Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel : +91 - 261 - 2227141 to 2227146, Toll Free : 1800 2333 011, Digital Helpline No.- 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

–: પરિપત્ર :–

યુનિવર્સિટી સંલગ્ન વાણિજય વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫–૨૬ થી અમલમાં આવનાર NEP-2020 અંતર્ગત B.Com. Data Science Sem-5 & 6 તથા B.Com. Data Analytics Sem-3 & 4 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ વાણિજય વિદ્યાશાખાની તા.૦૧/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ૩૩ થી કોમ્પ્યુટર સાયન્સ અભ્યાસ સમિતિને મંજૂર કરવા રીફર કરેલ છે જે અંગે કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા તથા કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની સંયુકત તા.૩૦/૦૪/૨૦૨૫ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૪ થી સ્વીકારી મંજૂર કરેલ છે અને વાણિજય વિદ્યાશાખાનાં ડીનશ્રીએ વાણિજય વિદ્યાશાખાવતી મંજૂર કરેલ છે એકેડેમિક કાઉન્સિલની તા. ૦૫/૦૫/૨૦૨૫ ની સભાનાં ઠરાવ ક્રમાંકઃ ૧૫૯ થી મંજુર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

વધુમાં, પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ B. Com. Data Science Sem-1 to 6 નું Structure અને B.Com. Data Analytics Sem-1 to 6 નું Structure ને વાણિજય વિદ્યાશાખા વતી વાણિજય વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજુર કરેલ છે તથા એકેડમિક કાઉન્સિલની તા.૨૪/૧૨/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંકઃ ૩૫૩ અન્વયે માનનીય કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત એકેડમિક કાઉન્સિલ વતી માનનીય કુલપતિશ્રીએ મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંકઃઓથો./પરિપત્ર/સિલેબસ/૧૨૬૦૭/૨૦૨૫
તા.૩૧–૦૫–૨૦૨૫

કુલસચિવ

પ્રતિ,
૧) યુનિવર્સિટી સંલગ્ન વાણિજય વિદ્યાશાખા હેઠળની તમામ કોલેજોનાં આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
૨) ડીનશ્રી, વાણિજય વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Faculty of Commerce – B.Com. Data Science Course

Credit Structure (NEW)

SEMESTER-V

SR NO	COURSE TYPE	NAME OF THE COURSE	CREDIT	LECTURE /WEEK
1.	Major (12 Credit)	4. R for Data Science 5. Multivariate Techniques for Data Analytics 6. Select Any One 1) Front End Technology 2) Advance Excel	2th+4Pr=4cr 4cr 2th+4Pr=4cr	8th+8Pr
2.	MINOR (8 Credit)	3. Optimization Techniques 4. Data Ethics and Privacy	4cr 4cr	4th 4th
3.	MD / ID	--	--	--
4.	AEC	--	--	--
5.	SEC	Introduction to Stock exchange Softwares**/Advance SQL	2cr	2th
6.	VAC/IKS	--	--	--
Total			**22cr**	**18th+8Pr**

Practical: Practical of course R for Data Science is in R. Practical of Front-End technology is basedon chosen Front End

**: Exam will be conducted MCQs based or as per subject expert's opinion for Introduction toStock exchange Softwares.

[Subject Code for Theory -2508000605010002]

[Subject Code for Practical- 2508000605010003]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –V

R for Data Science (MAJOR) (2th+4pr=4 credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	R for Data Science		
Credit	2th+4pr=4 credit		
Teaching per week	6 Hours		
Effective from	2025-2026		
Purpose of course	The purpose is to introduce undergraduate students to the R programming language as a powerful tool for data analysis. Through hands-on learning, students will gain foundational programming skills, explore data manipulation and visualization techniques, and apply basic statistical analysis to real-world datasets.		
Objective of course	The main objective of this course is to develop students' ability to perform meaningful data analytics using R, enabling them to make data-driven decisions and communicate results effectively.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem

PSO4 : Develop students for self-learning and practicing challenging problem solution

PSO5 : Train students to apply managerial skills to develop business applications.

PSO6 : Train students to use Data Analytics and application domain specific knowledge

PSO7 : Train students to take-up the real world challenges to develop workable solution to a domain specific problem

PSO8 : Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.

Mapping between POs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes

CO1: To Understand the fundamentals of R programming.

CO2: To Apply user-defined functions and control flow constructs to solve basic computational problems in R.

CO3: To Demonstrate the use of R's core data structures (vectors, lists, matrices, arrays, data frames, and factors) for effective data handling.

CO4: To Create and customize various data visualizations using ggplot2 to explore and present data insights.

CO5: To Perform basic statistical analysis in R, including descriptive statistics.

Mapping between COs with PSOs

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content

Unit-I: Basics of R Programming: ➢ Introduction to R and R Studio ➢ Installation and package management ➢ R syntax, variables, data types ➢ Operators and expressions ➢ Control structures: if, else, for, while, repeat ➢ Writing and calling user-defined functions ➢ Introduction to built-in help and documentation	**25%**	**12**
Unit-II: Data Structures and Manipulation: ➢ Vectors, lists, matrices, arrays ➢ Data frames and factors ➢ Indexing and subsetting ➢ Type coercion and conversion ➢ Introduction to data manipulation with dplyr: select, filter, mutate, arrange, summarise	**25%**	**13**

	➢ Reshaping data with tidyr: gather, spread, unite, separate		
	Unit-III: Data Import, Cleaning, and Visualization: ➢ Importing data: CSV, Excel, Text (readr, readxl) ➢ Handling missing values and duplicates ➢ Data exploration techniques ➢ Visualization using Base R: plot, hist, boxplot ➢ Introduction to ggplot2: aesthetic mappings, layers ➢ Creating bar charts, line plots, scatter plots ➢ Customizing graphs: themes, labels, titles, colors	**25%**	**13**
	Unit-IV: Basic Statistical Analysis and Real-life Applications: ➢ Descriptive statistics: mean, median, SD, variance ➢ Frequency tables, cross-tabulations ➢ Correlation and simple linear regression ➢ Basic hypothesis testing: t-tests, chi-square test ➢ Mini-project: Analyze a real dataset using R ➢ Interpreting output and generating reports	**25%**	**12**
References	1. Hadley Wickham & Garrett Grolemund (2017) : "R for Data Science" Published by O'Reilly Media 2. Robert I. Kabacoff (2015): "R in Action: Data Analysis and Graphics with R" Published by Manning 3. Kieran Healy (2018): "Data Visualization: A Practical Introduction" Published by Princeton University Press 4. Garrett Grolemund (2014): "Hands-On Programming with R" Published by O'Reilly Media 5. Tilman M. Davies (2016): "The Book of R: A First Course in Programming and Statistics"		

[Subject Code-2508000605020008]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –V
Multivariate Techniques for Data Analytics (MAJOR) (4 credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Multivariate Techniques for Data Analytics		
credit	4 credit		
Teaching per week	4 Hours		
Effective from	2025-2026		
Purpose of course	The purpose is to introduce students to the fundamental concepts, techniques, and applications of Multivariate Statistical Analysis. The course is designed to develop an understanding of how to analyse data involving multiple variables simultaneously, enabling better decision-making in complex, real-world scenarios.		
Objective of course	The main objective of this course is to introduces students to key multivariate statistical techniques used for analysing data with multiple variables. It covers distributions, hypothesis testing, dimension reduction, and classification methods such as PCA, Factor Analysis, MANOVA, and Discriminant Analysis. The focus is on applying these methods to interpret complex datasets and support data-driven decision-making.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		

Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** Understand the basic concepts and importance of multivariate analysis in statistics. **CO2:** Describe and apply fundamental multivariate distributions such as the multinomial and multivariate normal. **CO3:** Learn and apply techniques like Hotelling's T^2 and MANOVA to compare groups with multiple variables. **CO4:** Use data reduction and exploration methods like Factor Analysis and Principal Component Analysis (PCA). **CO5:** Understand and apply basic classification methods, including Fisher's discriminant analysis, to classify multivariate data.		
Mapping between COs with PSOs			
Course content	Unit-I: ➢ Concept and need of multivariate analysis, Concept of multinomial distribution and multivariate Normal distribution – its properties (without proof).	**20%**	**10**
	Unit-II:	**25%**	**13**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

