Faculty of Vocational Studies

SYLLABUS FOR

Bachelor of Vocation

(Artificial Intelligence and Data Science)

(Semester I-VI)

(Under Credit Based Continuous Evaluation Grading System)

Session: 2023-24

The Heritage Institution

KANYA MAHA VIDYALAYA JALANDHAR

(Autonomous)

PROGRAMME SPECIFIC OUTCOMES

On successful completion of the 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 Tableau) while working collaboratively on real-world problems.

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

PS 06: Learn about the working of Neural Networks, advanced AI and Machine Learning Algorithms, Natural Language Processing etc.

PS 07: Learn about managing a Project, steps to perform effective research and make a major project on the basis of their learnings.

Scheme and Curriculum of Examinations of Three-Year Degree Programme

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

Session 2023-2024

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester I									
Course code	**Course Title**	**Course Type**	**L-T-P**	**Total**	**Marks**				**Examination time (in Hours)**
					Total	**Ext.**		**CA**	
						L	**P**		
BVIL-1421/ BVIL-1031/ BVIL-1431	[1]Punjabi(Compulsory)/ Basic Punjabi/ [2]Punjab History and Culture	C	2-0-0	2	50	40	-	10	3
BVAL-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	35	-	15	3
BVIL-1114	Introduction to Artificial Intelligence and Data Science	S	4-0-0	4	100	70	-	30	3
BVIL-1115	Office Fundamentals	S	2-0-0	2	50	35		15	3
BVIM-1116	Computational Problem Solving-I	S	2-0-2	4	100	40	30	30	3+3
BVIP-1117	Lab in Office Fundamentals	S	0-0-4	4	100		70	30	3
BVID-1118	Minor Project -1	S	0-2-2	4	100	-	70	30	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**						

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

***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 2023-2024

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
BVIM-2102	Communication Skills in English	C	3-0-1	4	50	25	15	10	3+3
BVIL-2113	Computational Problem Solving-II	S	3-0-0	3	100	70	-	30	3
BVIL-2114	Mathematical Foundation	C	4-0-0	4	100	70	-	30	3
BVIL-2115	Technical Writing	S	3-0-0	3	50	35		15	3
BVIL-2116	Data Collection and Analysis	S	4-0-0	4	50	35	-	15	3
BVIM-2117	Relational Database Management System	S	2-0-2	4	100	40	30	30	3+3
BVIP-2118	Computational Problem-Solving Lab	S	0-0-2	2	50		35	15	3
BVID-2119	Minor Project-II	S	0-0-2	2	50		35	15	3
SECM-2502	*Moral Education	AC	2-0-0	2	25	20	-	05	3
	Total			**30**					

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 2023-24

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 2023-24

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester IV									
Course Code	**Course Title**	**Course Type**	**Credits**		**Marks**				**Examination time (in hours)**
					Total	**Ext.**		**CA**	
			L-T-P	**Total**		**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

Scheme and Curriculum of Examinations of Three-Year Degree Programme

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

Session 2023-2024

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester V									
Course Code	**Course Title**	**Course Type**	**Credits**		**Marks**				**Examination time (in hours)**
					Total	**Ext.**		**CA**	
			L-T-P	**Total**		**L**	**P**		
BVIL-5111	Research Methodology	C	3-0-0	3	75	60	-	15	3
BVIL-5112	Principles of Artificial Intelligence	C	4-0-0	4	75	60		15	3
BVIL-5113	Machine Learning- II	S	4-0-0	4	75	60		15	3
BVIL-5114	Soft Computing	S	4-0-0	4	75	60		15	3
BVIL-5115	Project Management	C	3-0-0	3	50	40		10	3
BVIP-5116	Lab on Machine Learning-II	S	0-0-4	4	75		60	15	3
BVID-5117	Minor Project-V	S	0-0-6	6	100		80	20	3
SECI-5541	Innovation, Entrepreneurship and Creative Thinking	AC	2-0-0	2	25	20	-	5	1
Total				30	525				

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 VI

Session 2023-2024

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester VI									
Course Code	**Course Title**	**Course Type**	**Credits**		**Marks**				**Examination time (in hours)**
					Total	**Ext.**		**CA**	
			L-T-P	**Total**		**L**	**P**		
BVIL-6111	Introduction to Blockchain Technology	C	4-0-0	4	75	60	-	15	3
BVIL-6112	Deep Learning	C	4-0-0	4	75	60		15	3
BVIL-6113	Business Intelligence	C	4-0-0	4	75	60		15	3
BVID-6113	Industrial Training/ Major Project	S	0-0-18	18	250	-	250	5	
Total				30	475				

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

Course Title: Punjab History and Culture (From Earliest Times to C. 320)

(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code:BVRL-1431/BVML-1431/BVAL-1431/BVTL-1431/BVNL-1431/BVBL-1431/BVAL -1431/BVHL-1431

Examination Time: 3 Hours **Max. Marks: 100**
Credits L-T-P: 4-0-0 **Theory: 80**
Contact Hours: 4 Hrs/Week **CA: 20**

Instructions for the Paper Setter:

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.
3. Candidates shall attempt 5 questions in 1000 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.
4. Each question will carry 16 marks

Unit-I

1. Physical features of the Punjab
2. Sources of the ancient history of Punjab

Unit-II

3. Harappan Civilization: social, economic and religious life of the Indus Valley People.
4. The Indo-Aryans: Original home

Unit-III

5. Social, Religious and Economic life during Early Vedic Age.
6. Social, Religious and Economic life during Later Vedic Age.

