ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS COLLEGES AFFILIATED TO
ANNA UNIVERSITY
MASTER OF BUSINESS ADMINISTRATION (BUSINESS ANALYTICS)
CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

MBA Business Analytics programme curriculum is designed to prepare the post graduate students

   I.   To have a thorough understanding of the core aspects of Business Analytics.

  II.   To provide the learners with the management tools to identify, analyze and create business opportunities as well as application of Business Analytics to solve Business problem.

 III.   To prepare them to have a holistic approach towards management functions.

 IV.   To inspire them to practice ethical standards in Business.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

 1.   Ability to apply the business acumen gained in practice.

 2.   Ability to understand application of Business Analytics to solve managerial issues.

 3.   Ability to communicate and negotiate effectively, to achieve organizational and individual goals.

 4.   Ability to understand one's own ability to set achievable targets and complete them using Business Analytics.

 5.   Ability to fulfill social outreach.

 6.   Ability to take up challenging assignments.

ANNA UNIVERSITY, CHENNAI

NON-AUTONOMOUS COLLEGES AFFILIATED TO ANNA UNIVERSITY

MASTER OF BUSINESS ADMINISTRATION (BUSINESS ANALYTICS)

(FULL – TIME)

REGULATIONS 2021

CHOICE BASED CREDIT SYSTEM

CURRICULA AND SYLLABI FOR I TO IV SEMESTERS

SEMESTER – I

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	BA4102	Management Concepts and Organizational Behavior	PCC	3	0	0	3	3
2.	BA4103	Managerial Economics	PCC	3	0	0	3	3
3.	BA4101	Statistics for Management	PCC	3	0	0	3	3
4.	BA4105	Legal Aspects of Business	PCC	3	0	0	3	3
5.	BN4101	Managerial Decision Science	PCC	3	0	0	3	3
6.	BN4102	Data Management & Data Engineering	PCC	3	0	0	3	3
7.	BN4103	Financial Accounting and Management	PCC	3	0	0	3	3
PRACTICAL								
8.	BA4112	Business Communication (Laboratory)	EEC	0	0	4	4	2
9.	BN4111	Data Science Tools – 1 (Laboratory)	EEC	0	0	4	4	2
			TOTAL	**21**	**0**	**8**	**29**	**25**

SEMESTER – II

S. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	BA4203	Human Resource Management	PCC	3	0	0	3	3
2.	BA4207	Marketing Management	PCC	3	0	0	3	3
3.	BA4204	Operations Management	PCC	3	0	0	3	3
4.	BN4201	Predictive Modeling for Business	PCC	3	0	0	3	3
5.	BA4205	Business Research Methods	PCC	3	0	0	3	3
6.	BA4201	Quantitative Techniques for Decision Making	PCC	3	0	0	3	3
7.	BA4032	Entrepreneurship Development	NEC	3	0	0	3	3
PRACTICAL								
8.	BN4211	Data Science Tools - 2 (Laboratory)	EEC	0	0	4	4	2
9.	BN4212	Social Media Content Creation (Laboratory)	EEC	0	0	4	4	2
			TOTAL	21	0	8	29	25

SEMESTER – III

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	BA4301	Strategic Management	PCC	3	0	0	3	3
2.	BN4301	Artificial Intelligence and Machine Learning	PCC	3	0	0	3	3
3.	-	Professional Elective I	PEC	3	0	0	3	3
4.	-	Professional Elective II	PEC	3	0	0	3	3
5.	-	Professional Elective III	PEC	3	0	0	3	3
6.	-	Professional Elective IV	PEC	3	0	0	3	3
7.	-	Professional Elective V	PEC	3	0	0	3	3
8.	-	Professional Elective VI	PEC	3	0	0	3	3
PRACTICAL								
9.	BN4311	R Programming (Laboratory)	EEC	0	0	4	4	2
10.	BN4312	Cloud Computing and Big Data Tools for Data Analytics (Laboratory)	EEC	0	0	4	4	2
11.	BN4313	Mini Project	EEC	0	0	4	4	2
			TOTAL	24	0	12	36	30