	➢ Concept of Hotelling T^2 distribution (without derivation) & its applications. ➢ Comparisons of several multivariate means: multivariable analysis of variances (MANOVA).		
	Unit-III: ➢ Concept and application of I. Factor analysis II. Principal Component analysis (PCA) III. Conical Correlation analysis IV. Discriminant analysis	**30%**	**15**
	Unit-IV: ➢ Discrimination and Classification: - Separation and Classification of populations - Classification of multivariate populations - Fisher's discriminant function - Classification of several populations - Fisher's method of discriminating among several populations	**25%**	**12**
References	1. Anderson T. W. (2003): "An Introduction to Multivariate Statistical Analysis"; 3rd Edition, Wiley-interscience, **ISBN:** 0471360910, **ISBN-13:** 9780471360919 2. Johnson R.A. and Wichern D.W. (2008) : "Applied Multivariate Statistical Analysis"; Pearson Education(singapore) Pte. Ltd., **ISBN:** 8131722228, **ISBN-13:** 9788131722220 3. Stephen E. Fienberg, Jobson J. D., Ingram Olkin (1994): "Applied Multivariate Data Analysis: Volume Ii: Categorical and Multivariate Methods"; Springer, ISBN: 0387978046, **ISBN-13:** 9780387978048, 978-0387978048 4. Khirsagar.A.M. (1972): Multivariate Analysis. Marcel Dekker, New York. 5. Kent J. T. , J. M. Bibby, K. V. Mardia (1980) : "Multivariate Analysis (probability And Mathematical Statistics)"; Academic Press, **ISBN:** 0124712525, **ISBN-13:** 9780124712522 6. Morrison D.F. (1990): "Multivariate Statistical Methods"; Mcgraw-hill Professional, **ISBN:**0071008152,**ISBN-13:** 9780071008150, 978-0071008150 7. Morrison D.F. (2004): "Multivariate Statistical Methods"; Thomson Brooks/cole, ISBN: 0534387780,**ISBN-13:** 9780534387785 8. George A. Marcoulides, Scott L. Hershberger and Marcoulide (1997) : "Multivariate Statistical Methods: A First Course"; Lawrence Erlbaum Associates, **ISBN:** 080582572X, **ISBN- 13:** 9780805825725 9. Muirhead R.J. (2005): "Aspects of Multivariate Statistical Theory"; Wiley-interscience, ISBN:0471769851, ISBN-13: 9780471769859 10. Seber G.A.F. (1984): "Multivariate Observations"; John Wiley & Sons Inc., ISBN 10: 047188104X , ISBN 13: 9780471881049 11. Gnanadesikan R. (1997): "Methods For Statistical Data Analysis Of Multivariate Observations"; Wiley-interscience, **ISBN:** 0471161195,ISBN-13: 9780471161196 12. Srivastava and Khatri (1979): "An Introduction to Multivariate Statistics"; North Holland, New York. 13. Srivastava M.S. (2002): "Methods of Multivariate Statistics"; John Wiley and Sons Inc., New York. 14. Dillon W.R. and Goldstein M. (1984): "Multivariate Analysis: Methods and Applications"; John Wiley and Sons Inc., New York. **ISBN:** 0471083178, **ISBN-13:** 9780471083177		

	15. Rohatgi V. K., A. K. Md. Ehsanes Saleh (2008): "An Introduction To Probability And Statistics"; 2nd Ed, Wiley, **ISBN:** 8126519266, **ISBN-13:** 9788126519262 16. Wolfgang Hardle, Zdenek Hlavka (2007): "Multivariate Statistics: Exercises And Solutions"; Springer Verlag, **ISBN:** 0387707840, **ISBN-13:** 9780387707846		

[Subject Code for Theory- 2508000605030008]

[Subject Code for Practical-2508000605030009]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

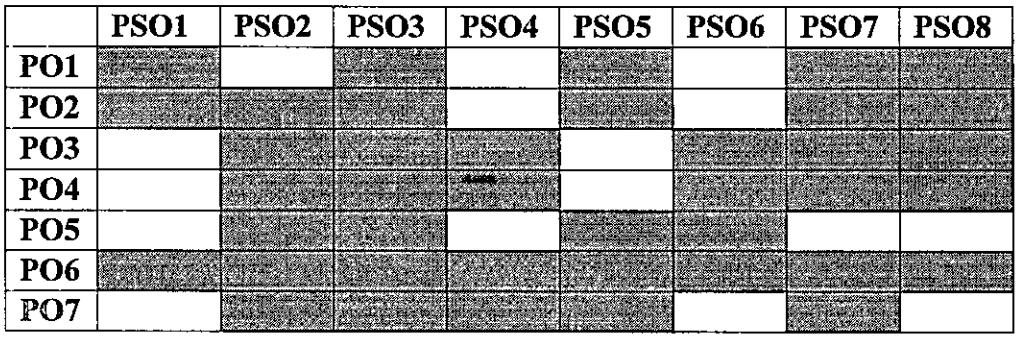
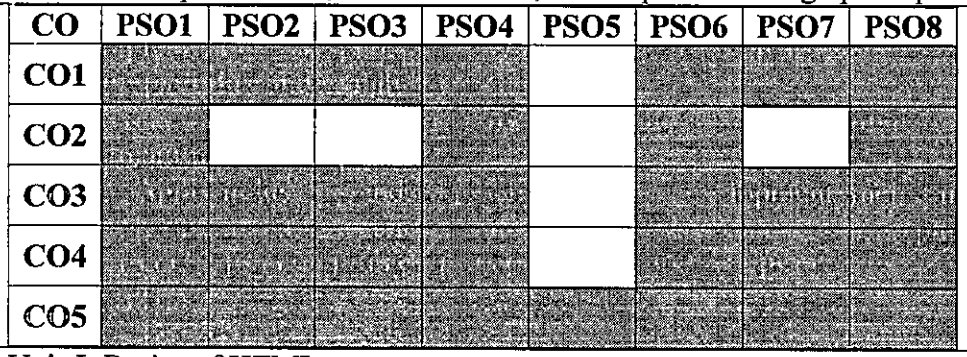
T.Y.B.Com. Data Science SEM –V

Front End Technology (MAJOR) (2th+4pr=4 credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Front End Technology		
Credit	2th+4pr=4 credit		
Teaching per week	6 Hours		
Effective from	2025-2026		
Purpose of course	The purpose is to provide students with a fundamental understanding of **HTML**, **CSS**, and **JavaScript**, the core technologies used to create and design web pages. By the end of this course, students will be able to develop and manage websites, incorporate styling through CSS, and enhance functionality using JavaScript.		
Objective of course	The main objective of this course is to is to make students aware of web terminology and website designing tools. Student can understand and implement the real functions of website development.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems		

	PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** To apply HTML5 syntax and semantics to create visually appealing and well-structured web pages.. **CO2:** Students will be able to understand concept of Table and Forms. **CO3:** Implement CSS responsive design, ensuring cross-browser compatibility and scalability. **CO4:** Utilize Javascript for interactivity and dynamic content manipulation for streamlined development. **CO5:** To Apply industry-standard practices in web development, including code optimization, version control, and responsive design principles.		
Mapping between COs with PSOs			
Course content	Unit-I: Basics of HTML: Introduction of HTML – Introduction, Structure of HTML, HTML Comments HTML Elements – <h1>..<h6>, <a>,<img>, , <p>, etc. HTML Attributes – alt, href, src, width, height, style, title, id HTML Headings – <head> Text Formatting - <b>, ,<i>,,<mark>,<small>,<del>, <ins>,<sub>,<sup>	**10%**	**5**
	Unit-II: Tables and Forms in HTML Tables - Table height and width, Table Caption, Cell padding and Cell	**20%**	**10**

