Holy Cross College (Autonomous), Nagercoil
Kanyakumari District, Tamil Nadu.
Accredited with A$^+$ by NAAC - IV Cycle – CGPA 3.35

Affiliated to
Manonmaniam Sundaranar University, Tirunelveli

PG Programmes

GENERIC VALUE-ADDED COURSE
2024-2025

Issued from
THE DEANS' OFFICE

GENERIC VALUE-ADDED COURSE: MATH AND CS FOUNDATIONS FOR COMPETITIVE EXCELLENCE

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2401	1	-	1	-	1	2	30	25	75	100

Pre-requisite:

Students should have basic knowledge on basic mathematics and introductory computer science concepts.

Learning Objectives:

1. To understand the mathematical concepts and computational techniques essential for solving complex problems in competitive programming.
2. To enhance problem-solving skills and algorithmic thinking to excel in competitive programming contests and technical interviews.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	demonstrate proficiency in mathematical concepts and computational techniques, applying them to solve complex problems effectively.	**K1**
2	improve speed and accuracy in problem solving under time constraints typically found in competitive programming environments.	**K2**
3	learn common abbreviations and terminology used in the field of Computer Science and Information Technology	**K2**
4	develop their analytical thinking and problem-solving abilities, preparing them for success in competitive programming contests and technical interviews.	**K3**
5	master key mathematical concepts, including Discrete Mathematics, Number Theory, and Combinatorics.	**K4**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze

Units	Contents	No. of Hours
I	Numbers - Percentages - Profit and Loss - Average – Time and Work- Simple Interest - Compound Interest	**6**
II	Problems on Ages - Problems on Trains – Area – Probability – Reasoning - Coding and Decoding – Alphabet Series- Directions	**6**
III	Ranking – Blood relations - Syllogism – Puzzles – Inequalities – Parallel Row – Input & Output	**6**
IV	Introduction to computers – Basic Computer Organization and Data processing cycle – Computer Peripheral – Operating System- Software - Memory storage Units- number System – Logic Gates	**6**
V	Data base Management System – Microsoft Office – File Extension- Computer Network – Open System Interconnection Model – Internet – Computer Hacking – List of Abbrevations	**6**
	Total	**30**

Self study	Percentages

Textbooks

1. Aggarwal, R.S (2017). *Quantitative Aptitude* (Revised Edition). S. Chand and Company LTD.
2. Kumar, A. 2011. *Computer General Awareness*. Upkar Prakashan Publisher

Reference Books

1. Singh, N.K. 2014. *Quantitative Aptitude for All Competitive Examinations*. Published by McGraw Hill Education (India) Pvt. Ltd.
2. Bhatt, S. 2013. *Comprehensive Mathematics for Competitive Examinations*. S. Chand and Company LTD.
3. Munjal, V. 2019. *Advanced Quantitative Aptitude*. Tata McGraw-Hill Publishing Company Limited.
4. Kumar, R. 2017. *Ultimate Mathematics for Competitive Exams*. Unique Publisher.
5. Verma, S. 2015. *The Pearson Guide to Quantitative Aptitude for Competitive*

Web Resources

1. Simplification - Shortcuts & Tricks for Placement Tests, Job Interviews & Exams - YouTube
2. Aptitude Made Easy - Profit & Loss – Basics and Methods, Profit and loss shortcuts, Math tricks - YouTube
3. https://www.smartkeeda.com/
4. https://blog.grabon.in/competitive-exam-preparation-sites/
5. https://sscstudy.com/

GENERIC VALUE-ADDED COURSE: DESCRIPTIVE BIOSTATISTICS WITH EXCEL APPLICATIONS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2402	1	-	1	-	1	2	30	25	75	100

Prerequisite: Familiarity with basic statistical concepts such as mean, median, mode, standard deviation and probability.

Learning Objectives:

1. To identify different types of data and understand various data collection methods.
2. to ensure students can recognize appropriate methods to analyze data using excel.

Course Outcomes

On completion of this course, students will be able to:		
1	recall basic statistical terms and concepts	**K1**
2	summarize the properties of mean, median and mode.	**K2**
3	demonstrate how to enter data and use basic functions in Excel.	**K3**
4	analyze data sets to calculate and interpret measures of central tendency and dispersion.	**K4**
5	evaluate the effectiveness of different data visualization techniques using Excel.	**K5**

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse; **K5** – Evaluate

Units	Contents	No. of Hours
I	**Introduction to Descriptive Statistics and Central Tendency:** Introduction to Excel: interface, data entry, and basic functions. Types of data: qualitative vs. quantitative.	**6**
II	**Scales of measurement:** nominal, ordinal, interval, and ratioMean: definition, calculation, properties. Hands-on practice with Excel for entering data and basic formatting.	
III	**Median and Mode:** Median: definition, properties, calculation, and applications Mode: definition, properties, calculation, and applications. Hands-on exercises using Excel to calculate median and mode.	**6**
IV	**Measures of Dispersion:** Definition and importance of dispersion: Range, interquartile and Quartiles calculation, Standard deviation & Standard error: Hands-on exercises using Excel to calculate range, IQR, variance, and standard deviation.	**6**
V	**Data Visualization for Central Tendency and Dispersion:** Importance of data visualization in statistical analysis. Creating and interpreting box plots, histograms, and scatter plots, etc. using Excel. .	**6**
	Total	**30**

Textbooks:

1. Chaudhary, S.S., Madhu, G., Govind S. 2021. Descriptive Statistics. Sstudent's friends & company, Agra.
2. Giovanni. A. 2016. Descriptive and Inferential Statistics with Excel. Lambert Academic Publishing, India.

Reference Books

1. Stephanie, Glen. 2014. Excel Statistics: Step-by-Step. CreateSpace Independent Pub., USA.
2. Thomas J. Quirk, Meghan H. Quirk, Howard F. Horton. 2021. Excel 2019 for Environmental Sciences Statistics - A Guide to Solving Practical Problems. Springer Nature, USA.
3. Thomas J. Quirk Simone M. Cummings. 2021. Excel 2019 for Social Work Statistics - A Guide to Solving Practical Problems. Springer Nature, USA.
4. Thomas J. Quirk Meghan H. Quirk Howard F. Horton. 2021. Excel 2019 for Physical Sciences Statistics - A Guide to Solving Practical Problems. Springer Nature, USA
5. Patricia Haden, 2019. The Cambridge Handbook of Computing Education Research - Descriptive Statistics. Cambridge University Press. UK.