UNIT-IV

7. Teachings of Buddhism
8. Teachings of Jainism

Suggested Readings

- B.N. Sharma, *Life in Northern India*, Delhi. 1966
- Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983.
- Chopra, P.N., Puri, B.N., & Das, M.N. (1974). *A Social, Cultural & Economic History*
- L. M Joshi (ed.), *History and Culture of the Punjab*, Art-I, Patiala, 1989 (3rd edition)
- L.M. Joshi and Fauja Singh (ed.), *History of Punjab*, Vol. I, Patiala 1977.

of India, Vol. I, New Delhi: Macmillan India.

COMMUNICATION SKILLS IN ENGLISH

(Theory)

Course Code: BVRL/BVML/BVAL/BVTL/BVNL/BVBL/BVAI/BVHL-1102

COURSE OUTCOMES

At the end of this course, the students will develop the following Skills:

CO 1: Reading skills that will facilitate them to become an efficient reader

CO 2: Through reading skills, the students will have an ability to have a comprehensive understanding of the ideas in the text and enhance their critical thinking

CO 3: Writing skills of students which will make them proficient enough to express ideas in clear and grammatically correct English

CO 4: The skill to use an appropriate style and format in writing letters (formal and informal) and resume, memo, notices, agenda, minutes

BACHELOR OF VOCATION (RETAIL MANAGEMENT) / BACHELOR OF VOCATION (MANAGEMENT & SECRETARIAL PRACTICES)/ BACHELOR OF VOCATION (ANIMATION)/ BACHELOR OF VOCATION (TEXTILE DESIGN & APPAREL TECHNOLOGY)/ BACHELOR OF VOCATION (NUTRITION EXERCISE & HEALTH)/ BACHELOR OF VOCATION (BEAUTY & WELLNESS) /BACHELOR OF VOCATION (ARTIFICIAL INTELLIGENCE AND DATA SCIENCE)/ BACHELOR OF VOCATION (HOSPITALITY AND TOURISM)

(Semester I)

Session 2023-24

COMMUNICATION SKILLS IN ENGLISH

(Theory)

Course Code: BVRL/BVML/BVAL/BVTL/BVNL/BVBL/BVAI/BVHL-1102

Total Marks: 100

Examination Time: 3 Hrs **Theory: 80**

CA: 20

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 16 marks. Each question can be sub divided into two parts. (16 x 5 = 80)

Unit I

Reading Skills: Reading Tactics and strategies; Reading purposes–kinds of purposes and associated comprehension; Reading for direct meanings.

Unit II

Reading for understanding concepts, details, coherence, logical progression and meanings of phrases/ expressions.

Activities:

- Comprehension questions in multiple choice format
- Short comprehension questions based on content and development of ideas

Unit III

Writing Skills: Guidelines for effective writing; writing styles for application, personal letter, official/ business letter.

Activities:

- Formatting personal and business letters.
- Organizing the details in a sequential order

Unit IV

Resume, memo, notices, agenda, minutes, Tips for effective blog writing

Activities:

- Converting a biographical note into a sequenced resume or vice-versa
- Ordering and sub-dividing the contents while making notes.
- Writing notices for circulation/boards
- Writing blogs

Recommended Books:

1)*Oxford Guide to Effective Writing and Speaking* by JohnSeely.
2)*Business Communication,* by Sinha, K.K. GalgotiaPublishers,2003.
3)*Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education2009.
4)*CommunicationSkills* by Raman, M. & S. Sharma, OUP, New Delhi, India(2011).

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: 35**
Time: 3 Hours	**CA: 15**

Instructions for Paper Setter -

Eight questions of equal marks 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 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 ofmemory),Secondarystorage,MagneticstoragedevicesandOpticalStorageDevices.

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 Providers: GCP, AWSS, Introduction to 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-1114

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 BusinessIntelligence.

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: 100
4-0-0	Theory: 70
Time: 3 Hours	CA: 30

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 ofdata 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, modelling, 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: Create, 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.

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

Course Code: BVIL-1115

Office Fundamentals

L - T – P	**Max. Marks: 50**
2-0-0	**Theory: 35**
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

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 ofword.

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 Word Art 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. WeverkaPeter,"Office2016AllinOneforDummies",FirstEdition,WileyIndia,2015.
4. Satish Jain, Kratika, M.Geetha, "MS–Office 2010", First Edition, BPBPublications,2012.