	Spacing, Column Span Row Span, Links and bookmarks Forms - Form Attributes (action, method, novalidate, autocoinplete, target), Form Controls (text, email, password, radio button, Checkbox, Submit and Reset Button, Select, textarea)		
	Unit-III: CSS Introduction to CSS, Defining Style with HTML Tags, Features of Style Sheet, Style Properties, Style Classes, External Style Sheet HTML Links and attribute (_self, _blank, _parent, _top), Absolute URL and Relative URL in <href>	**20%**	**10**
	Unit-IV: Overview of Javascript Structure of Java Script, Data types and Variable, Java Script String and Events – Java script Strings types, String functions (concat(), split(), substring(), trim(), replace()), javascript Events(Mouse Events : (click, mouseover, mouseremove, mouseout, mouseup), Keyboard Events : (keyup, keydown), Form Event : (focus, submit, blur, change))	**25%**	**13**
	Unit-V: Javascript Object & Dialog Box Creating object - (By object literal, By creating instance of Object, By using an object constructor) Document Object Model (DOM) - DOM concepts, DOM properties, DOM methods - write(), writeln( ),getElementByld(), getElementByName() Dialog Box : Alert, prompt, confirm	**25%**	**12**
References	1. HTML & CSS: The Complete Reference -Thomas Powell -MCGraw Hill Education 2. HTML Black Book – Steven Holzner – Dreamtech Press 3. Java Scrjpting Programming for Absolute Beginner, Harris –PHI 4. Javascript and JQuery (Interactive Front-End Web Development) by Jon Duckett 5. HTML, DHTML, JavaScript, Perl CGI By Ivan Bayross(BPB) 3rd Edition		

[Subject Code for Theory-2508000605030010]

[Subject Code for Practical-2508000605030011]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –V

Advance Excel (MAJOR) (2th+4pr=4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Advance Excel		
Credit	2th+4pr=4credit		
Teaching per week	6 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with the advanced skills in Microsoft Excel necessary to effectively manage, analyze, and present complex data, making you more proficient and competitive for future academic pursuits and career opportunities in various fields.		
Objective of course	The main objective of this course is to provide students with a robust set of advanced Excel skills that are highly valuable for a wide range of professional, academic, and personal applications involving data management and analysis.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem		

	PSO4 : Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	CO1: Efficiently Manage and Prepare Complex Data CO2: Perform In-Depth Data Analysis by Applying Advanced Excel Functions and Formulas. CO3: Create Dynamic Reports and Dashboards through Advanced Data Summarization and Visualization CO4: Automate Repetitive Tasks and Optimize Workflows using VBA and Macros CO5: Apply Advanced Excel Tools for Data-Driven Decision Making		
Mapping between COs with PSOs			
Course content	Unit-I: Excel Fundamentals and Data Entry 1.1 Introduction to Excel • Data Entry and Editing • Working with Rows and Columns • Formatting Cells • Basic Functions (SUM, AVERAGE, MIN, MAX, COUNT) • Saving Workbooks	**10%**	**5**
	Unit-II: Working with Data and Tables 2.1 Working with Tables • Creating tables and Design • Sort, Filters and Slicers • Graph Representations 2.2 Working with Data • Text to Columns • Remove Duplicates	**20%**	**10**

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

	• FILTER • Data Validations and Dropdown List • Use of Flash Fill		
	Unit-III: Intermediate Data Handling and Analysis 3.1 Intermediate Data Handling • Conditional Formatting • Logical Functions: (IF, IFS, COUNTIF, COUNIFS, SUMIF, SUMIFS, AVERAGEIF, AVERAGEIFS, AND, OR) 3.2 Working with Date and Time Functions • DATE, YEAR, MONTH, DAY, DAY360, TEXT, EDATE, DATEDIF, TODAY, TIME, HOUR, MINUTE, SECOND, NOW 3.3 Working with Math and Text Functions • PRODUCT, CEIL, FLOOR, ROUND, ABS, SIN, COS, LEN, UPPER, LOWER, LEFT, RIGHT, SEARCH, CONCATENATE, EXACT, PROPER	**30%**	**15**
	Unit-IV: Advanced Analysis and Output 4.1 PivotTables & Charts • Creating PivotTables for summarizing data • Grouping data, filtering data, creating calculated fields in PivotTables • Creating bar, column, line, and pie charts • Slicers with multiple charts 4.2 Working with Lookup Functions • VLOOKUP, HLOOKUP, XLOOKUP, MATCH, INDEX 4.3 Working with Forecast • Goal seek and data table • Forecast sheet 4.4 Working with Subtotal • Group and ungroup data • Apply the subtotal 4.5 View of Data • Header and Footer • Freeze Row and Column • Basic use of MACRO 12-15. Final Assignment • Dashboard Creation	**40%**	**20**
References	1. "Microsoft Excel 365 Bible" by John Walkenbach 2. "Excel Formulas & Functions For Dummies" by Ken Bluttman 3. "Excel 2019 For Dummies" by Greg Harvey 4. "Mastering Excel 2019" by Carolyn Monroe 5. "Power Pivot and Power BI: The Excel User's Guide to DAX, Power Query, Power BI & Power Pivot in Excel 2010-2016" by Rob Collie and Avi Singh 6. "Microsoft Excel Data Analysis and Business Modeling" by Wayne L. Winston		

[Subject code-2508000605040002]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –V
Optimization Techniques (MINOR) (4 credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Optimization Techniques		
credit	4 credit		
Teaching per week	4 Hours		
Effective from	2025-2026		
Purpose of course	The purpose is to introduce students to provide students with a foundational understanding of optimization techniques and their practical applications.		
Objective of course	The main objective of this course is to introduce students to basic optimization techniques used in data analytics and business decision-making. It covers methods like Linear Programming, Integer Programming, and Transportation Problems, along with hands-on practice using tools like Excel Solver. Students will learn to model real-world problems and apply optimization to improve efficiency and support data-driven decisions.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1:** To Understand meaning and importance of optimization. **CO2:** Solve simple optimization problems using easy methods. **CO3:** Use basic tools like Excel Solver for real-life decision-making. **CO4:** Learn how optimization is used in data-related tasks. **CO5:** Apply basic techniques to solve practical analytics problems.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Introduction to Optimization: ➢ What is optimization? ➢ Real-life examples (e.g., choosing best route, minimizing cost) ➢ Types of problems: maximize vs. minimize	**10%**	**5**
	Unit-II: Linear Programming (LP): ➢ What is Linear Programming? ➢ Simple examples (2-variable problems) ➢ Graphical method ➢ Applications: Budgeting, resource allocation	**25%**	**12**
	Unit-III: Integer and Transportation Problems: ➢ What is Integer Programming? ➢ Assignment and transportation problems (with tables) ➢ Simple solutions with examples	**20%**	**10**
	Unit-IV: Tools for Optimization: ➢ Introduction to Excel Solver ➢ Step-by-step solving of a real-life problem using software	**15%**	**8**

	Unit-V: Applications in Data Analytics: ➢ Using optimization in basic data analysis tasks ➢ Examples: product mix, scheduling, clustering basics (like k-means) ➢ Connecting optimization to decision making	**30%**	**15**
References	1. By Gerald B. Williams: "Practical Optimization with Excel Solver" (Focused guidance on using Excel Solver to solve real-world optimization problems.) 2. Foster Provost and Tom Fawcett: "Data Science for Business" (Great for Unit V – explains how data-driven decision-making works, including optimization and clustering.) 3. Suvrit Sra, Sebastian Nowozin, and Stephen J. Wright: "Optimization for Machine Learning" (Covers optimization from a data analytics and machine learning perspective) 4. N.D. Vohra: "Quantitative Techniques in Management" (User-friendly book focused on linear programming, assignment, and transportation problems with step-by-step solutions.) 5. Frederick S. Hillier & Gerald J. Lieberman: "Introduction to Operations Research" (Detailed explanations of optimization techniques with case studies and software applications.) 6. Hamdy A. Taha: "Operations Research: An Introduction" (Comprehensive coverage of linear programming, integer programming, and transportation models with practical examples.)		