SI. NO	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICAL								
1.	BN4411	Project Work	EEC	0	0	20	20	10
			TOTAL	0	0	20	20	10

TOTAL : 90 CREDITS

PROFESSIONAL ELECTIVES (PEC)

Students can take six elective subjects:

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
1.	BN4001	Human Resource Analytics	PEC	3	0	0	3	3
2.	BN4002	Marketing and Social Media web Analytics	PEC	3	0	0	3	3
3.	BN4003	Financial Analytics	PEC	3	0	0	3	3
4.	BN4004	Operation and Supply chain Analytics	PEC	3	0	0	3	3
5.	BN4005	Time Series Analysis	PEC	3	0	0	3	3
6.	BN4006	Block Chain Technology	PEC	3	0	0	3	3
7.	BN4007	Cloud Computing Tools and Techniques	PEC	3	0	0	3	3
8.	BN4008	Enterprise Information System	PEC	3	0	0	3	3
9.	BN4009	Big data Analytics	PEC	3	0	0	3	3
10.	BN4010	Disruptive Technologies for Digital Transformation in Business	PEC	3	0	0	3	3
11.	BN4011	Multivariate Data Analysis	PEC	3	0	0	3	3
12.	BN4012	Natural Language Processing	PEC	3	0	0	3	3

BA4102   MANAGEMENT CONCEPTS AND ORGANIZATIONAL BEHAVIOR   L T P C
                                                                                                   3 0 0 3

COURSE OBJECTIVES:
➢ To familiarize the students to the basic concepts of management in order to aid in understanding how an organization functions, and in understanding the complexity and wide variety of issues managers face in today's business firms.
➢ To acquaint the students with the fundamentals of managing business and to understand individual and group behaviour at work place so as to improve the effectiveness of an organization. The course will use and focus on Indian experiences, approaches and cases.

UNIT I   NATURE AND THEORIES OF MANAGEMENT   9
Evolution of management Thought-Classical, Behavioral and Management Science Approaches Management- meaning, levels, management as an art or science, Managerial functions and Roles, Evolution of Management Theory- Classical era- Contribution of F.W.Taylor, Henri Fayol, Neo- Classical-Mayo & Hawthorne Experiments. • Modern era — system & contingency approach Managerial Skills.

UNIT II   PLANNING AND ORGANISING   9
Planning - Steps in Planning Process - Scope and Limitations - Forecasting and types of Planning - Characteristics of a sound Plan - Management by Objectives (MBO) - Policies and Strategies - Scope and Formulation - Decision Making - Types, Techniques and Processes.

Organisation Structure and Design - Authority and Responsibility Relationships - Delegation of Authority and Decentralisation - Interdepartmental Coordination - - Impact of Technology on Organisational design - Mechanistic vs Adoptive Structures - Formal and Informal Organisation. Control:meaning, function, Process and types of Control.

UNIT III   INDIVIDUAL BEHAVIOUR   9
Meaning of Organizational behavior, contributing disciplines, importance of organizational behavior, Perception and Learning - Personality and Individual Differences - Motivation theories and Job Performance - Values, Attitudes and Beliefs - Communication Types-Process - Barriers – Making Communication Effective.

UNIT IV   GROUP BEHAVIOUR   9
Groups and Teams: Definition, Difference between groups and teams, Stages of Group Development, Group Cohesiveness, Types of teams, Group Dynamics - Leadership - Styles - Approaches - Power and Politics - Organisational Structure - Organisational Climate and Culture, Conflict: concept, sources, Types, Stages of conflict, Management of conflict Organisational Change and Development.

UNIT V   EMERGING ASPECTS OF ORGANIZATIONAL BEHAVIOUR   9
Comparative Management Styles and approaches - Japanese Management Practices Organizational Creativity and Innovation - Organizational behavior across cultures - Conditions affecting cross cultural organizational operations, Managing International Workforce, Productivity and cultural contingencies, Cross cultural communication, Management of Diversity.