Web Resources:

1. https://www.slideshare.net/slideshow/a-practical-tutorial-to-excel/36024341
2. https://www.slideshare.net/slideshow/excel-chapter-1-preparing-an-excel-workbook/283888
3. https://www.analyticsvidhya.com/blog/2021/11/a-comprehensive-guide-on-microsoft-excel-for-data-analysis/
4. https://www.digitalvidya.com/blog/using-excel-for-statistical-analysis/
5. https://www.slideshare.net/slideshow/data-analysis-with-microsoft-excel-pdfdrive-pdf/251644111

GENERIC VALUE-ADDED COURSE: ADVANCED EXCEL

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2403	1	-	1	-	1	2	30	25	75	100

Pre-requisite

Students should know the basic knowledge on computer.

Learning Objectives

1. To provide knowledge to the students on Excel
2. To give knowledge on Data entry.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	recall and understand various selection techniques.	**K1,K2**
2.	apply the data entry for creating, editing and Savings	**K3**
3.	know to work with functions and formula.	**K3**
4.	understand the Conditional Formatting and IF Conditions & Charts.	**K2**
5.	define and apply Advance of Pivot Table, Pivot Charts.	**K1, K3**

K1 - Remember; **K2** - Understand; **K3** - Apply

Units	Contents	No. of Hours
I	**Excel Introduction** Introduction to Excel interface - An Overview of the Screen, Navigation and Basic Spreadsheet Concept - Various Selection Techniques - Understanding rows and columns, Naming cells-Working with excel workbook and sheets Formatting excel work book.	6
II	**Managing Excel Sheet** Data entry-Creating, Editing, Saving -Page Settings - Sorting and Filtering data - Basic Calculation and Basic Formulas - Customizing Common options in Excel - Absolute and Relative referencing - Protecting and Un-Protecting worksheets and cells - Securing & Protecting Spreadsheets - Short cut Keys	6
III	**Calculations with Functions** Working with Functions & Formulas - Basic Calculation and Basic Formulas - Basic Functions - Lookup Functions [Hlookup & Vlookup] - Logical Functions -Financial Functions [PMT,IPMT,PPMT,RATE,NPER] - Statistical Functions -Maths & Trig. Functions - Text Functions - Date & Time Functions.	6
IV	**Excel Data Tools** Modifying worksheets with color - Auto Formats - Conditional Formatting and IF Conditions - Charts & Graphs - Pivot Table & Pivot Chart - Sort & Filter. Subtotal and What if Analysis - Cell References Formulas, Audit Formula, Define Name - Protect Workbook & Worksheet - Record Macro Freeze Panes - Advance Filter with Wild Card Character, Macros, Page Setup and Printing - Advance Conditional Formatting, Paste Special & Advance Number - Advance Tools – Solver, Advance Subtotal etc. - Advance Marcos.	6
V	**More Advanced Options** Data - 1. Subtotal 2. Sorting Data 3. Filtering Data 4. Data Validation 5. Goal	6

	Seek - Advance of Pivot Table, Pivot Charts - Advance Date & Time Functions with Logical Functions - Lookup Functions with IF Error - Advance Logical Functions and Lookup Functions & etc.- Proofing and Printing	
	Total	**30**

Textbooks

1. John Walkenbach (2023) *MS Excel Bible*, Wiley Publication, New Jersey, USA.
2. Ramesh Bangia, *Learning Microsoft Excel 2013*, Khanna Book Publishing, Bangalore.

Reference Books

1.Glyn Davis &BrankoPecar (2021) *Business Statistics using Excel*, Oxford publications, Chennai.
2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons (2018) *Microsoft 2003*, Tata McGraw Hill, Noida.
3. Wayne L Winston, *Microsoft Excel, Data Analysis and Business Modelling*, Prentice Hall, New Jersey, USA.
4**.** HarjitSuman (2022)*Excel Bible for Beginners*, Kindle Editio, Chennai.
5. Greg Harvey(2023) *Excel 2016 for Dummies*, Chennai.

Web Resources

1.https://www.freebookkeepingaccounting.com/using-excel-in-accounts
2. https://courses.corporatefinanceinstitute.com/courses/free-excel-crash-course-for-finance
3. https://www.youtube.com/watch?v=Nv_Nnw01FaU
4.https://www.youtube.com/watch?v=Nv_Nnw01FaU
5.https://www.udemy.com/course/office-automation-certificate-course/

GENERIC VALUE-ADDED COURSE: BUSINESS ANALYTICS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2404	1	-	1	-	1	2	30	25	75	100

Pre-requisite:

Students should have a basic knowledge of mathematics, statistics, and information technology.

Learning Objectives:

1.To develop the ability to analyze business processes.

2 To enhance skills in communicating complex business requirements clearly.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	identify inefficiencies and areas for improvement in business processes, and propose solutions that enhance productivity and effectiveness.	**K1**
2.	utilize data analysis and business intelligence tools to gather, process, and interpret data, supporting strategic decision-making.	**K3**
3.	apply project management and business analysis best practices to design, implement, and evaluate solutions that enhance business performance.	**K3**
4.	engage and collaborate with stakeholders to elicit requirements, provide updates, and ensure solutions align with business goals.	**K3**
5.	create detailed and clear business requirements documents, process models, and use cases that effectively communicate business needs and solutions.	**K4**

K1 - Remember; **K2** - Understand; **K3** – Apply; **K4** - Analyse;

Units	Contents	No. of Hours
I	**Foundations of Business Analysis** Market Research and Analysis - Requirements Gathering and Documentation - SWOT Analysis - Stakeholder Analysis	**6**
II	**Data and Process Analysis** Data Analysis and Visualization - Process Mapping and Optimization - Business Intelligence and Reporting - KPI Development and Monitoring	**6**
III	**Financial and Risk Analysis** Financial Analysis - Risk Management - Cost-Benefit Analysis - Scenario Analysis	**6**
IV	**Strategic Business Development** Business Model Development - Competitive Analysis - Customer Journey Mapping - Product Lifecycle Management - Digital Transformation and Technology Trend Analysis	**6**
V	**Implementation and Optimization** Project Management - Change Management - Lean Six Sigma - User Acceptance Testing (UAT) - Business Process Reengineering and Optimization	**6**
	Total	**30**