[Subject Code-2508000605050009]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –V

Data Ethics and Privacy (MINOR) (4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Data Ethics and Privacy		
Credit	4credit		
Teaching per week	4 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with a comprehensive understanding of the ethical challenges and responsibilities in the age of big data, artificial intelligence, and data-driven decision-making. As data science increasingly influences society, business, and policy, it is essential for practitioners to consider the ethical implications of data collection, analysis, and use.		
Objective of course	The main objective of this course is to Introduce students to the fundamental principles and frameworks of data ethics and their importance in data science.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1**: Students will understand and apply ethical frameworks to address challenges in data collection, analysis, and interpretation. **CO2**: Students will gain knowledge of data protection laws (e.g., GDPR, CCPA, HIPAA) and apply them to ensure compliance and protect user rights. **CO3**: Students will evaluate privacy, confidentiality, and informed consent issues and apply ethical guidelines for data security and responsible handling. **CO4**: Students will identify and mitigate biases in data and algorithms, ensuring fairness and equity in data-driven systems. **CO5**: Students will analyze the ethical challenges posed by emerging technologies, with a focus on transparency, accountability, and societal impact.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Introduction to Data Ethics • What is data ethics? Why it matters in data science • Overview of ethical frameworks (utilitarianism, rights-based, justice)	**8%**	**4**
	Unit-II: Privacy in the Digital Age • Definitions: privacy, confidentiality, anonymity • Types of privacy (informational, physical, decisional, etc.) • Informed consent and user data collection	**12%**	**6**

	Unit-III: Data Ownership and Control • Who owns the data? • Data as labor and data as property • Transparency and user rights	**12%**	**6**
	Unit-IV: Bias and Fairness in Data and Algorithms • Types of bias: sampling, label, algorithmic • Case studies: AI discrimination examples • Fairness metrics in models	**14%**	**7**
	Unit-V: Legal & Regulatory Frameworks • Overview of GDPR, CCPA, HIPAA • Data protection principles • Ethical compliance in organizations	**12%**	**6**
	Unit-VI: Data Security & Responsible Data Handling • Data breaches and cybersecurity basics • Ethical responsibilities during and after a breach • Ethical data storage and access control	**12%**	**6**
	Unit-VII: Ethical Challenges in AI and Automation • Ethical issues in predictive analytics, facial recognition, surveillance • Explainable AI and algorithmic transparency	**14%**	**7**
	Unit-VIII: Real-World Case Studies & Emerging Issues • Case discussion: Cambridge Analytica, AI in hiring, health data sharing • Ethical dilemmas in modern data-driven platforms • Final Project/Reflection Submission	**16%**	**8**
References	1. "Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy" By Cathy O'Neil 2. "Ethics of Big Data: Balancing Risk and Innovation" By Kord Davis with Doug Patterson 3. "The Ethical Algorithm: The Science of Socially Aware Algorithm Design" By Michael Kearns and Aaron Roth 4. "Privacy, Big Data, and the Public Good: Frameworks for Engagement" Edited by Julia Lane, Victoria Stodden, Stefan Bender, and Helen Nissenbaum 5. "Data Ethics: The New Competitive Advantage" By Gry Hasselbalch and Pernille Tranberg 6. "Data Ethics: Concepts and Cases for Responsible Data Science" By Jeffrey Stanton		

[Subject Code-2508000605060011]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –V
Introduction to Stock exchange Softwares (SEC) (2credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Introduction to Stock exchange Softwares		
Credit	2credit		
Teaching per week	2 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to provide students with a comprehensive understanding of Technical Analysis as a key tool for analyzing financial markets and making informed trading decisions. Through a structured approach, students will learn to interpret candlestick patterns, recognize chart formations, and effectively apply various technical indicators and oscillators.		
Objective of course	The main objective of this course is to develop the analytical skills necessary to identify potential market trends, reversals, and entry/exit points, enabling students to make data-driven decisions in real-time market scenarios. By the end of the course, learners will be equipped with both theoretical insights and practical tools to confidently analyse price movements in stocks, forex, and other financial instruments.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		

Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** Understand the fundamentals, assumptions, and role of technical analysis in financial markets. **CO2:** Identify and interpret candlestick patterns to assess market sentiment. **CO3:** Analyze common chart patterns to recognize trends and reversals. **CO4:** Apply technical indicators and oscillators for market analysis and trade decisions. **CO5:** Use charting tools to develop practical, data-driven trading strategies.		
Mapping between COs with PSOs			
Course content	Unit-I: Introduction To Technical Analysis	**12%**	**3**
	Unit-II: Candle Charts 2.1 One candlestick pattern 2.1.1 Hammer 2.1.2 Hanging Man 2.1.3 Shooting Star 2.2 Two candlestick pattern 2.2.1 Bullish Engulfing 2.2.2 Bearish engulfing	**28%**	**7**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

	2.2.3 Piercing 2.2.4 Bearish Harami 2.2.5 Bullish Harami 2.3 Three candlestick pattern 2.3.1 Evening Star 2.3.2 Morning Star 2.3.3 Doji		
	Unit-III: Types of Pattern 3.1 Support and Resistance 3.1.1 What is Support 3.1.2 What is Resistance 3.1.3 Important of Support and Resistance 3.1.4 Changes of support to resistance and vice versa 3.2 Head and shoulder 3.2.1 Head and shoulder Reversal 3.2.2 Inverted Head and shoulder 3.3 Double top and Double bottom 3.3.1 Double top 3.3.2 Double bottom 3.4 Gap theory 3.5 Flag and Pole 3.6 Cup And Handle	**32%**	**8**
	Unit-IV: Indicators and Oscillators 4.1 Simple moving average 4.2 Exponential moving average 4.3 RSI 4.4 Divergence 4.5 Stochastic 4.6 MACD 4.7 Bollinger Band	**28%**	**7**
References	1. Technical Analysis of the Financial Markets by John Murphy 2. Technical Analysis Explained by Martin J. Pring 3. The Complete Guide to Technical Analysis for the Forex Market by James Chen 4. Technical Analysis: The Complete Resource for Financial Market Technicians by Charles D. Kirkpatrick & Julie R. Dahlquist 5. Market Wizards by Jack D. Schwager		

[Subject Code-2508000605060011]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

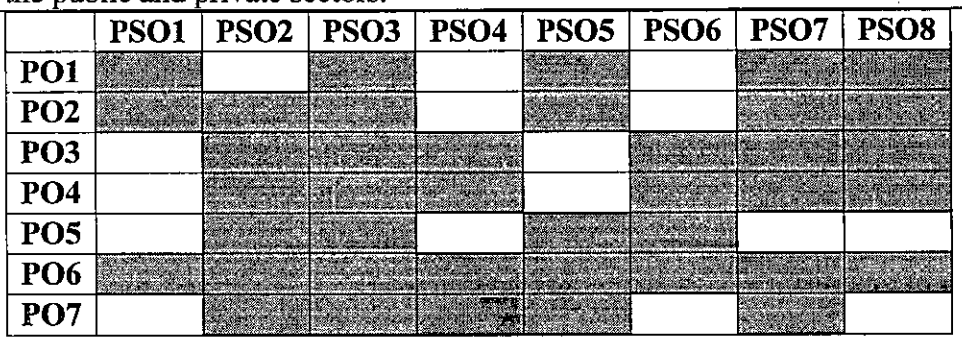
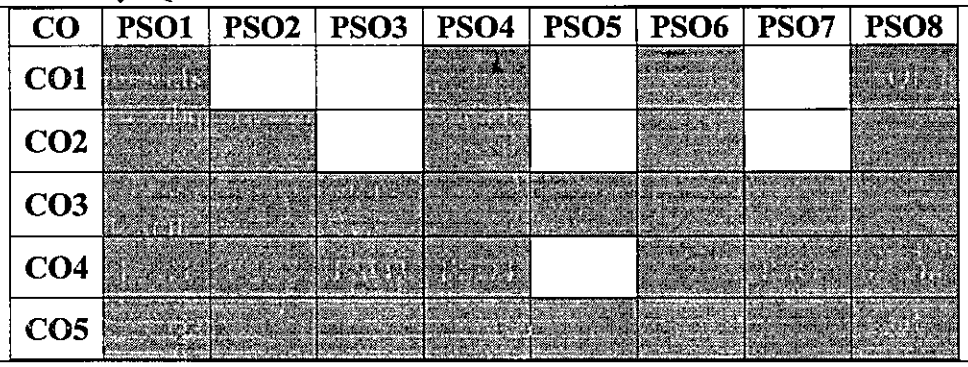
T.Y.B.Com. Data Science SEM –V