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

Course Code: BVIM-1116

Computational Problem Solving-I

COURSE OUTCOMES:

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

CO1: Understand the basic concepts and terminology of programming languages.

CO2: Comprehend the concepts of computation problem, data and expressions.

CO3: Demonstrate the usage of algorithms under several categories like list, string, dictionary and control structures.

CO4: Comprehend the concepts of functions and Recursive problem solving.

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

Course Code: BVIM-1116

Computational Problem Solving-I

L - T – P	**Max. Marks: 100**
2-0-2	**Theory: 40 Practical:30**
Time : 3 Hours	**CA: 30**

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

Basic Programming concepts: Generations of programming languages, Machine language, Assembly language, High level language, Compiler, Interpreter, Assembler, Programming environment**,** Text Editor

UNIT-II

Introduction to Python: Applications and features of Python,Process of Computational Problem

Data and Expressions: Literals, Variables, Identifiers, Keywords, Expressions, Statements and Data Types, Python Operators, Data Types: Numbers, String, List, Tuple, Array, Set, Tuples, Dictionaries

UNIT-III

Control Structures: Selection control, Iterative statements, Jumping statements

UNIT-IV

Functions: Fundamental Concepts, Program Routines, Flow of Execution, Parameters & Arguments, Recursive Functions, Recursive Problem Solving, Iteration vs. Recursion, Basic OOPs concept

References/ Textbooks:

1. Charles Dierbach, “Introduction to Computer Science Using Python: A Computational Problem-Solving Focus”, First Edition, John Wiley & Sons, 2013.
2. GUTTAG JOHN V, “Introduction to Computation and Programming Using Python”, Second Edition, PHI,2014.
3. Jeeva Jose, Sojan P.Lal, “Introduction to Computing & Problem Solving Through Python”, First Edition, Khanna Publishers,2015.

4. Mark J. Guzdial, Barbara Ericson, “Introduction to Computing and Programming in Python”, First Edition, Pearson Education,2015.
5. Kenneth Lambert, “Fundamentals of Python”, First Edition, Cengage Learning,2015.
6. Mark Lutz, “Learning Python", Fifth Edition, O'Reilly Media,2013.

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

Course Code: BVIP-1117

Lab on Office Fundamentals

COURSE OUTCOMES:

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

CO1: Learn to build and format formal word documents.

CO2: Create and customize Tables and Graphics in word.

CO3: Learn to build professional PowerPoint presentation by using animations and Transitions.

CO4: Understand spreadsheet basics, create graphs, query, filter and analyse data using pivot tables of data.

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

Course Code: BVIP-1117

Lab on Office Fundamentals

L - T – P	**Max. Marks: 100**
0-0-4	**Practical: 70**
Time: 3 Hours	**CA: 30**

MS WORD

- Text Basics
- Text Formatting and saving file
- Working with Tabs and Indents
- Working with Objects
- Headers and Footers
- Working with bullets and numbered lists
- Working with Tables
- Adding a Footnote and Endnote
- Sharing and Maintaining Document
- Restricting Document Access
- Using Protected View
- Proofing the document
- Printing the document

MS POWERPOINT

- Setting Up PowerPoint Environment
- Creating slides and applying themes
- Working with bullets and numbering
- Working with Shapes, Clipart and Pictures, Word Art, Smart Art
- Hyperlinks and Action Buttons
- Working With Movies and Sounds
- Animation and Slide Transition
- Using slide Master
- Slide Show

MS EXCEL

- Introduction to Excel
- Formatting excel work book
- Perform Calculations with Functions
- Sort and Filter Data with Excel
- Create Effective Charts to Present Data Visually
- Analyse Data Using PivotTables and Pivot Charts
- Protecting and sharing the work book

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

Course Code: BVID-1118

Minor Project – I

COURSE OUTCOMES:

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

CO1: Collect and study data from reliable data sources

CO2 Apply the tools and techniques learnt in the course to process and analyze data for problems associated with AI and Data science.

CO3: Apply their knowledge to work on assigned/self-identified project.

CO4: 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-1119

Minor Project – I

L - T – P	**Max. Marks: 100**
0-2-2	**Practical: 70**
Time : 3 Hours	**CA: 30**

Instructions to the examiner:

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.

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

Course Title: Punjab History and Culture (C. 320 to 1000 A.D.)