Self-study	Financial Analysis

Textbooks:

1. Steven P. Blais (2011), Business Analysis: Best Practices for Success,1st Edition, John Wiley & Sons, Hoboken, NJ**.**

Reference Books:

1. F.C.Sharma, Dr.R.U.Singh," " Business Finance", SBPD Publications, 1st Edition 2022.
2. Dr.S.B.Gupta, " Business Finance, SathyaBhawan Publications" , New Delhi.
3. Cadle, J., Paul, D. and Turner, P. (2014) Business Analysis Techniques: 99 Essential Tools for Success. Swindon: BCS.
4. . Apte P.G, (2020), "International Financial Management" 8th Edition, Tata McGraw Hill, New Delhi.
5. Pandey I. M., (2021), "Financial Management", 12thEdition, Pearson IndiaEducation Services Pvt. Ltd, Noida.

Web Resources

1. https://www.coursera.org/learn/fundamentals-of-business-analysis
2. https://www.springboard.com/blog/data-analytics/data-analysis-process/
3. https://www.allianz-trade.com/en_US/insights/how-to-assess-financial-risk.html
4. https://www.investopedia.com/articles/personal-finance/090815/basics-business-development.asp
5. https://www.sophist.de/en/consultationproject/definition-optimization-and-implementation-of-methods/

GENERIC VALUE-ADDED COURSE: CONTENT MANAGEMENT SYSTEM WITH AI TOOLS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2405	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Should have basic Computer knowledge.

Learning Objectives

1. To provide college students with comprehensive knowledge and practical skills in using Content Management Systems (CMS)
2. To integrating Artificial Intelligence (AI) tools into Content Management.

Course Outcomes

On the successful completion of the course, students will be able to:		
1.	understand the fundamentals and importance of CMS	**K1**
2.	learn how to manage, organize, and publish content effectively.	**K1**
3.	explore the role of AI in enhancing CMS functionalities, including content personalization, automated content generation, and advanced analytics.	**K2**
4.	develop practical skills in integrating AI tools and frameworks with CMS platforms	**K3**
5.	work on real-world projects to apply their learning and solve practical problems using CMS and AI.	**K2, K3**

K1 - Remember; **K2** - Understand; **K3** – Apply

Units	Contents	No. of Hours
I	**Introduction to Content Management Systems (CMS) Overview of CMS** Importance of CMS for content management - Common features - functionalities of CMS - Popular CMS platforms (WordPress, Joomla, Drupal, etc.)	**6**
II	**Content Management** Installation and setup of CMS - Configuration and customization of CMS platforms - Understanding themes - templates Plugin and extension management Creating and managing content (posts, pages, media) - Organizing content with categories - tags User roles - permissions in CMS Search Engine best practices for CMS	**6**
III	**Enhancing CMS with AI** Introduction to AI and its applications in CMS AI tools and Content Making Natural Language Processing (NLP) for content management - Implementing AI chatbots in CMS Automated content generation and curation using AI Image and video analysis with AI in CMS Advanced analytics and insights with AI	**6**
IV	**Hands-on Projects and Case Studies** Real-world CMS projects with AI integration Group projects: Developing a CMS site with AI features Case studies of successful AI-CMS implementations Presentation and discussion of project outcomes	**6**
V	**Future Trends and Career Opportunities** Emerging trends in CMS and AI The future of AI in content management	**6**

	Career opportunities in CMS and AI Resources for continuous learning and development	
	Total	**30**

Textbook

1. Brad Williams, David Damstra, Hal Stern - *Professional WordPress: Design and Development* 2015 (3rd edition), Wrox.

Reference books

1. Andy Williams - *WordPress for Beginners 2023*, Independently published
2. Lisa Sabin-Wilson, *WordPress All-in-One for Dummies* 2019 (4th edition) For Dummies.
3. Matthew MacDonald *WordPress: The Missing Manual* - O'Reilly Media, Inc.
4. Ela Kumar, *Artificial Intelligence*, 2013 TechSar Pvt. Ltd
5. Shraddha N. Zanjat *Artificial Intelligence & Expert Systems*, 2020, Notion Press Media Pvt Ltd

Web Resources

1. youtu.be/T-JUKC5Pgxg?si=4s86LsbWvbG_Kby1
2. youtu.be/5WJdlbFAOvg?si=4jJXBDC1cEub_vEi
3. youtu.be/N8e-2htD4qg?si=OwvvBOuJi6msFkWB
4. www.youtube.com/live/gQ2A-zYZC-k?si=bqs9UBRUuWZ8F_Cp
5. youtu.be/-6q3Rt1MTtk?si=Xe7qPwDRu0BIDcFP

GENERIC VALUE-ADDED COURSE: CYBER SECURITY

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2406	1	-	1	-	1	2	30	25	75	100

Prerequisite: Understanding the importance of cyber security

Learning Objectives:

1. To understand the basics of cyber crime
2. To understand how to utilize social media effectively

Course Outcomes

	On the successful completion of this course, students will be able to	CL
1	gain knowledge on basics of cyber security	K1
2	understand the basics of cyber crime	K2
3	handle social media	K3
4	implement cyber law	K4
5	understand and evaluate the tools and techniques in cyber security	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** – Evaluate.