Advance SQL (SEC) (2credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Advance SQL		
Credit	2credit		
Teaching per week	2 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to empower students with the necessary SQL skills		
Objective of course	The main objective of this course is to equip with the essential knowledge and practical skills to confidently work with MySQL, enabling them to manage, analyze, and extract valuable information from databases, which is a crucial skill in today's data-centric world.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem		

	PSO4 : Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** Students will be able to perform fundamental SQL operations to manage and retrieve data from MySQL databases. **CO2:** Students will be able to utilize SQL aggregate functions and grouping to summarize and analyze data in MySQL. **CO3:** Students will be able to design and manage relational database tables in MySQL using SQL DDL and constraints. **CO4:** Students will be able to implement multi-table queries using SQL joins and subqueries to integrate data in MySQL. **CO5:** Students will be able to apply advanced SQL techniques like views and wildcard characters for efficient data retrieval and manipulation in MySQL.		
Mapping between COs with PSOs			
Course content	Unit-I: Fundamentals of SQL and Data Manipulation 1.1 Introduction to Databases & SQL Basics • What is SQL? • Overview of Relational Databases • SQL syntax and structure • Basic SQL commands: CREATE, INSERT, SELECT • SQL data types: Integer, String, Date, etc. • Basic query structure and examples 1.2 Filtering Data with WHERE and Operators • Using the WHERE clause for filtering • Comparison operators (=, >, <, !=, etc.) • Logical Operators: AND, OR, NOT • Pattern matching with LIKE	**40%**	**11**

	• Using IN, BETWEEN, and IS NULL • Case-insensitive search 1.3 Data Manipulation (INSERT, UPDATE, DELETE) • Inserting Data (INSERT INTO) • Updating Data (UPDATE) • Deleting Data (DELETE) • Difference between DELETE and TRUNCATE • Using WHERE to restrict data manipulation 1.4 Sorting and Limiting Results • Using ORDER BY • Sorting in ascending/descending order • Use of LIMIT 1.5 Aggregating Data with Aggregate Functions • Aggregate functions: COUNT, SUM, AVG, MIN, MAX • Using GROUP BY • HAVING clause (filtering grouped data) • Combining aggregates in complex queries		
	Unit-II: Table Design, Relationships, and Advanced Queries 2.1 Constraints, Keys, and Table Design • Creating tables with CREATE TABLE • Primary Key, Foreign Key, Unique, NOT NULL constraints • ALTER TABLE: Adding/Removing columns, constraints • Composite keys and indexing considerations 2.2 Joins (Part 1 & 2) • Introduction to Joins • INNER JOIN • LEFT JOIN, RIGHT JOIN, FULL OUTER JOIN • Join conditions • Using JOIN with multiple tables 2.3 Subqueries or Nested Queries • Introduction to subqueries • Subqueries in SELECT, WHERE, and FROM clauses • Correlated subqueries • Using subqueries with aggregate functions 2.4 Views of tables • What are Views? • Creating, updating, and deleting Views • Using Views to simplify complex queries 2.5 Wildcard Characters • Use of (%, _, LIKE, NOT LIKE) 2.6 Miscellaneous Examples • Miscellaneous Examples 2.7 Final Assignment • Execute queries based on a real dataset	**60%**	**14**
References	1. "Learning SQL" by Alan Beaulieu 2. SQL QuickStart Guide: The Simplified Beginner's Guide to SQL" by Walter Shields 3. "Sams Teach Yourself SQL in 10 Minutes" by Ben Forta 4. "Head First SQL" by Lynn Beighley and Michael Morrison 5. "SQL All-in-One For Dummies" by Allen G. Taylor 6. "High-Performance MySQL: Optimization, Backups, Replication, Load Balancing & More" by Baron Schwartz, Peter Zaitsev, and Vadim Tkachenko 7. "MySQL Cookbook: Solutions for Database Developers and Administrators" by Paul DuBois		

	8. "Effective SQL: 61 Specific Ways to Write Better SQL" by John L. Viescas 9. "SQL Pocket Guide" by Jonathan Gennick 10. "Learning SQL 1 Edition" by Ramesh Bangia 11. "SQL in MySQL : Learn and Practice" by Suripeddi Koundinya		

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

Faculty of Commerce – B.Com. Data Science Course

Credit Structure (NEW)

SEMESTER-VI

NO	COURSE TYPE	NAME OF THE COURSE	CREDIT	LECTURE /WEEK
1.	Major (12 Credit)	4. Financial Analytics 5. Data collection techniques in ancient India & Vedic mathematics 6. Select any ONE 5. Supply Chain Analytics 6. Customer Analytics 7. Social Media Analytics 8. Healthcare Analytics	3th+2Pr=4cr 4cr 3th+2Pr=4cr	10th+4Pr
2.	Minor (4 Credit)	Introduction to Big Data Analysis	3th+2Pr=4cr	3th+2Pr
3.	MD / ID	--	--	--
4.	AEC (2 Credit)	Power BI	2cr	2th
5.	SEC	Internship	4cr	4th
6.	VAC / IKS	--	--	--
Total			**22**	**19th+6Pr**

Internship: Student is expected to take up a live / real data analytics project in-house / industry.At the end of internship students are required to prepare and present report for the work carriedout.

[Subject Code for Theory-2508000606010002]
[Subject Code for Practical-2508000606010003]
VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –VI
Financial Analytics (MAJOR) (3th+2pr=4credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Financial Analytics		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with the necessary tools, techniques, and frameworks to perform comprehensive financial analysis and make informed decisions in the context of corporate finance, financial markets, portfolio management, technical analysis, and credit risk analysis. This course is designed to blend theory with practical application, focusing on real-world financial problems and challenges faced by businesses and investors.		
Objective of course	The main objective of this course is to introduces a core set of modern analytical tools that specifically target finance applications.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1:** Understand and apply corporate financial modeling techniques and capital budgeting tools, including project cash flows, sensitivity analysis, and bankruptcy prediction models. **CO2:** Estimate and forecast financial market risk and return using time series models, and perform data adjustments for corporate actions. **CO3:** Construct and optimize investment portfolios using CAPM, Sharpe Ratio, and mean-variance models, and apply option pricing techniques. **CO4:** Use technical indicators and machine learning models to analyze stock trends and simulate trading strategies. **CO5:** Evaluate credit risk through data preprocessing, decision trees, and logistic regression models.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Corporate Finance Analysis Basic corporate financial predictive modeling- Project analysis- cash flow analysis- cost of capital using sensitivity analysis, Indifference point and Financial Break even modeling, Capital Budget model-Payback, NPV, IRR, and MIRR. Bankruptcy Modeling- Beaver t test, Ohison logistic regression and Alt man Z score.	**20%**	**10**
	Unit-II: Financial Market Analysis Estimation and prediction of risk and return (bond investment and stock investment) – adjusting for stock splits, adjusting for mergers, plotting multiple series, data importing from web portal and data cleansing. Time	**20%**	**10**

	series-examining nature of data, EWMOA, Value at risk, ARMA, ARCH and GARCH.		
	Unit-III: Portfolio Analysis Portfolio Analysis – capital asset pricing model, Sharpe ratio, Markowitz's mean variance optimization model and cluster analysis for categorisation of portfolio. Option pricing models- binomial model for options, Black Scholes model and Option implied volatility.	**20%**	**10**
	Unit-IV: Technical Analysis Prediction using chart and fundamentals – RSI, ROC, MACD, moving average and candle charts, simulating trading strategies. Prediction of share prices using machine learning-ANN and SVM.	**20%**	**10**
	UNIT V - Credit Risk Analysis Credit Risk analysis- Data processing, Decision trees, logistic regression and evaluating credit risk model.	**20%**	**10**
References	1. Financial analytics with R by Mark J. Bennett, Dirk L. Hugen, Cambridge university press. 2. Haskell Financial Data Modeling and Predictive Analytics Paperback – Import, 25 Oct 2013 by Pavel Ryzhov. 3. Quantitative Financial Analytics: The Path To Investment Profits Paperback – Import, 11 Sep 2017 by Edward E Williams (Author), John A Dobelman. 4. Python for Finance - Paperback – Import, 30 Jun 2017 by Yuxing Yan (Author). 5. Mastering Python for Finance Paperback – Import, 29 Apr 2015 by James Ma Weiming.		