(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code: BVRL-2431/BVML-2431/BVAL-2431/BVTL-2431/BVNL-2431/BVBL-2431/BVAL-2431/BVHL-2431

COURSE OUTCOMES:

After completing Semester II and course on Ancient History of Punjab students will be able to understand:

CO 1: The reasons and impact of Alexander's invasions and to comprehend various factors leading to rise and fall of empires and emergence of new dynasties and their administration specifically of Maurya rule in general and Ashok in particular

CO 2: art and architecture of Gupta period and the Indo-Greek style of architecture under Gandhara School

CO 3: To have an insight into the socio-cultural history under Harshvardhan and Punjab under the stated period

CO 4: To enable students to have thorough insight into the various forms/styles of Architecture and synthesis of Indo - Greek Art and Architecture in Punjab

Bachelor of Vocation (Retail Management)/ Bachelor of Vocation (Management and Secretarial Practices)/ Bachelor of Vocation (Animation)/ Bachelor of Vocation (Textile Designing and Apparel Technology)/ Bachelor of Vocation (Nutrition Exercise and Health), Bachelor of Vocation (Beauty and Wellness)/ Bachelor of Vocation (Artificial Intelligence and Data Science)/ /Bachelor of Vocation (Hospitality and Tourism)

(Semester-II)
Session 2023-24
Course Title: Punjab History and Culture (C. 320 to 1000 A.D.)
(Special paper in lieu of Punjabi Compulsory)
(For those students who are not domicile of Punjab)

Course Code: BVRL-2431/BVML-2431/BVAL-2431/BVTL-2431/BVNL-2431/BVBL-2431/BVAL-2431/BVHL-2431

Examination Time: 3 Hours **Max. Marks: 100**
Credits L-T-P: 4-0-0 **Theory: 80**
Contact Hours: 4 Hrs/Week **CA: 20**

Instructions for the Paper Setter:

1. Question paper shall consist of four Units
2. Examiner shall set 8 questions in all by selecting Two Questions of equal marks from each Unit.
3. Candidates shall attempt 5 questions in 1000 words, by at least selecting One Question from each Unit and the 5th question may be attempted from any of the four Units.
4. Each question will carry 8 marks

Unit-I

1. Alexander's Invasion's and Impact

2. Administration of Chandragupta Maurya and Ashoka.

Unit-II

3. The Kushans: Gandhar School of Art

4. Gupta Empire: Golden Period-Social and cultural life, Art and Architecture

Unit-III

5. The Punjab under the Harshvardhana --**Society and Religion during the time of Harshvardhana (Delete)**

6. Socio-cultural History of Punjab from 7th to 1000 A.D.

UNIT IV

7. Development of Languages and Education with Special reference to Taxila

8. Development to Art and Architecture

Suggested Readings

- B.N. Sharma: *Life in Northern India*, Delhi. 1966.
- Budha Parkash, *Glimpses of Ancient Punjab*, Patiala, 1983
- L. M Joshi (ed), *History and Culture of the Punjab*, Art-I, Punjabi University, Patiala, 1989 (3rd edition)
- L.M. Joshi and Fauja Singh (ed.), *History of Punjab*, Vol. I, Punjabi University, Patiala, 1977.

COMMUNICATION SKILLS IN ENGLISH

Course Code: BVRM/BVMM/BVAM/BVTM/BVNM/BVBM / BVIM/BVHM/ DGCM-2102

COURSE OUTCOMES

At the end of this course, the students will develop the following skills:

CO 1: Enhancement of listening skills with the help of listening exercises based on conversation, news and TV reports

CO 2: The ability of Note-Taking to be able to distinguish the main points from the supporting details and the irrelevant information from the relevant one

CO 3: Improvement of speaking skills enabling them to converse in a specific situation

CO 4: Acquisition of knowledge of phonetics which will help them in learning about correct pronunciation as well as effective speaking

COMMUNICATION SKILLS IN ENGLISH

Course Code:BVRM/BVMM/BVAM/BVTM/BVNM/BVBM / BVIM/BVHM/ DGCM-2102

Time: 3 hours (Theory) **Max. Marks: 100**

3 hours (Practical) **Theory: 50**

Practical: 30

Continuous Assessment: 20

Instructions for the paper setter and distribution of marks:

The question paper will consist of four sections. The candidate will have to attempt five questions in all selecting one from each section and the fifth question from any of the four sections. Each question will carry 10 marks. Each question can be sub divided into two parts. (10 x 5 = 50)

COMMUNICATION SKILLS IN ENGLISH

Course Code:BVRM/BVMM/BVAM/BVTM/BVNM/ BVBM / BVIM/ BVHM/ DGCM-2102

Course Contents:

Unit I

Listening Skills: Barriers to listening; effective listening skills; feedback skills.

Activities: Listening exercises – Listening to conversation, News and TV reports

Unit II

Attending telephone calls; note taking and note making

Activities: Taking notes on a speech/lecture

Unit III

Speaking and Conversational Skills: Components of a meaningful and easy conversation, understanding the cue and making appropriate responses, forms of polite speech, asking and providing information on general topics

Activities: 1) Making conversation and taking turns

2) Oral description or explanation of a common object, situation or concept

Unit IV

The study of sounds of English, stress Situation based

Conversation in English Essentials of Spoken English

Activities: Giving Interviews

Recommended Books:

1. *Oxford Guide to Effective Writing and Speaking* by John Seely.
2. *Business Communication* by Sethi, A and Adhikari, B., McGraw Hill Education 2009.
3. *Communication Skills* by Raman, M. & S. Sharma, OUP, New Delhi, India (2011).
4. *A Course in Phonetics and Spoken English* by J. Sethi and P.V. Dhamija, Phi Learning.