Units	Contents	No. of Hours
I	**Introduction to Cyber security** Definition – Crime, Cyber Crime, Information Security, Digital Forensics Uniqueness of Cyber Crime – Concept of cyber security, Issues and challenges of cyber security.	6
II	**Forms of Cyber Crimes** Hacking – types of hacking, hackers, Cracking, Dos, DDos, Cyber Bullying, Cyber Stalking, Pornography, Phishing, Intellectual Property Theft, Data Theft, Dada diddling, malwares, steganography, salami attacks, ATM and Credit card frauds, Telecom Frauds.	6
III	**Social Media overview** Definition, Types, advantages and disadvantages – Crimes through social media, victimization through social media – Do's and Don'ts in Social Media – Safe Surfing.	6
IV	**Cyber crime and cyber law** Classification of cyber crimes, Common cyber crimes- Cybercriminals modus-operandi, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences.	6
V	**Tools and Technologies for Cyber Security** Mobile phone security, Password policy, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Wi-Fi security	6
	Total	30

Text Books

1. Raef Meeuwisse, May 14, 2015, Cybersecurity For Beginners, Lulu Publishing Services
2. Christopher Hadnagy, June 25, 2018, Social Engineering: The Science Of Human Hacking,Wiley

Reference Books

1. Sumit Belapure and Nina Godbole 2012. *Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives*, Wiley India Pvt. Ltd.
2. Dorothy F. Denning, Addison Wesley 2013. *Information Warfare and Security*
3. Henry A. Oliver , *2003. Security in the Digital Age: Social Media Security Threats and Vulnerabilities* , Create Space Independent Publishing Platform.
4. Natraj Venkataramanan and Ashwin Shriram, 2016. *Data Privacy Principles and Practice* by, CRC Press.
5. W. KragBrothy, 2004.I*nformation Security Governance, Guidance for Information Security Managers*, 1st Edition, Wiley Publication

Web Resources

1. https://cio-wiki.org/wiki/Cyber_Security
2. https://www.ftc.gov/system/files/attachments/cybersecurity-small business/cybersecuirty_sb_factsheets_all.pdf
3. https://uou.ac.in/sites/default/files/slm/Introduction-cyber-security.pdf
4. https://www.researchgate.net/publication/335322600_Cyber_Security
5.https://www.niti.gov.in/sites/default/files/201907/CyberSecurityConclaveAtVigyanBhavanDelhi_1.pdf

GENERIC VALUE-ADDED COURSE: JAVA SERVER FACES (JSF)

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2407	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on computer.

Learning Objectives

1. Grasp the phases of JSF application lifecycle and the role of UI components, converters, and validators.
2. Develop basic CRUD operations using managed beans, forms, data validation, and JSF navigation rules.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	choose fundamental JSF concepts, such as managed Beans, Face lets, and component libraries, a foundational knowledge of the framework.	K1
2	understand and examine JSF applications, identifying performance bottle necks, usability issues, fostering strong analytical and problem solving skills.	K2
3	identify the role of JSF in web development, including its integration with other Java technologies, to create robust, user-friendly, and maintainable web applications that align with industry best practices.	K3
4	develop dynamic and responsive web applications using JSF, leveraging managed beans and lifecycle management.	K4
5	evaluate and optimize JSF applications for performance and scalability, employing best practices and design patterns.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No. of hours
I	**Introduction to Java Programming** Overview of Java - Setting Up the Development Environment - Basic Syntax and Structure - Variables and Data Types - Operators and Expressions.	6
II	**Control Flow Statements** Conditional Statements – Loops - Control Flow in Loops – Arrays - String Handling.	6
III	**Conversation and Pronunciation Practice** Classes and Objects – Encapsulation – Inheritance – Polymorphism – Interfaces.	6
IV	**Writing and Comprehension** Exception Handling - Built-in Exceptions - File I/O Basics - Advanced File I/O - Java 8 I/O (NIO).	6
V	**Advanced Language Skills and Projects** Collections Framework – Generics – Multithreading – Networking - JavaFX Basics.	6
	Total	30

Textbooks:

1. "Core JavaServer Faces" by David Geary and Cay S. Horstmann.
2. "JavaServer Faces: The Complete Reference" by Chris Schalk and Ed Burns
3. "JavaServer Faces 2.0, The Complete Reference" by Ed Burns and Chris Schalk

Reference Books:

1. "JavaServer Faces: Introduction by Example" by Josh Juneau
2. "Pro JSF and HTML5: Building Rich Internet Components" by Zubin Wadia

Web Resources:

1. https://docs.oracle.com/javaee/7/tutorial/jsf-intro.htm
2. (https://www.d.umn.edu/~tcolburn/cs4531/corejsf/)
3. (https://www.oreilly.com/library/view/javaserver-faces-20/9780071625098/)
4. (https://www.manning.com/books/javaserver-faces-in-action)

GENERIC VALUE-ADDED COURSE: PYTHON

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2408	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on computer.

Learning Objectives:

1. To understand and apply Python syntax, control structures, and data types such as lists, dictionaries, and sets.
2. To write and debug Python programs using functions, modules, and libraries for various applications.

Course outcomes

On the successful completion of the course, student will be able to:		
1	learn the advanced Python programming paradigms, such as multithreading, web development.	**K1**
2	understand data analysis, enabling them to create sophisticated Python applications that meet industry standards and best practices	**K2**
3	apply advanced python concepts, including object-oriented programming data structures and libraries, establishing a solid knowledge of Python.	**K3**
4	analyze and solve complex problems using Python, including performance optimization, debugging and algorithm design, fostering strong analytical skills.	**K4**
5	evaluate Python code for efficiency and suitability, demonstrating proficiency in performance analysis and optimization	**K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No.of hours
I	**Advanced Python Programming:** Review of Python Fundamentals-List Comprehensions and Generators-Decorators and Metaprogramming-Context Managers and the with Statement-Advanced Functions and Closures.	**6**
II	**Object-Oriented Programming (OOP) in Python:** Principles of OOP-Classes and Objects-Inheritance and Polymorphism-Advanced OOP Concepts (Abstract Classes, Mixins)-Design Patterns in Python.	**6**
III	**Python Standard Library:** Exploring the Python Standard Library-Working with File I/O-Networking and Sockets-Multithreading and Multiprocessing-Unit Testing and Test-Driven Development (TDD)	**6**
IV	**Data Manipulation and Analysis with Python:** NumPy for Numerical Computing-Pandas for Data Analysis-Data Visualization with Matplotlib and Seaborn-Working with JSON and XML Data-Introduction to Data Science Libraries (e.g., SciPy)	**6**
V	**Web Development with Python:** Introduction to Web Frameworks (e.g., Flask, Django)-Building RESTful APIs with Flask-Integrating Databases (SQL and NoSQL)-Deploying Python Web Applications-Final Project: Building a Python Web Application.	**6**
	Total	**30**

Textbooks:

1. "Learning Python" by Mark Lutz.
2. "Python Programming for the Absolute Beginner" by Michael Dawson.
3. "Head-First Python" by Paul Barry.
4. "A Byte of Python" by Swaroop C H.