[Subject Code- 2508000606020008]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –VI

Data collection techniques in ancient India & Vedic Mathematics (MAJOR) (4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Data collection techniques in ancient India & Vedic Mathematics		
Credit	4 credit		
Teaching per week	4 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to provide students with an understanding of the origins and development of data collection and record-keeping practices in ancient India.		
Objective of course	The main objective of this course is to help students explore the rich traditions of data collection and record-keeping in ancient India, including both formal and informal systems. Students will understand how demographic records were maintained using various indigenous methods and analyze how these early practices connect to and influence modern data collection techniques. Through historical examples and comparisons, students will gain a deeper appreciation of India's contributions to data management and its relevance in today's world.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems		

PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership

PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem

PSO4 : Develop students for self-learning and practicing challenging problem solution

PSO5 : Train students to apply managerial skills to develop business applications.

PSO6 : Train students to use Data Analytics and application domain specific knowledge

PSO7 : Train students to take-up the real world challenges to develop workable solution to a domain specific problem

PSO8 : Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.

Mapping between POs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes

CO1: Students will understand the formal and informal systems of data collection and record-keeping in ancient India.

CO2: Students will understand how people kept demographic and administrative records.

CO3: Students will know about King Todar Mal's contributions to data and revenue systems.

CO4: Students will relate ancient data practices to modern data collection techniques.

CO5: Students will get a basic idea of Vedic Mathematics and how it is useful today.

Mapping between COs with PSOs

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Data collection in ancient India ➢ Formal and Informal Systems of Data Recording in Ancient India ➢ How Demographic Records keep in Ancient India	**20%**	**10**
	Unit-II: Data collection methods in ancient India ➢ Different methods use to keep records in ancient india ➢ Linking Ancient and Modern Data Collection Methods	**10%**	**5**
	Unit-III: King Todar Mal ➢ Early life of King Todar Mal ➢ Early career under Sher Shah Suri	**20%**	**10**

	➢ Service under Emperor Akbar ➢ Revenue Reforms and Administrative Achievements ➢ Record keeping and Local administration		
	Unit-IV: Introduction to Vedic Mathematics ➢ Origin and history (Attributed to Jagadguru Shri Bharati Krishna Tirthaji Maharaj) ➢ Importance and applications in modern times ➢ 16 Sutras and 13 Sub-Sutras (only basic idea, not all in-depth)	**50%**	**25**
References	1. **"A History of India"** – Romila Thapar (Good for understanding early Indian society, administration, and record-keeping.) 2. **"The Wonder That Was India"** – A.L. Basham (Covers ancient Indian social, political, and administrative systems.) 3. **"Ancient Indian History and Civilization"** – Sailendra Nath Sen (Useful for methods of data recording and demographic practices.) 4. **"Indian Administration"** – M.V. Pylee (Background on early administrative practices and evolution.) 5. **"Akbar and His India"** – Irfan Habib (coverage of Akbar's administration, including Todar Mal's revenue reforms.) 6. **"The Mughal Empire"** (Volume 1 of The New Cambridge History of India) – John F. Richards (for Todar Mal's career under Akbar and general Mughal record systems.) 7. **"Medieval India: From Sultanat to the Mughals"** – Satish Chandra (Covers Sher Shah Suri's and Akbar's administrative and revenue systems.) 8. **"Vedic Mathematics"** – Jagadguru Shri Bharati Krishna Tirthaji Maharaj (The original classic text — must refer.) 9. **"Vedic Mathematics Made Easy"** – Dhaval Bathia (Simplified approach for beginners, very practical.) 10. **"Speed Mathematics Using Vedic Sutras"** – Dr. Aditi Singhal (Modern applications of Vedic techniques, suitable for practice.) 11. **"India's Ancient Past"** – R.S. Sharma (Background for general ancient Indian society and culture.) 12. **Administrative System of the East India Company"** – B.B. Mishra (comparison when linking ancient and modern administrative ideas.)		

[Subject Code - 2508000606020008]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –VI
Supply Chain Analytics (MAJOR) (3th+2pr=4credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Supply Chain Analytics		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+ 2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with a comprehensive understanding of the key concepts, data analysis tools, and practical skills needed to manage and optimize supply chains in various industries.		
Objective of course	The main objective of this course is to help students understand the basics of supply chains and learn how to apply simple data analysis techniques to solve everyday supply chain problems using tools like Excel or Google Sheets.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial.skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs				

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1:** Understanding the Fundamentals of Supply Chain Management **CO2:** Analyzing and Interpreting Supply Chain Data **CO3:** Applying Data Analysis Tools in Supply Chain Decision Making **CO4:** Identifying and Solving Supply Chain Issues **CO5:** Practical Application of Supply Chain Concepts through Projects		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Introduction to Supply Chain **Topics Covered:** • What is a supply chain? • Key elements: suppliers, manufacturers, warehouses, retailers, customers • Types of supply chains (retail, manufacturing, food delivery) • Real-life examples (e.g., Amazon, Flipkart, local store) **Activities:** • Group discussion: "Where does your phone come from?" • Simple diagram-making of a supply chain	**14%**	**7**
	Unit-II: Understanding Supply Chain Data **Topics Covered:** • Types of data: stock levels, sales, orders, delivery times • Importance of data in supply chain decisions • Introduction to Excel/Google Sheets **Activities:** • Hands-on: Entering sales data in Excel	**16%**	**8**

	• Make a simple sales table		
	Unit-III: Working with Data in Excel **Topics Covered:** • Excel basics: tables, filters, sorting, basic formulas (sum, average) • Creating graphs: bar chart, line chart • Reading trends and patterns **Activities:** • Practice worksheet: "Which item sells the most?" • Make a bar graph of product sales	**20%**	**10**
	Unit-IV: Simple Analysis for Better Supply Chains **Topics Covered:** • Stock vs. demand comparison • Introduction to ABC classification • Spotting stockouts or overstock • Supplier delivery performance basics **Activities:** • Mini exercise: Which items are slow-moving? • Match stock to sales data	**24%**	**12**
	UNIT-V: Mini Project Work **Steps in the Project:** 1. Select a problem (e.g., stock issue, slow delivery) 2. Collect or use given sample data 3. Analyze it using Excel 4. Make graphs and write simple findings 5. Present your project to the class	**26%**	**13**
References	1. Supply Chain Management: Strategy, Planning, and Operation by Sunil Chopra and Peter Meindl 2. Essentials of Supply Chain Management by Michael H. Hugos 3. Data Science for Supply Chain Forecasting by Nicolas Vandeput 4. The Handbook of Logistics and Distribution Management by Alan Rushton, Phil Croucher, and Peter Baker 5. The Supply Chain Revolution by Suman Sarkar		

[Subject Code for Theory -2508000606030010]

[Subject Code for Practical-2508000606030011]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –VI

Customer Analytics (MAJOR) (3th+2pr=4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Customer Analytics		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+ 2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with practical skills in identifying customer types, tracking behavior, analyzing feedback, and using simple tools like Excel or Google Sheets for data handling. Through interactive activities and a mini project, students will learn to apply analytics techniques to real-world customer scenarios, laying a strong foundation for further studies in data analytics and business strategy.		
Objective of course	The main objective of this course is to understand customer behavior using simple data and tools, and to apply customer insights in solving small business problems.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		

Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** Understand what customer analytics is and identify different types of customers such as new, loyal, and inactive. **CO2:** Collect and organize basic customer data (like name, age, location, purchases, and feedback) using Excel or Google Sheets. **CO3:** Analyze customer data to find average spending, visit frequency, and identify top customers and popular products. **CO4:** Interpret customer feedback to understand satisfaction levels and suggest ways to improve the customer experience. **CO5:** Apply everything learned in a mini project by analyzing sample data, creating charts, and presenting useful insights and solutions.		
Mapping between COs with PSOs			
Course content	Unit I: Introduction to Customer Analytics **Topics Covered:** • What is customer analytics? • Types of customers: new, loyal, inactive • Basic customer data: name, age, purchase, feedback, location **Activities:** • Create a list of customers from an imaginary store • Discuss how businesses use customer feedback	**10%**	**5**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