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

Course Code: BVIL-2113

Computational Problem Solving-II

COURSE OUTCOMES:

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

CO1: Comprehend the concepts of Object-Oriented Programming and file handling.

CO2: Implement Database programming in Python.

CO3: Develop Graphical user interface using Tkinter programming.

CO4: Understand the uses of various Python Libraries.

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

Course Code: BVIL-2113

Computational Problem Solving-II

L - T – P	**Max. Marks: 100**

3-0-0	**Theory: 70**
Time: 3 Hours	**CA: 30**

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

Object Oriented Programming, Modular Design: Modules, Top-Down Design, Python Modules, **Files:** Opening Files, Using Text Files, String Processing, Exception Handling

UNIT-II

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

UNIT-III

Python GUI Programming: Tkinter, Widgets: Label, Button, Entry, Text, Frame,Adjusting Frame Appearance With Reliefs,Controlling Layout With Geometry Manager

UNIT-IV

Introduction to Python Libraries: Introduction to Data Scraping with Python: Scrapy Library, TensorFlow, Scikit-Learn, Numpy, Keras, PyTorch, LightGBM, Eli5, SciPy, Theano, Pandas

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. Mark J. Guzdial, Barbara Ericson, “Introduction to Computing and Programming in Python”, First Edition, Pearson Education,2015.

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

Course Code: BVIL-2114

Mathematical Foundation

COURSE OUTCOMES:

After completing 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

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- II
Course Code: BVIL-2114

Mathematical Foundation

L - T – P	Max. Marks: 100
4-0-0	Theory: 70
Time :3 Hours	CA: 30

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: 35**
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

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, wiring 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.

Bachelor of Vocation (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: 35
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

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: Analyse, 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.

Bachelor of Vocation (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: Understand querying using SQL and PL/SQL

Bachelor of Vocation (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, INF, 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. IvanBayross, "Oracle – Developer – 2000", Third Edition, BPB Publishers,2010.

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

Course Code: BVIP-2118

Computational ProblemSolving Lab

COURSE OUTCOMES:

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

CO1: Perform file handing using Python

CO2: Implement MySQL and Python connectivity

CO3: Build Graphical user interface applications using tkinter

CO4: Implement Python libraries

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

Course Code: BVIP-2118

Computational ProblemSolving Lab

L - T – P	**Max. Marks: 50**
0-0-2	**Practical:35**
Time : 3 Hours	**CA: 15**

Lab based on Computational Problem solving

Bachelor of Vocation (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 Python tools and techniques to develop GUI application.

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 their project with report and PPT submission.

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

Course Code: BVID-2119

Minor Project-II

L - T – P	**Max. Marks: 50**
0-0-2	**Practical:35**
Time: 3 Hours	**CA: 15**

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. The performance of the students is to be marked on the basis of their technical knowledge, innovation and presentation.

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 the Laplace theorem.

CO3: Understand various types of Probability distributions

CO4: 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: 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

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 probabilitydistributions: Uniform, Exponential, Gamma, Beta, Normal distributions.

UNIT-IV

Sampling Distributions: Chi-square, t and F-distributions with their properties, distribution ofsample 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**
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”, Oreilly 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
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: 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: 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: Decision Trees, Random Forest, Principal Component analysis, Support Vector Machine, Markov decision process, Stochastic Gradient Descent.

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: Recognise the process of preparing a Data story

CO3: Identify and work with various graphs and plots.

CO4: 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

Activity 2:

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

Activity 3:

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

Activity 4:

- 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 NussbaumerKnaflic, "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**

Students will implement ML based Regression, Classification, Clustering algorithms using various Python Libraries such as Panda, Numpy, Matplotlib, Scikit Learn

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: Implement Regression , Classification or Clustering in the project

CO4: 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: Solve problems based on 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 wayAnalysis 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 completing 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, 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 JorisMeys, “R Programming for Dummies”, Wiley, 2nd Edition, 2016

2. Sandip Rakshit, “Statistics with R Programming”, McGraw Hill Education, 1st Edition, 2018

3. Garrett Grolemund, “Hands on Programming with R”, O’Reilly, 1st Edition, 2014

4. Mark Gardener, “Beginning R: The Statistical Programming Language”, Wiley,Ist 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 Hadoop Ecosystem.

CO3: Comprehend various types of databases in NoSQL and CRUD: Create, Update, Delete and Query operation on database

CO4: Understand indexing, projection, aggregation, etc on existing database.

Bachelor of Vocation (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. Adam Fowler, "NoSQL For Dummies", Wiley, First Edition, 2015.

5. Gerardus Blokdyk, “NoSQL A Complete Guide”, 5STARCooks, Second Edition, 2021.
6. 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.