References:

1. "Effective Python: 90 Specific Ways to Write Better Python" by Brett Slatkin
2. "Python in a Nutshell" by Alex Martelli
3. "Flask Web Development" by Miguel Grinberg

Web Resources:

1. https://realpython.com/
2. https://www.geeksforgeeks.org/python-programming-language/
3. https://docs.python.org/3/ • https://www.w3schools.com/python/
4. https://stackoverflow.com/ • http://pythontutor.com/

GENERIC VALUE-ADDED COURSE: DATA SCIENCE

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2409	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on statistics.

Learning Objectives:

1. Grasp fundamental concepts in statistics, data manipulation, and data visualization using tools like Python and R.
2. Develop and evaluate machine learning models for predictive analytics and data-driven decision-making.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	define data science concepts, including statistical methods, data cleaning techniques and programming languages like Python establishing a knowledge of the field.	**K1**
2	classify the complex data sets, applying data visualization	**K2**
3	develop statistical techniques to extract meaningful insights and patterns.	**K3**
4	examine the ethical implications and limitations of data science, as well as the role of data in decision-making processes.	**K4**
5	evaluate them to make informed and responsible data-driven decisions in various contexts.	**K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No.of hours
I	**Introduction to Data Science:** Overview of Data Science and its applications-Understanding the Data Science workflow-Basics of data collection, cleaning, and preprocessing-Introduction to data visualization and exploratory data analysis (EDA)	**6**
II	**Data Manipulation and Analysis:** Data wrangling techniques using Python or R-Descriptive statistics and summary metrics-Hypothesis testing and statistical inference-Correlation and causation in data analysis	**6**
III	**Machine Learning Fundamentals:** Introduction to machine learning and its types-Supervised learning: Regression and Classification-Unsupervised learning: Clustering and Dimensionality Reduction-Model evaluation and selection	**6**
IV	**Advanced Topics in Data Science:** Feature engineering and selection-Time series analysis and forecasting-Natural Language Processing (NLP)-Introduction to deep learning and neural networks	**6**
V	**Real-World Data Science Projects:** Guided project work applying concepts learned in previous units-Data-driven decision-making and problem-solving-Presentation and communication of data insights-Ethical considerations in Data Science	**6**
	Total	**30**

Textbooks:

1. Introduction to Data Science" by Jeffrey Stanton
2. "Data Science for Business" by Foster Provost and Tom Fawcett
3. "Python for Data Analysis" by Wes McKinney

Reference Books:

1. "The Elements of Statistical Learning" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman
2. "Data Science from Scratch" by Joel Grus

Web Resources:

1. https://stackoverflow.com/questions/tagged/data-science
2. https://www.reddit.com/r/datascience/?rdt=54435
3. https://jupyter.org/

GENERIC VALUE-ADDED COURSE: .NET FRAMEWORK

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2410	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on computer applications.

Learning Objectives

1. Teach students to develop software applications using .NET technologies, including C# and ASP.NET, enabling them to create functional and scalable software solutions.
2. Provide learners with the skills to design, test and deploy .NET based applications, fostering proficiency in the complete software development lifecycle.

Course Outcome

On the successful completion of the course, student will be able to:		
1	list key,NET framework components and concepts, such as C# , ASP.NET, and the . NET Framework libraries, establishing a solid foundational knowledge of the technology.	**K1**
2	infer and dissect.NET based applications, identifying performance bottle necks, security vulnerabilities, and problem solving skills.	**K2**
3	make use of scalability, cross platform development and security within the .NET ecosystem, enabling them to create robust and secure software solutions that meet modern industry standards.	**K3**
4	develop robust web applications using .NET Framework , demonstrating proficiency in server-side programming, data access, and user interface design	**K4**
5	evaluate and implement .NET Framework technologies to develop efficient and secure enterprise applications, demonstrating proficiency in performance analysis and optimization techniques.	**K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No.of hours
I	**Introduction to .NET Framework** Overview of the .NET Framework and its components-Historical context and evolution of .NET-Common Language Runtime (CLR) and the .NET ecosystem-Installing and setting up the .NET development environment.	**6**
II	**C# Programming** Introduction to C# programming language-Data types, variables, and operators in C#-Control structures: loops and conditionals.-Object oriented programming (OOP) principles in C#Lab: Writing and debugging C# programs.	**6**
III	**Building Windows Applications** Windows Forms applications with C#-Event driven programming and GUI design-Controls and user interface (UI) components-Handling user input and user interactions-Lab: Developing a simple Windows Forms application.	**6**
IV	**Web Development with ASP.NET** Introduction to ASP.NET web development-Creating web forms and web applications-Server side scripting with ASP.NET-Data access and database	**6**

	integration with ASP.NET-Lab: Building a basic ASP.NET web application	
V	**Advanced Topics and Project** Advanced .NET features and technologies (e.g., ASP.NET Core, WPF, Xamarin)-Design patterns and best practices in .NET development-Building a complete .NET application project-Project presentations and peer review-Examining real world .NET applications and case studies.	**6**
	Total	**30**

Textbooks:

1. "Pro C# 9 with .NET 5" by Andrew Troelsen and Philip Japikse
2. "C# in Depth" by Jon Skeet
3. "Entity Framework Core in Action" by Jon P Smith

Reference Books

1. "Code Complete: A Practical Handbook of Software Construction" by SteveMcConnell.
2. "Clean Code: A Handbook of Agile Software Craftsmanship" by Robert C. Martin
3. "Design Patterns: Elements of Reusable Object-Oriented Software" by Erich Gamma, Richard Helm, Ralph Johnson, and John Vlissides

Web Resources

1. https://www.c-sharpcorner.com/learn/c-sharp-asynchronous-programming
2. https://www.c-sharpcorner.com/article/tutorial-working-with-windows-forms-
3. https://www.javatpoint.com/c-sharp-tutorial

GENERIC VALUE-ADDED COURSE: BIG DATA

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2411	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on data storage processes.