	Unit II: Collecting and Organizing Customer Data **Topics Covered:** • What data to collect: purchases, visits, preferences • Using Excel/Google Sheets for organizing data • Basic charts: Pie chart (customer location), Bar chart (age group) **Activities:** • Practice: Create a sample customer database • Add columns: Total spent, number of visits	**15%**	**7**
	Unit III: Simple Customer Analysis **Topics Covered:** • Average spend per customer • Frequency of visits • Most popular products by customer group • Customer segmentation basics **Activities:** • Analyze: Who are the top 5 customers? • Chart: Which age group spends the most?	**20%**	**10**
	Unit IV: Customer Feedback and Retention **Topics Covered:** • Collecting simple feedback (e.g., rating out of 5) • Basic sentiment (positive, neutral, negative) • Finding unhappy customers • Ideas to improve customer experience **Activities:** • Analyze feedback data • Suggest improvement ideas	**15%**	**8**
	Unit V: Mini Project Work **Steps:** 1. Choose a project topic (e.g., "Why are customers leaving?", "Who are our top customers?") 2. Use sample data or collect from local source 3. Analyze and create charts 4. Present findings with simple solutions	**40%**	**20**
References	1. "Customer Analytics for Dummies" by Jeff Sauro 2. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett 3. "Business Intelligence Guidebook: From Data Integration to Analytics" by Rick Sherman 4. "Excel Data Analysis: Your Visual Blueprint for Analyzing Data, Charts, and PivotTables" by Jinjer L. Simon 5. "Customer Experience 3.0: High-Profit Strategies in the Age of Techno Service" by John A. Goodman 6. "The Big Book of Dashboards: Visualizing Your Data for Decision Making" by Steve Wexler, Jeffrey Shaffer, and Andy Cotgreave 7. "Data Science for Marketing Analytics" by Tommy Blanchard, Debasish Behera, and Himanshu Singh		

[Subject Code for Theory-2508000606030012]

[Subject Code for Practical-2508000606030013]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –VI

Social Media Analytics (MAJOR) (3th+2pr=4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Social Media Analytics		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+ 2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to introduce students to the foundational concepts and practical applications of **social media analytics.** Students will learn how to collect, organize, and analyze social media data from major platforms like **Instagram, YouTube, Twitter,** and **Facebook**. Through hands-on activities and a mini project, students will gain insights into the behavior of social media users and develop skills to assess and optimize post performance for better engagement and reach.		
Objective of course	The main objective of this course is to help students understand how social media platforms work, what kind of data is collected, and how to analyze that data to improve content, engagement, and performance.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		

Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			
Course outcomes	**CO1:** Understand social media analytics concepts, platforms, and key metrics. **CO2:** Collect, clean, and organize social media data using tools like Excel. **CO3:** Analyze post performance and compare post types for engagement. **CO4:** Analyze audience insights and suggest tailored content strategies. **CO5:** Complete a mini project applying social media analytics to real-world data and present findings.		
Mapping between COs with PSOs			
Course content	Unit I: Introduction to Social Media Analytics **Topics Covered:** • What is social media analytics? • Key platforms: Instagram, YouTube, Twitter, Facebook • Common metrics: Likes, Comments, Shares, Reach, Followers, Views **Activities:** • Watch a video showing Instagram Insights or YouTube Studio • Discuss: "Why do some posts go viral?"	**16%**	**8**
	Unit II: Collecting and Organizing Social Media Data **Topics Covered:** • Sample data: Post type, date, likes, comments, reach	**20%**	**10**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

	• Manual data entry and cleaning in Excel • Using filters, tables, sorting **Activities:** • Create a dataset of 10 posts with imaginary data • Identify the top 3 posts by engagement		
	Unit III: Analyzing Post Performance **Topics Covered:** • Metrics explained: Engagement rate, reach, click-through • Comparing posts (text vs. image vs. video) • Finding best time/day to post **Activities:** • Calculate average likes/comments • Create bar charts: Post vs. Likes	**20%**	**10**
	Unit IV: Understanding Audience Insights **Topics Covered:** • Demographics: age, gender, location (imaginary or from sample) • Follower growth over time • Sentiment basics: positive, negative, neutral **Activities:** • Analyze sample audience data • Suggest content types for different age groups	**16%**	**8**
	Unit V: Mini Project Work **Steps:** 1. Choose a social media page (real, imaginary, or local business) 2. Enter sample data for 10–15 posts 3. Analyze post types, likes, comments, engagement 4. Create 2–3 charts and a summary 5. Present recommendations for improvement	**28%**	**14**
References	1. "Social Media Analytics: Effective Tools for Building, Interpreting, and Using Metrics" by Marshall Sponder 2. "Social Media Data Mining and Analytics" by G. K. Gupta 3. "Social Media Analytics: A Data-Driven Approach to Understanding and Optimizing Social Media" by Piyush S. R. 4. "Social Media Marketing: Theories and Applications" by Alan Charlesworth 5. "The Social Media Analytics Handbook" by Michael K. Barbera		

MARCH 7

[Subject Code for Theory-2508000606030014]

[Subject Code for Practical-2508000606030015]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –VI

Healthcare Analytics (MAJOR) (3th+2pr=4credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Healthcare Analytics		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+ 2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to provide students with a foundational understanding of healthcare analytics, enabling them to use data to improve hospital operations, healthcare delivery, and patient care.		
Objective of course	The main objective of this course is to teaches students how to use data to improve healthcare decisions. It focuses on collecting and organizing data like patient information, hospital visits, and costs using tools like Excel. Through simple projects, students learn to analyze this data to understand trends and make better healthcare choices.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems		

	PSO2 : Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership **PSO3 :** Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1**: Understand the basics of healthcare analytics and how data helps improve healthcare services. **CO2**: Learn how to collect and organize healthcare data using tools like Excel or Google Sheets. **CO3**: Analyze healthcare data to find trends, such as common diseases or patient visit patterns. **CO4**: Create charts to visualize healthcare data and interpret the trends. **CO5**: Complete a small project, report your findings, and present data-driven recommendations to improve healthcare services.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	UNIT I – What is Healthcare Analytics? • Meaning: Using data to help improve hospitals, doctors, and patient care • Examples: Number of patients in a hospital, age groups of patients, medicine stock • Why it's useful: Helps make better health decisions	**16%**	**8**
	UNIT II – Collecting Health Data • What kind of data: Age, gender, disease, visit date, cost, etc. • From where: Sample/mock hospital data or surveys • Entering data into Excel or Google Sheets • Checking and cleaning simple errors (like blanks or duplicates)	**20%**	**10**

	UNIT III – Understanding the Data
	• Counting how many patients came per day
	• Which diseases are most common?
	• Finding average patient age, average cost, etc.
	• Drawing charts like:
	  o Bar chart: Patients per disease
	  o Pie chart: Male vs Female patients
	  o Line chart: Patients over time
		24%	**12**

	UNIT IV – Doing a Simple Health Project Choose 1 small project. Examples: 1. **Patient Visit Analysis:** How many patients came each week? 2. **Common Illness Trends:** Which age group gets sick the most? 3. **Hospital Expenses Report:** What is the average bill? Include: • A short report (1 page) • Charts/Graphs • Key learnings (2–3 points)	**40%**	**20**
References	1. "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement" by Hubert L. (Hank) Chiang 2. "Healthcare Data Analytics" by Chandan K. Reddy and H. Raghavendra 3. "The Healthcare Data Guide: Learning from Big Data in Health Care" by Ralph L. Kliem 4. "Big Data and Health Analytics" by Rafael A. Calvo, Dorian Peters, and David C. M. 5. "Practical Guide to Healthcare Analytics" by Shannon L. Bracken		