                                                                    TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of course, Students will develop

> CO1 Understanding of various management concepts and skills required in the business world CO2 In-depth knowledge of various functions of management in a real time management context
>
> CO3 Understanding of the complexities associated with management of individual behavior in the organizations
>
> CO4 Develop the skill set to have manage group behaviour in OrganizationsCO5 Insights about the current trends in managing organizational behaviour

REFERENCES:
1. Andrew J. Dubrin, Essentials of Management, Thomson Southwestern, 10th edition, 2016.
2. Samuel C. Certo and S.Trevis Certo, Modern Management: Concepts and Skills, Pearson education, 15th edition, 2018.
3. Harold Koontz and Heinz Weihrich, Essentials of Management: An International, Innovation, And Leadership Perspective, 10th edition, Tata McGraw-Hill Education, 2015.
4. Charles W.L Hill and Steven L McShane, „Principles of Management, McGraw Hill Education, Special Indian Edition, 2017.
5. Stephen P. Robbins, Timothy A.Judge, Organisational Behavior, PHI Learning / Pearson Education,16th edition, 2014.
6. Fred Luthans, Organisational Behavior, McGraw Hill, 12th Edition, 2013.
7. Don Hellriegel, Susan E. Jackson and John W,Jr Slocum, Management: A competency-Based Approach, Thompson South Western,11th edition, 2008.
8. Heinz Weihrich, Mark V Cannice and Harold Koontz, Management- A global entrepreneurial perspective, Tata McGraw Hill, 12th edition, 2008.
9. Stephen P. Robbins, David De Cenzo and Mary Coulter, Fundamentals Of Management, PrenticeHall of India,9 th edition 2016.
10. Mc Shane, Mary V. Glinow, Organizational Behavior, 8th Edition, Tata Mc Graw Hill, 2017.
11. Nelson, Quick, Khandelwal. ORGB – An innovative approach to learning and teaching. Cengagelearning. 2nd edition. 2012
12. Robert Konopaske, John M Ivancevich, Michael T Matteson, Oranizational Behavior and Management, 11th edition, Tata McGraw Hill, 2017.
13. Udai Pareek, Understanding Organisational Behavior, 3rd Edition, Oxford Higher Education, 2011.
14. Jerald Greenberg, Behavior in Organizations, PHI Learning. 10th edition. 2011

BA4103   **MANAGERIAL ECONOMICS**   **L T P C**

                                                                3 0 0 3

OBJECTIVE:

➢ To introduce the concepts of scarcity and efficiency.
➢ To explain principles of micro economics relevant to managing an organization.
➢ To describe principles of macroeconomics and have the understanding of economic environment of business.

UNIT I   INTRODUCTION   9

The themes of economics – scarcity and efficiency – three fundamental economic problems – society's capability – Production possibility frontiers (PPF) – Productive efficiency Vs economic efficiency – economic growth & stability – Micro economies and Macro economies – the role of markets and government – Positive Vs negative externalities.

UNIT II   CONSUMER AND PRODUCER BEHAVIOUR   9

Market – Demand and Supply – Determinants – Market equilibrium – elasticity of demand and supply – consumer behaviour – consumer equilibrium – Approaches to consumer behaviour – Production – Short-run and long-run Production Function – Returns to scale – economies Vs diseconomies of scale – Analysis of cost – Short-run and long-run cost function – Relation between Production and cost function.

UNIT III   PRODUCT AND FACTOR MARKET   9

Product market – perfect and imperfect market – different market structures – Firm's equilibrium and supply – Market efficiency – Economic costs of imperfect competition – factor market – Land, Labour and capital – Demand and supply – determination of factor price – Interaction of product and factor market – General equilibrium and efficiency of competitive markets.

UNIT IV   PERFORMANCE OF AN ECONOMY – MACRO ECONOMICS   9

Macro-economic aggregates – circular flow of macroeconomic activity – National income determination – Aggregate demand and supply – Macroeconomic equilibrium – Components of aggregate demand and national income – multiplier effect – Demand side management – Fiscal policy in theory.