Learning Objectives

1. Develop data processing and analysis skills for data driven decision making using big data technologies.
2. Enable scalable data storage and processing solutions for handling big data challenges across diverse domains.

Course outcomes

On the successful completion of the course, student will be able to:		
1	know the significance of data governance ethical considerations and big data's impact on business, enabling them to design and implement effective big data solutions that align with industry standards and legal regulations.	K1
2	understand the fundamental big data concepts, such as distributed computing frameworks, data storage technologies	K2
3	apply the data manipulation techniques establishing a knowledge of the field.	K3
4	analyze large datasets extract valuable insights	K4
5	evaluate data processing and machine learning algorithms to solve real world problems fostering strong analytical and problem solving skills.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Unit	Content	No.of hours
I	**Introduction to Big Data** Understanding the significance of big data-Historical context and the evolution of data-Characteristics and challenges of big data-Key technologies and tools in the big data ecosystem.	6
II	**Data Collection and Ingestion** Data sources and data collection methods-Data ingestion and data integration techniques-Data quality and data cleansing.-Realtime data processing and streaming.	6
III	**Big Data Storage and Management** Big data storage solutions (HDFS, NoSQL databases)-Distributed file systems and data sharding-Data warehousing and data lakes-Managing data at scale.	6
IV	**Big Data Analysis and Processing** MapReduce and parallel processing-Apache Hadoop and Spark for big data analytics-Data querying and visualization-Machine learning and predictive analytics.	6
V	**Big Data Applications and Case Studies** Industry applications of big data (e.g., ecommerce, healthcare)-Case studies of successful big data implementations-Ethical considerations in big data-Final project: Developing a big data analysis project.	6
	Total	30

Textbooks

1. "Big Data: A Revolution That Will Transform How We Live, Work, and Think" by Viktor Mayer- Schönberger and Kenneth Cukier
2. "Hadoop: The Definitive Guide" by Tom White
3. "Big Data at Work: Dispelling the Myths, Uncovering the Opportunities" by Thomas H. Davenport

Reference Books

1. "Big Data: A Practical Guide" by David Feinleib
2. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett

Web Resources

1. https://www.infoq.com/bigdata/
2. https://towardsdatascience.com/
3. https://www.datasciencecentral.com/
4. https://bigdatauniversity.com/

GENERIC VALUE-ADDED COURSE: TECHNICAL WRITING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2412	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Should have knowledge on importance of technical writing.

Learning Objectives

1. Equip students with the skills to communicate complex technical information clearly and concisely through written documents, such as manuals, reports, and instructional guides.
2. Teach students to adapt their writing style to audience and industries, enabling them to create effective technical documentation that meets professional standards.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	remember the fundamental principles of technical writing, including formatting, style guides.	**K1**
2	apply document organization, ensuring adherence to established conventions.	**K2**
3	understand the importance of audience analysis, information gathering and ethical considerations in technical writing, enabling them to produce documents that meet the needs of diverse readers while upholding ethical standards.	**K3**
4	analyze the critically complex technical information, synthesizing it into clear.	**K4**
5	evaluate the comprehensible documents, demonstrating effective problem-solving skills.	**K5**

K1 - Remember; **K2** - Understand **K3** – Apply, **K4** – Analyze, **K5**-Evaluate

Units	Content	No.of hours
I	**Introduction to Technical Writing** Understanding the importance of technical writing in different industries-Differentiating technical writing from other forms of writing-Identifying the target audience and purpose of technical documents-Overview of key principles, including clarity, conciseness, and precision-Common challenges in technical writing and how to address them.	**6**
II	**Planning and Research** The prewriting process: Defining objectives and scope-Conducting effective research and gathering relevant data-Organizing information and creating outlines-Developing a document structure for different types of technical documents-Citation and referencing in technical writing.	**6**
III	**Writing Techniques and Style** Writing clearly and concisely: Avoiding jargon and complex language-Choosing the appropriate tone for the audience and purpose-Grammar and punctuation in technical writing-Visual aids and graphics: Incorporating images, tables, and diagrams-Reviewing and editing for clarity and coherence.	**6**
IV	**Document Types and Genres** User manuals and instructional guides-Technical reports and research papers-Proposals, business plans, and project documentation-Online documentation and help systems-Case studies: Analyzing examples from	**6**

	different industries.	
V	**Collaboration and Project Management** Collaborative writing in technical teams-Version control and document management tools-Understanding project timelines and deadlines-Peer review and feedback processes-Finalizing and publishing technical documents.	**6**
	Total	**30**

Textbooks:

1. "Technical Writing: Process and Product" by Sharon J. Gerson and Steven M. Gerson.
2. "Technical Communication" by Mike Markel.
3. "Handbook of Technical Writing" by Gerald J. Alred, Charles T. Brusaw, and Walter E. Oliu.
4. "Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content" by Alan S. Pringle and Sarah S. O'Keefe.

References:

1. "Microsoft Manual of Style for Technical Publications" by Microsoft Corporation
2. "Read Me First! A Style Guide for the Computer Industry" by Sun Technical Publications
3. "The Chicago Manual of Style" by The University of Chicago Press Editorial Staff.

Web Resources:

1. https://techwhirl.com/
2. https://www.stc.org/
3. https://www.writethedocs.org/
4. https://technicalcommunicationcenter.com/

GENERIC VALUE-ADDED COURSE: ENGLISH LANGUAGE TEACHING THROUGH CHAT GPT

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2413	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on language teaching tools.

Learning Objectives

1. To instruct educators in using Chat GPT as a supplementary tool for English language teaching, enabling them to effectively integrate technology into their language instruction methods.
2. Teach educators how to adapt and personalize Chat GPT interactions to meet the specific needs of English language learners, fostering language acquisition and communication skills.