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

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.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- IV
Course Code: BVIP-4116

Lab on Non-Relational Databases

L-T-P	**Max. Marks: 100**
0-0-3	**Practical: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 completing this course, the students will be able to:

CO1: Collect data to perform Statistical Techniques using R Language.

CO2: Apply CRUD: Create, Update, Delete and Query operation operations on Database.

CO3: Apply their knowledge to work on small/medium scale NoSQL database or R language project.

CO4: Work within defined time and resource constraints while working with real world applications.

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

Minor Project-IV

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 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

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5111

Research Methodology

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

Course Outcomes:

After completing this course, the student will be able to**:**

CO1: Significance of ethical conduct, Classification of Research

CO2: Understand the various research methods and data sources in research

CO3: Interpretation of Data and Paper Writing

CO4: Research ethics, IPR and Scholarly publishing

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5111

Research Methodology

L-T-P	**Max.Marks: 50**
3-0-0	**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

Overview of Research: Meaning, purpose, significance of ethical conduct in research, Classification of Research based on its purpose (Basic, Applied, Evaluation and Action Research)

UNIT II

Method: Types of approaches – Narrative, phenomenological, grounded theory, ethnographic, case study, Data Sources: Interviews, Focus groups, observations, approaches to analysis of qualitative data –coding, content analysis

UNIT III

Interpretation of Data and Paper Writing – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish? Ethical issues related to publishing, Plagiarism and Self-Plagiarism. Oral Presentation

UNIT IV

RESEARCH ETHICS, IPR AND SCHOLARY PUBLISHING:

Ethics-ethical issues, ethical committees (human & animal); IPR- intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing- IMRAD concept and design of research paper, citation and acknowledgement

References/Textbooks:

1. Research Methodology (Kindle Edition)by R. Panneerselvam
2. Research Methodology: A Step-by-Step Guide for Beginners (Paperback)by Ranjit Kumar

3. Case Study Research: Design and Methods (Applied Social Research Methods)by Robert K. Yin

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5112

Principles of Artificial Intelligence

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

COURSE OUTCOMES:

After completing thiscourse, the student will be able to:

CO1: Apply knowledge of agent architecture, searching and reasoning techniques for different applications.

CO2: Analyse Searching and Inferencing Techniques.

CO3: Develop knowledge base sentences using propositional logic and first order logic

CO4: Demonstrating agents, searching, inferencing and illustrate the application of probability in uncertain reasoning.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5112

Principles of Artificial Intelligence

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: What is AI? Foundations and History of AI Intelligent Agents: Agents and environment, Concept of Rationality, The nature of environment, The structure of agents.Problem-solving: Problem-solving agents, Example problems, Searching for Solutions

Unit-II

Uninformed Search Strategies: Breadth First search, Depth First Search, Iterative deepening depth first search. Informed Search Strategies: Heuristic functions, Greedy best first search, A*search. Heuristic Functions Logical Agents: Knowledge–based agents, The Wumpus world, Logic, Propositional logic, Reasoning patterns in Propositional Logic

Unit-III

First Order Logic: Representation Revisited, Syntax and Semantics of First Order logic, Using First Orderlogic. Inference in First Order Logic:Propositional Versus First Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution

Unit-IV

Uncertain Knowledge and Reasoning: Quantifying Uncertainty: Acting under Uncertainty, Basic Probability Notation, Inference using Full Joint Distributions, Independence, Baye's Rule and its use. Wumpus World Revisited

References/Textbooks:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence, 3rd Edition, Pearson,2015
2. Elaine Rich, Kevin Knight, Artificial Intelligence, 3rd edition,Tata McGraw Hill,2013
3. George F Lugar, Artificial Intelligence Structure and strategies for complex, Pearson Education, 5th Edition, 2011

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5113

Machine Learning II

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

Course Outcomes:

After completing this course, the student will be able to**:**

CO1: Understand the concepts of Reinforcement Learning

CO2: Learn about various machine learning methods

CO3: Overview of Independent Component

CO4: Basis introduction to Natural Language Processing

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5113

Machine Learning II

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

Reinforcement learning, Reinforcement Learning Algorithm : Python Implementation using Q-learning, Introduction to Thompson Sampling, Genetic Algorithm for Reinforcement Learning, SARSA Reinforcement Learning, Q-Learning in Python

Unit-II

Introduction to Dimensionality Reduction, Introduction to Kernel PCA, Principal Component Analysis(PCA), Principal Component Analysis with Python, Low-Rank Approximations, Overview of Linear Discriminant Analysis (LDA), Mathematical Explanation of Linear Discriminant Analysis (LDA), Generalized Discriminant Analysis (GDA)

Unit-III

Independent Component Analysis, Feature Mapping, Extra Tree Classifier for Feature Selection, Parameters for Feature Selection, Underfitting and Overfitting in Machine Learning

