Hadoop1 vs. Hadoop2, Hadoop vs. SQL, RDBMS vs. Hadoop, Hadoop Components, Architecture: HDFS, YARN, Hive,Pig,Mahout, Avro, Sqoop, Oozie, Zookeeper, Chukwa, Flume.

UNIT III

NoSQL Overview, Need of NoSQL, Structured Data Vs. Unstructured Data, Types of Database in NoSQL, Brief History of NoSQL Databases, Features of NoSQL, Advantages of NoSQL, CAP Theorem, Eventual Consistency, ACID vs BASE Properties.MongoDB: Overview, Install MongoDB server, Environment, Create Database, Data Model, Collection (Creation and Deletion), Data types in MongoDB, CRUD: Create, Update, Delete And Query Database.

UNIT IV

SQL to MongoDB Mapping, Projection. Sorting, Limiting and Counting records.

Indexes in MongoDB: Creation of Index, Options, Dropping and fetching of Index. Analyze Query performance, Plan and Profiler. MongoDB Aggregation Query: Aggregate Framework (sum, avg, min, max, push, first, etc). Replication and Sharding, MapReduce Function. Creating database backup.

Reference/ Textbooks:

1. Tom White, “ Hadoop: The Definitive Guide”, Third Edition, O’reily Media, 2012.
2. Seema Acharya, SubhasiniChellappan, "Big Data Analytics" Wiley, Second Edition, 2015.
3. Y. Lakshmi Prasad, “Big Data Analytics Made Easy”, Notion Press, First Edition, 2016.
4. Vignesh Prajapati, “Big Data Analytics with R and Hadoop”,PacktPublishing, First Edition, 2013.
5. Gaurav Vaish, “Getting Started with NoSQL”, Packt Publishing, First Edition, 2013.
6. Adam Fowler, “NoSQL For Dummies”, Wiley, First Edition, 2015.
7. Dan McCreary, Ann Kelly, “Making Sense of NoSQL: A guide for managers and the rest of us”,Manning Publications, First edition, 2013.
8. Shashank Tiwari, “Professional NoSQL”, Wrox, First edition, 2011.
9. Gerardus Blokdyk, “NoSQL A Complete Guide”, 5STARCooks, Second Edition, 2021.
10. Shannon Bradshaw, Eoin Brazil, Kristina Chodorow, “MongoDB: The Definitive Guide: Powerful and Scalable Data Storage”, O'Reilly Media; Third edition, 2019.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIL-4114

Workplace Management

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Comprehend Formal and Informal Communication.

CO2: Identify Skills required to be an efficient employee

CO3: Apply workplace etiquettes and learn to handle difficult situations.

B.Voc. (Artificial Intelligence and Data Science) Semester- III

Course Code: BVIL-3107

Workplace Management

L-T-P	Max.Marks: 75
2-0-0	Theory:60
Time:3 Hours	CA: 15

Instructions for Paper Setter -

Eight questions of equal marks are to set, two in each of the four sections (A-D). Questions of Sections A-D should be set from Units I-IV of the syllabus respectively. Questions may be divided into parts (not exceeding four).

UNIT I

Formal Communication: Etiquettes of Public speaking, Business meetings, Telephonic communication, Email etiquettes.

Informal Communication: Introduction, expressing gratitude, Expressing regret, Apologize, Resolving conflicts.

UNIT II

Presentation Skills: Preparing presentation, making presentation meaningful and engaging, making effective use of the visual aid, interacting with audiences, dealing with queries from the audiences. **Preparing for Interviews:** Key factors for being successful in an interview, body language, confidence, subject expertise. Resume Writing.

UNIT III

Maintaining Relationships at workplace, Maintaining Client Satisfaction, Identify Skills required for the job, Work effectively with colleagues.

UNIT IV

Personality Development, Self-Esteem & Confidence Building, Power Dressing: Wardrobe Etiquette, Grooming for Success, Body Language, Poise, and Eye Contact, Pronunciation, Voice Modulation, Assertive Behaviour, Leadership Qualities, Handling difficult situations with grace, Style and Professionalism

References/ Textbooks:

1. Chaturvedi P.D. , “ Business Communication”, Pearson Education India, Third Edition, 2013.
2. Robin Ryan, “60 Seconds and You're Hired!", Fourth Edition, Penguin Books, 2016
3. Joan van Emden, Lucinda Becker, “Presentation Skills for Students”, Palgrave, Third Edition, 2016
4. David Barron, “Resume: The Definitive Guide on Writing a Professional Resume to Land You Your Dream Job”, CreateSpace Independent Publishing Platform, First Edition, 2017

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIP- 4115

Applied Statistical Programming Lab

L-T-P	Max.Marks: 100
0-0-4	Theory:80
Time:3 Hours	CA:20

Lab based on applied statistics.

B.Voc. (Artificial Intelligence and Data Science) Semester- IV

Course Code: BVIP-4116

Lab on Non-Relational Databases

L-T-P	Max. Marks: 100
0-0-4	Theory:80
Time:3Hours	CA: 20

Lab based on NoSQL

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVID-4117
Minor Project-IV

Course Outcomes:

After completion of this course, the students will be able to:

CO1: Apply CRUD: Create, Update, Delete and Query operation operations on Database.

CO2: Apply their knowledge to work on small/medium scale database related project.

CO3: Work within defined time and resource constraints while working with real world applications.

B.Voc. (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIP-4017

Minor Project-IV

L-T-P	Max. Marks: 100
0-0-4	Practical:80
Time:3Hours	CA: 20

Instructions to the examiner:

The students will be working on a database related project. The students need to submit the self-made project at the end of the semester. The marks will be awarded to the student on the basis of Technical knowledge, Project reports and performance in viva-voce