UNIT V   AGGREGATE SUPPLY AND THE ROLE OF MONEY   9

Short-run and Long-run supply curve – Unemployment and its impact – Okun's law – Inflation and the impact – reasons for inflation – Demand Vs Supply factors –Inflation Vs Unemployment tradeoff – Phillips curve –short- run and long-run –Supply side Policy and management- Money market- Demand and supply of money – money-market equilibrium and national income – the role of monetary policy.

                                                        TOTAL: 45 PERIODS

COURSE OUTCOMES:

➢ To introduce the concepts of scarcity and efficiency;
➢ To explain principles of microeconomics relevant to managing an organization
➢ To describe principles of macroeconomics
➢ To have the understanding of economic environment of business.
➢ To study about the policies that regulate economic variables

REFERENCES:
1. Paul A. Samuelson, William D. Nordhaus, Sudip Chaudhuri and Anindya Sen, Economics,19th edition, Tata McGraw Hill, New Delhi, 2011
2. William Boyes and Michael Melvin, Textbook of economics, Biztantra, 7 th edition 2008.
3. N. Gregory Mankiw, Principles of Economics, 8 th edition, Thomson learning, New Delhi,2017.
4. Richard Lipsey and Alec Chrystal, Economics, 13th edition, Oxford, University Press,New Delhi, 2015.
5. Karl E. Case and Ray C. Fair, Principles of Economics, 12th edition, Pearson, Education Asia, New Delhi, 2017.
6. Panneerselvam. R, Engineering Economics, 2 nd Edition, PHI Learning, 2014.

BA4101   **STATISTICS FOR MANAGEMENT**   **L T P C**
                                                                                3 0 0 3

OBJECTIVE:

  ➢ To learn the applications of statistics in business decision making.

UNIT- I   **INTRODUCTION**   **9**
Basic definitions and rules for probability, conditional probability independence of events, Baye's theorem, and random variables, Probability distributions: Binomial, Poisson, Uniform and Normal distributions.

UNIT- II   **SAMPLING DISTRIBUTION AND ESTIMATION**   **9**
Introduction to sampling distributions, sampling distribution of mean and proportion, application of central limit theorem, sampling techniques. Estimation: Point and Interval estimates for population parameters of large sample and small samples, determining the sample size.

UNIT- III   **TESTING OF HYPOTHESIS - PARAMETIRC TESTS**   **9**
Hypothesis testing: one sample and two sample tests for means and proportions of large samples (z- test), one sample and two sample tests for means of small samples (t-test), F-test for two sample standard deviations. ANOVA one and two way.

UNIT- IV   **NON-PARAMETRIC TESTS**   **9**
Chi-square test for single sample standard deviation. Chi-square tests for independence of attributes and goodness of fit. Sign test for paired data. Rank sum test. Kolmogorov-Smirnov – test for goodness of fit, comparing two populations. Mann – Whitney U test and Kruskal Wallistest. One sample run test.

UNIT- V   **CORRELATION AND REGRESSION**   **9**
Correlation – Coefficient of Determination – Rank Correlation – Regression – Estimation of Regression line – Method of Least Squares – Standard Error of estimate.

                                                                TOTAL: 45 PERIODS

COURSE OUTCOMES:

  ➢ To facilitate objective solutions in business decision making.
  ➢ To understand and solve business problems.
  ➢ To apply statistical techniques to data sets, and correctly interpret the results.
  ➢ To develop skill-set that is in demand in both the research and business environments.
  ➢ To enable the students to apply the statistical techniques in a work setting.