Course outcomes

On the successful completion of the course, student will be able to:		
1	learn the evolving role of technology, like chat GPT, in language instruction, considering the pedagogical implications and ethical considerations.	K1
2	understand the innovative practices for enhancing English language teaching methodologies.	K2
3	apply foundational principles of English language teaching, including language acquisition theories, pedagogical strategies and Chat GPT utilization for language learning.	K3
4	analyze the effectiveness of chat GPT as a language teaching tool	K4
5	identifying its strengths, limitations, and appropriate contexts for use in language education.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Unit	Content	No.of Hours
I	**Introduction to ChatGPT and Language Teaching** Overview of ChatGPT and AI in Language Teaching-Role of AI in Language Learning-Setting Up and Interacting with ChatGPT-Ethics and Responsible Use of AI-Language Teaching Strategies with ChatGPT	6
II	**ChatGPT for Vocabulary and Grammar** Vocabulary Building with ChatGPT-Grammar Correction and Practice-Contextual Language Learning-Interactive Language Quizzes and Drills-ChatGPT for Language Assessment	6
III	**Conversation and Pronunciation Practice** Role-Playing Conversations with ChatGP-Pronunciation and Accent Improvement-Building Confidence in Speaking-Real-Life Language Scenarios-Monitoring Progress and Feedback	6
IV	**Writing and Comprehension** Writing Exercises and Prompts-Proofreading and Editing with ChatGPT-Reading Comprehension and Analysis-Creative Writing with AI Assistance-Collaborative Writing Projects	6
V	**Advanced Language Skills and Projects**	6

	Advanced Language Proficiency Challenges-Research Projects with ChatGPT-Using AI for Language Teaching Assessment-Final Project: Developing Innovative Language Learning Activities-Reflecting on the Future of AI in Language Education	
	Total	**30**

Textbooks:

1. "Touchstone" by Michael McCarthy and Jeanne McCarten:
1. "Outcomes" by Hugh Dellar and Andrew Walkley:
2. "Focus on Academic Skills for IELTS" by Morgan Terry:

Reference Books:

1. "Advanced Trainer" by Cambridge English:
1. "World English" by Martin Milner, Rebecca Traver Chase, and Kristin L. Johannsen:

Web Resources:

1. https://chat.openai.com/
2. https://www.bbc.co.uk/learningenglish
3. https://www.eslgamesplus.com/
4. https://www.duolingo.com/
5. https://learnenglish.britishcouncil.org/

GENERIC VALUE-ADDED COURSE: ADVANCED ARTIFICIAL INTELLIGENCE

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2414	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on Artificial intelligence.

Learning Objectives

1. Understand and implement advanced AI algorithms, including deep learning, reinforcement learning and neural networks.
2. Design, train, and fine-tune complex AI models for real-world applications, focusing on performance and accuracy.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	know the role of advanced AI in various domains, including healthcare, robotics, and natural language processing.	**K1**
2	understand them to design and implement cutting edge AI solutions that align with industry standards and ethical considerations.	**K2**
3	apply advanced artificial intelligence concepts, including deep learning algorithms, reinforcement learning strategies, and neural network architectures, establishing a strong foundational knowledge in AI.	**K3**
4	analyze complex AI systems, evaluating their performance, ethical implications and areas for improvement fostering strong analytical and problem solving skills in advanced AI applications.	**K4**
5	evaluate advanced AI models and algorithms, demonstrating the ability to assess their effectiveness across diverse applications.	**K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze **K5**-Evaluate

Units	Content	No.of hours
I	**Fundamentals of Artificial Intelligence** Introduction to Artificial Intelligence-Historical overview-Types of AI: Narrow vs General Intelligence-Ethical and societal implications-Machine Learning Basics-Supervised, Unsupervised, Reinforcement learning-Feature engineering and selection-Evaluation metrics-Deep Learning Foundations-Neural networks, activation functions-Backpropagation and gradient descent-Convolutional and recurrent neural networks	**6**
II	**Advanced Machine Learning Techniques** Advanced Deep Learning Architectures-Generative Adversarial Networks (GANs)-Transformers and attention mechanisms-Variational Autoencoders (VAEs)-Reinforcement Learning-Markov Decision Processes-Q-learning, Policy Gradient methods-Deep Reinforcement Learning-Natural Language Processing (NLP):-Tokenization, word embeddings-Sequence-to-sequence models-BERT, GPT, and other pre-trained models	**6**
III	**AI in Computer Vision** Image Processing and Feature Extraction-Filters, edge detection-Image segmentation-Object detection and tracking-Convolutional Neural Networks (CNNs)-Architectures (VGG, ResNet, etc.) Transfer learning-Image generation using CNNs-Advanced Computer Vision-	**6**

	Semantic segmentation-Pose estimation-Object recognition in videos	
IV	**AI in Natural Language Processing** Advanced NLP Techniques-Named Entity Recognition (NER)-Sentiment analysis-Text summarization and generation-Language Models-Transformer-based architectures-Training large-scale language models-Ethical considerations in language generation-Dialogue Systems and Chatbots-Rule-based vs Machine Learning-based approaches-Building interactive chatbots-Handling contextual conversations	**6**
	Special Topics and Applications AI Ethics and Bias-Bias in AI algorithms-Fairness and accountability-Ethical guidelines and regulations-AI in Healthcare-Disease prediction-Drug discovery-Medical image analysis-AI in Robotics-Robot perception and decision-making-Autonomous navigation-Human-robot interaction-AI for Business and Industry-Predictive analytics-Process automation-Customer behavior analysis-AI and Future Technologies-Quantum computing and AI-AI in IoT (Internet of Things)-AI and blockchain	**6**
	Total	**30**

Textbooks:

1. “Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville.
2. "Reinforcement Learning: An Introduction" by Richard S. Sutton and Andrew G. Barto.
3. "Natural Language Processing in Action" by Lane, Howard, and Hapke.
4. "Computer Vision: Algorithms and Applications" by Richard Szeliski.

Reference Books:

1. "Artificial Intelligence: A New Synthesis" by Nils J. Nilsson.
2. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy.

Web Resources:

1. https://www.ibm.com/topics/artificial-intelligence
2. https://www.techtarget.com/searchenterpriseai/definition/deep-learningdeep-neural-network
3. https://www.simplilearn.com/tutorials/machine-learningtutorial/reinforcement-learning

GENERIC VALUE-ADDED COURSE: CHAT GPT AND AI TOOLS

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2415	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Basic knowledge on the applications of Artificial Intelligence.