Unit-IV

Introduction to Natural Language Processing , Overview and language modeling: Overview: Origins and challenges of NLP-Language and Grammar,Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model, Text Preprocessing, Tokenize text , sentence, words ,Introduction to Stemming, Stemming words with NLTK, Lemmatization with NLTK, Lemmatization with TextBlob

References/Textbooks

1. The Hundred-Page Machine Learning Book,Andriy Burkov, First Edition
2. Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies by John D. Kelleher, Brian Mac Namee, and Aoife D'Arcy
3. Machine Learning in Action by Peter Harrington
4. Machine Learning: A Probabilistic Perspective by Kevin P. Murphy

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5114

Soft Computing

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

COURSE OUTCOMES:

After completing this course, the student will be able to**:**

CO1: Learn about major areas of soft computing.

CO2: Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.

CO3: Apply artificial neural networks and fuzzy logic theory for various problems

CO4: Determine the use of Genetic algorithm to obtain optimized solutions to problems.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5114

Soft Computing

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

Soft Computing: What is Soft Computing? Difference between Hard and Soft computing, Requirement of Soft computing, Major Areas of Soft Computing, Techniques, Applications of Soft Computing.

Unit-II

Fuzzy Logic: Introduction, Architecture of a Fuzzy Logic System, characteristics, fuzzy sets and relation, applications, advantages and disadvantages. Fuzzy versus crisp, crisp set, crisp relation, Crisp logic, predicate logic, fuzzy logic, defuzzification and fuzzification.

Unit-III

Neural Networks: Biological vs Artificial neurons, Difference between ANN and BNN, architecture, working/training of ANN, ADALINE and MADALINE Networks, Backpropagation networks-architecture, advantages, disadvantages, learning rules (Hebbian, perceptron, delta, correlation, out star).

Unit-IV

Genetic Algorithm: History of Genetic Algorithms (GA), Working Principle, Various Encoding methods, Fitness function, GA Operators, Convergence of GA, Bitwise operation in GA, Multi-level Optimization.

References/Textbooks

1. Principles of Soft Computing, S.N. Sivanandam, S.N. Deepa, Wiley India
2. Neuro - Fuzzy & Soft Computing - C. T. Sun, E. Mizutani, J. S. R. Jang, Pearson
3. Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis & Applications, S.Rajasekaran, G. A. Vijayalakshami, PHI.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5115

Project management

COURSE OUTCOMES

After completing this course, the student will be able to**:**

CO1: Understand and practice the process of project management

CO2: Develop the scope of work, provide accurate cost estimates and to plan the various activities.

CO3: Understand objectives of Activity Planning

CO4: Learn techniques to enhance software quality

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIL-5115

Project Management

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 Project Management: Introduction, Project and Importance of Project Management, Contract Management, Activities Covered by Software Project ManagementSoftware engineering, A Process Framework, Process Models: Prescriptive models, Waterfall model, Incremental process models, Evolutionary process models, Specialized process models, Software development life cycle, Software Effort Estimation, Resource Allocation, Software testing methods

Unit II

Methods and Methodologies, categories of Software Projects, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, Management and Management Control, Project Management life cycle, Traditional versus Modern Project Management Practices.

Unit III

Activity Planning: Objectives of Activity Planning, When to Plan, Project Schedules, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass– Backward Pass,critical path, Activity Float, Shortening Project Duration, Activity on Arrow Networks.

Unit IV

Software Quality: Introduction to software quality in project planning, Importance of software quality, software quality models, ISO 9126, quality management systems, process capability models, techniques to enhance software quality, quality plans.

References/Textbooks:

1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill.

2. Michael Blaha, James Rumbaugh: Object Oriented Modelling and Design with UML, 2nd Edition, Pearson Education, 2005.

3. Bob Hughes, Mike Cotterell, Rajib Mall: Software Project Management, 6th Edition, McGraw Hill Education, 2018.

4. Deepak Gaikwad, Viral Thakkar, DevOps Tools From Practitioner's Viewpoint, Wiley.

5. Ian Sommerville: Software Engineering, 9thEdition, Pearson Education, 2012.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIP-5116

Lab on Machine Learning-II

COURSE OUTCOMES

After completing this course, the student will be able to**:**

CO1: Understand and practice latest Machine Learning Algorithms.

CO2: Develop their coding skills using various python toolkits and libraries

CO3: Understand and implement feature selection, extraction ad mapping

CO4: Learn and implement NLTK

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVIP-5116

Lab on Machine Learning-II

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

Students will implement Machine Learning Techniques taught in the theory paper using Python toolkits and Tensorflow.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVID-5117

Minor Project-V

COURSE OUTCOMES

After completing this course, the student will be able to**:**

CO1: Build project based on Machine Learning Techniques.

CO2: Learn the importance of project management and delivering time-bound quality work.

CO3: Implement Neural Networks on real world problems.

CO4: Work thoroughly on their technical and management skills.