[Subject Code for Theory-2508000606040010]
[Subject Code for Practical-2508000606040011]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
T.Y.B.Com. Data Science SEM –VI
Introduction to Big Data Analysis (MINOR) (3th+2pr=4credit)
As per NEP 2020
To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Introduction to Big Data Analysis		
Credit	3th+2pr=4credit		
Teaching per week	6 Hours (4Theory+2Practical)		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to help students for apply Big Data technologies like Hadoop, NoSQL, and Spark. It focuses on teaching how to handle, process, and analyze large datasets, preparing students with practical skills for real-world data analytics and Big Data applications.		
Objective of course	The main objective of this course is to introduce students to Big Data Analytics, helping them understand how to analyze large datasets to discover patterns and insights. It equips students with essential, in-demand skills for today's data-driven world and prepares them for careers in data analytics across various industries.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1:** Students will understand what Big Data is, its key features, and how it's used in the real world. **CO2:** Students will learn how to use Hadoop and its components like HDFS and MapReduce to handle large datasets. **CO3:** Students will explore different NoSQL databases and know when and how to use them for Big Data problems. **CO4:** Students will gain skills to process and analyze real-time data streams for insights. **CO5:** Students will get hands-on experience with Big Data tools like Pig, Hive, HBase, and Spark to build data-driven applications.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Introduction to Big Data: Introduction to Big Data, Big Data characteristics, Challenges of Conventional System, Types of Big Data, Intelligent data analysis, Traditional vs. Big Data business approach, Case Study of Big Data Solutions.	**10%**	**5**
	Unit-II: Hadoop: History of Hadoop, Hadoop Distributed File System: Physical organization of Compte Nodes, Components of Hadoop Analyzing the Data with Hadoop, Scaling Out, Hadoop Streaming, Design of HDFS,Java interfaces to HDFS Basics, Developing a Map Reduce Application, How Map Reduce Works, Anatomy of a Map Reduce Job run, Failures, Job Scheduling, Shuffle and Sort, Task execution, Map Reduce Types and Formats, Map	**30%**	**15**

	Reduce Features, Hadoop environment. Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, ecurity in Hadoop, Administering Hadoop, Monitoring-Maintenance, Hadoop benchmarks, Hadoop in the cloud		
	Unit-III: NoSQL: What is NoSQL? NoSQL business drivers; NoSQL case studies; NoSQL data architecture patterns: Key-value stores, Graph stores, Column family (Bigtable) stores, Document stores, Variations of NoSQL architectural patterns; Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer; Four ways that NoSQL systems handle big data problems	**30%**	**15**
	Unit-IV: Mining Data Stream: Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating moments, Counting oneness in a Window, Decaying Window, Real time Analytics Platform (RTAP) applications, Case Studies, Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics	**30%**	**15**
References	1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007 2. Bill Franks , "Taming The Big Data Tidal Wave: Finding Opportunities In Huge Data Streams With Advanced Analytics", Wiley 3. Anand Rajaraman and Jeff Ullman "Mining of Massive Datasets", Cambridge University Press, 4. Michael Minelli, Michele Chambers, Ambiga Dhiraj, "Big Data Big Analytics: Emerging Business Intelligence And Analytic Trends For Today's Businesses", Wiley India 5. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley. 6. Chris Eaton, Dirk derooset al., "Understanding Big data", McGraw Hill, 2012. 7. BIG Data and Analytics , Seema Acharya, Subhashini Chhellappan, Willey 8. MongoDB in Action, Kyle Banker, Piter Bakkum , Shaun Verch, Dream tech Press 9. Tom White, "HADOOP: The Definitive Guide", O Reilly 2012. 10. Vignesh Prajapati, "Big Data Analytics with R and Hadoop", Packet Publishing 2013. 11. Learning Spark: Lightning-Fast Big Data Analysis Paperback by Holden Karau		

[Subject Code-2508000606050004]

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

T.Y.B.Com. Data Science SEM –VI

Power BI (AEC) (2credit)

As per NEP 2020

To be implemented from the Academic year 2025-26

Course code		Weightage	Marks
Course title	Power BI		
Credit	2credit		
Teaching per week	2 Hours		
Effective from	2025-2026		
Purpose of course	The purpose of this course is to equip students with the ability to make data-driven decisions by using Power BI as a powerful business intelligence tool. By the end of the course, students will be capable of handling real-world datasets, developing insightful visual reports, and applying analytical functions to derive meaningful business insights, thus preparing them for roles in data analysis, reporting, and business intelligence.		
Objective of course	The main objective of this course is to provide students with comprehensive knowledge and practical skills in using Microsoft Power BI for data visualization, business intelligence, and advanced analytics.		
Programme outcomes	**PO1 : Fundamental Knowledge Enrichment** Program trains students with the core Data Analytics, computer science and Statistics knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development. **PO2 : Critical Thinking Development** The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem. **PO3 : Advanced Emerging Technology Awareness** The program trains students with the latest technologies that is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry. **PO4 : Advanced Tools Usage** The program teaches the students to apply the advanced tools to solve real world problems. **PO5 : Nurturing Project Planning and Management Capabilities** The program trains students for designing and conceptualizing the Data architecture, planning and managing the product development process to analyze Data. It also makes students understand the decision making for selection of an appropriate data management capabilities. **PO6 : Real World Problem / Project Development** Real world project provides the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready. **PO7 : Team Work and Leadership Development** Trains students to work in a team and also to take leadership of the of the data management team.		
Programme specific outcomes	**PSO1 :** Develop and strengthen the fundamental core concepts that are required to solve complex problems **PSO2 :** Develop the professional and entrepreneurship skills that needs independent logical and analytical thinking, teamwork and leadership		

	PSO3 : Nurture the students to investigate for the design and development of a workable solution for a real world problem **PSO4 :** Develop students for self-learning and practicing challenging problem solution **PSO5 :** Train students to apply managerial skills to develop business applications. **PSO6 :** Train students to use Data Analytics and application domain specific knowledge **PSO7 :** Train students to take-up the real world challenges to develop workable solution to a domain specific problem **PSO8 :** Graduates with a Bcom Data Analytics degree have a wide range of employment options available to them. It is possible for them to work in both the public and private sectors.		
Mapping between POs and PSOs			

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
PO1								
PO2								
PO3								
PO4								
PO5								
PO6								
PO7								

Course outcomes	**CO1:** Understand the role of Power BI within Business Intelligence (BI) and Data Analytics. **CO2:** Understand how to create relationships between datasets and model data for reporting. **CO3:** Develop skills in creating interactive reports and dashboards using various Power BI visuals **CO4:** Understand the core concepts of DAX (Data Analysis Expressions) **CO5:** Learn how to publish reports to Power BI Service and collaborate with teams in the cloud environment.		
Mapping between COs with PSOs			

CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course content	Unit-I: Power BI Basics – Data Handling & Visualization 1.1 Introduction to Power BI & Business Intelligence • What is Power BI? Understanding BI & Data Analytics • Installation & Setup of Power BI Desktop • Power BI Interface & Dashboard Components 1.2 Connecting & Transforming Data • Importing data from Excel, SQL, CSV & Online Services • Cleaning & preparing data using Power Query • Data modeling & relationships 1.3 Data Visualization & Dashboard Creation • Creating Interactive Reports & Dashboards • Using Charts, Graphs, Maps & KPI Indicators	**50%**	**13**

	• Customizing visuals & formatting reports		
	Unit-II: Power BI Advanced – DAX, Services & Smart Insights 2.1 DAX (Data Analysis Expressions) in Power BI • Understanding DAX Formulas & Functions • Creating Calculated Columns & Measures • Using Filters, Slicers & Drill-through Reports 2.2 Power BI Services & Cloud Publishing • Publishing reports to Power BI Service • Sharing & collaborating with teams • Setting up Automatic Data Refresh 2.3 Power BI Advanced Features • Row-Level Security (RLS) – Controlling data access • Performance Optimization & Best Practices • AI-Powered Data Insights & Predictive Analysis	**50%**	**12**
References	1. "Microsoft Power BI Complete Reference" by Devin Knight, Brian Knight, Mitchell Pearson 2. "Analyzing Data with Power BI and Power Pivot for Excel" by Alberto Ferrari & Marco Russo 3. "Mastering Microsoft Power BI" by Brett Powell 4. "The Definitive Guide to DAX" by Marco Russo & Alberto Ferrari 5. "Power BI: Business Intelligence with Excel and Power BI" by Shivani Jain		