Learning Objectives

1. Understand and apply ChatGPT for various tasks such as text generation, conversation, and content creation.
2. Integrate and use AI tools for enhancing productivity, automating processes, and solving complex problems in diverse domains.

Course Outcomes

On the successful completion of the course, student will be able to:		
1	know the concepts of chat GPT and AI tools including natural language processing techniques.	K1
2	understand the chatbot architectures and ethical considerations.	K2
3	use the Chat GPT and AI tools in enhancing human computer interactions, ethical considerations in AI design.	K3
4	evaluate AI tools for conversational applications, assessing their performance limitations, and potential improvements, fostering strong analytical and problem solving skills.	K4
5	analyse their practical applications across various industries, enabling them to design and implement effective AI driven chatbot solutions.	K5

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No.of hours
I	**Introduction to AI and Chat GPT** Overview of Artificial Intelligence-Definition, history, and key concepts of AI-Types of AI: Narrow AI vs. General AI-Introduction to Chatbots-Definition, applications, and types of chatbots-Importance of chatbots in modern business and customer service.-Understanding Chat GPT. Introduction to Chat GPT and its capabilities-How Chat GPT works: NLP, machine learning, and deep learning concepts.	6
II	**NLP Fundamentals** Basic Concepts of NLP-Tokenization, stemming, lemmatization-Part-of-speech tagging and named entity recognition-Word Embeddings and Vectorization-Word2Vec, GloVe, and other word embedding techniques-Vectorization of text data for machine learning models.	6
III	**Deep Learning and Neural Networks** Introduction to Deep Learning-Neural networks architecture and working principles-Activation functions, loss functions, and optimization algorithms-Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM)-Understanding sequential data and the need for RNNs-LSTM networks for handling sequential data in NLP tasks.	6
IV	**Chatbot Development** Tools and Frameworks-Introduction to popular NLP libraries: NLTK, SpaCy and TensorFlow-Chatbot development frameworks: Dialogflow, Microsoft	6

	Bot Framework, Rasa, etc-Building a Basic Chatbot-Designing conversation flow and user interactions-Integrating NLP techniques for understanding user input-Implementing responses and feedback loops.	
V	**Advanced Topics and Applications** Advanced NLP Techniques-Sentiment analysis, text summarization, and language translation-Sequence-to-sequence models for chatbots-Ethical Considerations and Bias in AI-Understanding ethical concerns in AI and chatbot development-Mitigating biases in training data and algorithms-Real-world Applications-Chatbots in customer service, healthcare, finance, and other industries-Case studies and success stories of AI-powered chatbot implementations.	**6**
	Total	**30**

Textbooks

1. "Speech and Language Processing" by Dan Jurafsky and James H. Martin.
2. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville.
3. "Natural Language Processing in Action" by Lane, Howard, and Hapke.

Reference Books

1. "Natural Language Processing in Action" by Lane, Howard, and Hapke.
2. "Foundations of Machine Learning" by Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar.

Web Resources

1. TalkAI: ChatGPT Without Registration - Free Use
2. ChatGPT (openai.com)
3. CodeDesign.ai | AI Website Builder
4. NLP Research Scientist:

GENERIC VALUE-ADDED COURSE: CLOUD COMPUTING

Course Code	L	T	P	S	Credits	Inst. Hours	Total Hours	Marks		
								CIA	External	Total
GVAC2416	1	-	1	-	1	2	30	25	75	100

Pre-requisite: Knowledge on data storage processes.

Learning Objectives

1. Enable students to understand the fundamental principles of cloud computing, including virtualization, scalability and resource provisioning to effectively design and manage cloudbased solutions.
2. Teach students how to leverage cloud platforms and services, such as AWS, Azure, or Google Cloud, to deploy secure and optimize applications and data storage in the cloud, meeting industry standards and best practices.

Course Outcome

On the successful completion of the course, student will be able to:		
1	remember key cloud computing concepts, including virtualization, cloud service models and security protocols	**K1**
2	understand the implications of cloud compliance, cost management and disaster recovery as well as the role of cloud in modern IT infrastructures, enabling them to make informed decisions regarding cloud adoption and management in organizations.	**K2**
3	implement cloud computing solutions using major platforms demonstrating proficiency in deploying and managing scalable applications and services in the cloud.	**K3**
4	analyse cloud architecture and deployment models, evaluating their suitability for different business requirements in cloud design.	**K4**
5	evaluate the benefits and challenges of cloud computing architectures, demonstrating the ability to design and optimize cloud-based solutions	**K5**

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze , **K5**-Evaluate

Units	Content	No.of hours
I	**Introduction to Cloud Computing** What is cloud computing-Historical context and evolution of cloud technology-Advantages and challenges of cloud computing-Key cloud service providers and their offerings-Cloud computing trends and industry impact.	**6**
II	**Cloud Service Models** Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS)-Comparison of service models and use cases-Practical examples and case studies of each service model-Lab: Deploying virtual machines on an IaaS platform.	**6**
III	**Cloud Deployment Models** Public, private, hybrid, and multicloud deployments-Factors influencing deployment model selection-Case studies of organizations using different deployment models-Lab: Setting up a private cloud environment.	**6**
IV	**Cloud Security and Compliance** Cloud security challenges and best practices-Data protection, encryption, and	**6**

	identity management in the cloud-Regulatory compliance and industry standards-Lab: Implementing cloud security measures.	
V	**Cloud Migration and Management** Strategies for migrating applications to the cloud-Cloud management tools and platforms-Cost management and optimization in the cloud-Lab: Managing cloud resources and optimizing costs.	**6**
	Total	**30**

Text books:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Maand Zaigham Mahmood
2. "Cloud Computing: A Hands-On Approach" by Arshdeep Bahga and Vijay Madisetti
3. "Cloud Computing: From Beginning to End" by Ray J. Rafaels

Reference Books:

1. "The Big Switch: Rewiring the World, from Edison to Google" by Nicholas Carr
2. Cloud Native Patterns: Designing Change-Tolerant Software" by Cornelia Davis

Web Resources:

1. https://cloud.google.com/docs https://docs.aws.amazon.com/ 2.
2. https://docs.microsoft.com/en-us/azure/
3. https://www.coursera.org/ https://www.udacity.com/ https://www.edx.org/