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- V
Course Code: BVID-5117

Minor Project-V

L-T-P	**Max.Marks: 100**
0-0-6	**Practical:80**
Time:3 Hours	**CA: 20**

The students will be working on a Machine Learning or Neural Network based project using Weka tool. 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- VI
Course Code: BVIL-6111

Introduction to Blockchain Technology

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

Course Outcomes: After completing this course, the student will be able to**:**

CO1: Understanding about the basis of blockchain

CO2: Significance of Cryptography & Cryptocurrencies

CO3: How to Store and Use Bitcoins

CO4: Bitcoin and Anonymity Basics, How to De-anonymize Bitcoin

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- VI
Course Code: BVIL-6111

Introduction to Blockchain Technology

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

Blockchain: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain. Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations.

Unit II

Introduction to Cryptography & Cryptocurrencies: Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Cryptocurrency, How Bitcoin Achieves Decentralization: Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work, Putting it all together

Unit III

Mechanics of Bitcoin: Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bitcoin network, Limitations and improvements How to Store and Use Bitcoins: Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets

UNIT IV

Bitcoin Mining: The task of Bitcoin miners, Mining Hardware, Energy consumption and ecology, Mining pools, Mining incentives and strategies, Bitcoin and Anonymity: Anonymity Basics, How to De-anonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin and Zerocash

References/Textbooks:

1. Blockchain Technology: Exploring Opportunities, Challenges, and Applications, CRC Press, Authors: Sonali Vyas, Vinod Kumar Shukla, Shaurya Gupta, Ajay Prasad
2. Blockchain and Web3: Building the Cryptocurrency, Privacy, and Security Foundations of the Metaverse, Wiley, Author: Winston Ma and Ken Huang
3. The Basics of Bitcoins and Blockchains by Antony Lewis

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- VI
Course Code: BVIL-6112

Deep learning

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

COURSE OUTCOMES:

After completing this course, the student will be able to**:**

CO1: Understand Basic Concepts of Deep Learning

CO2: Comprehend Various Deep Learning Algorithms

CO3: Learn about Convolutional Neural Networks

CO4: Understand Recurrent and Recursive Neural Networks

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- VI
Course Code: BVIL-6112

Deep learning

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

Deep learning: Introduction to Deep Learning: Introduction, Deep learning Model, Historical Trends in Deep Learning.

Unit-II

Deep learning algorithms: Feedforward Networks: Introduction to feedforward neural networks, Gradient-Based Learning, Back Propagation and Other Differentiation Algorithms. Regularization for Deep Learning CNN, long short-term memory networks, recurrent NN, Multi-layer perceptron, self-organizing maps, deep belief network, restricted Boltzmann machines, auto encoders.

Unit-III

Convolutional Networks: The Convolution Operation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features- LeNet, AlexNet.

Unit-IV

Recurrent and Recursive Neural Networks: Unfolding Computational Graphs, Recurrent Neural Network, Bidirectional RNNs, Deep Recurrent Networks, Recursive Neural Networks, The Long Short Term Memory and Other Gated RNNs. Applications: Large-Scale Deep Learning, Computer, Speech Recognition, Natural Language Processing and Other Applications.

References/Textbooks:

1. Neural Networks and Deep Learning: A Textbook by Charu C. Aggarwal
2. Fundamentals of Deep Learning: Designing Next-Generation Machine Learning Algorithms by Nithin Buduma, Nikhil Buduma and Joe Papa
3. Deep Learning: A Practitioners Approach by Josh Patterson and Adam Gibson

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- VI
Course Code: BVIL-6113

Business Intelligence

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

COURSE OUTCOMES:

After completing this course, the student will be able to**:**

CO1: Understand the concepts of Business Intelligence and Decision Making

CO2: Learn Implementation Phase

CO3: Comprehend Mathematical Models for Decision Support

CO4: Learn Activities and Approaches to Knowledge Management

Bachelor of Vocation (Artificial Intelligence and Data Science) Semester- VI
Course Code: BVIL-6113

Business Intelligence

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

Decision Support and Business Intelligence: Opening Vignette, Changing Business Environments and Computerized Decision Support, Managerial Decision Making, Computerized Support for Decision Making, An Early Framework for Computerized Decision Support, The Concept of Decision Support Systems (DSS), A framework for Business Intelligence (BI), A Work System View of Decision Support.

Unit-II

Computerized Decision Support: Decision Making, Models, Phases of the Decision-Making Process, The Intelligence Phase, The Design Phase, The Choice Phase, The Implementation Phase, How Decisions Are Supported.

Unit-III

Modelling and Analysis: Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk, Management Support Systems, Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking.

Unit IV

Knowledge Management: Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation.

References/Textbooks:

1. Data Strategy: How To Profit From A World Of Big Data, Analytics And The Internet Of Things" by Bernard Marr
2. A Practitioner’s Guide to Business Analytics by Randy Bartlett

3. Successful Business Intelligence: Unlock the Value of BI & Big Data by Cindi Howson