REFERENCES:
1. Richard I. Levin, David S. Rubin, Masood H.Siddiqui, Sanjay Rastogi, Statistics for Management, Pearson Education, 8th Edition, 2017.
2. Prem. S. Mann, Introductory Statistics, Wiley Publications, 9th Edition, 2015.
3. T N Srivastava and Shailaja Rego, Statistics for Management, Tata McGraw Hill, 3rd Edition 2017.
4. Ken Black, Applied Business Statistics, 7th Edition, Wiley India Edition, 2012.
5. David R. Anderson, Dennis J. Sweeney, Thomas A.Williams, Jeffrey D.Camm, James J.Cochran, Statistics for business and economics, 13th edition, Thomson (South – Western)Asia, Singapore, 2016.
6. N. D. Vohra, Business Statistics, Tata McGraw Hill, 2017.

BA4105   **LEGAL ASPECTS OF BUSINESS**   **L T P C**
                                                                              3 0 0 3
OBJECTIVE:
➢ The objective of this course is to familiarize the students with various laws that will help them to refine their understanding of how law affects the different aspects of business.

UNIT- I   COMMERCIAL LAW   9

THE INDIAN CONTRACT ACT 1872
Definition of contract, essentials elements and types of a contract, Formation of a contract, performance of contracts, breach of contract and its remedies, Quasi contracts - Contract Of Agency: Nature of agency, Creation and types of agents, Authority and liability of Agent and principal: Rights and duties of principal and agents, termination of agency.

THE SALE OF GOODS ACT 1930 Nature of Sales contract, Documents of title, risk of loss, Guarantees and Warranties, performance of sales contracts, conditional sales and rights of an unpaid seller -

NEGOTIABLE INSTRUMENTS ACT 1881: Nature and requisites of negotiable instruments. Types of negotiable instruments, liability of parties, holder in due course, special rules for Cheque and drafts, discharge of negotiable instruments.

UNIT- II   COMPANY LAW AND COMPETITION ACT   9

COMPANY ACT 1956 & 2013 Major principles — Nature and types of companies, Formation, Memorandum and Articles of Association, Prospectus, Power, duties and liabilities of Directors, winding up of companies, Corporate Governance.

Competition Act 2002 - Introduction, Definitions, Enquiry into Certain Agreements and Dominant Position of Enterprise and Combinations.

UNIT- III   INDUSTRIAL LAW   9
An Overview of Factories Act - Payment of Wages Act - Payment of Bonus Act - Industrial Disputes Act.

UNIT- IV   CORPORATE TAX & GST   9
Corporate Tax Planning, Corporate Taxes and Overview of Latest Developments in Indirect tax Laws relating to GST: An introduction including constitutional aspects, Levy and collection of CGST& IGST, Basic concept of time and value of supply, Input tax credit, Computation of GST Liability, Registration, Tax Invoice, Credit & Debit Notes, Electronic Way bill, Returns, Payment of taxes including Reverse Charge

UNIT- V   CONSUMER PROTECTION ACT AND INTRODUCTION OF
                CYBER LAWS   9
Consumer Protection Act — Consumer rights, Procedures for Consumer grievances redressal, Types of consumer Redressal Machineries and Forums-- Cyber crimes, IT Act 2000 and 2002, Cyber Laws, Introduction of IPR Intellectual Property Laws- Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement.– Copy rights, Trade marks, Patent Act. Introduction, Right to Information Act, 2005.

                                                              TOTAL: 45 PERIODS

COURSE OUTCOMES:

➤ Understand the fundamental legal principles in developing various contracts and commercial laws in the business world
➤ Identify the common forms of business associations and elements of Corporate Governance
➤ Develop insights regarding the laws related to industrial environment
➤ Ability to understand the fundamentals of corporate tax and GST
➤ Understand the role of consumer rights and cyber laws in the modern business environment

REFERENCES :

1. N. D. Kapoor, Elements of Mercantile Law, Sultan Chand and Company, India, 2017.
2. P. K. Goel, Business Law for Managers, Biztantatara Publishers, India, 2017.
3. Akhileshwar Pathak, Legal Aspects of Business, Tata McGraw Hill,, 6th Edition 2018.
4. Ravinder Kumar, Legal Aspects of Business, New Delhi: Cengage Learning, 4 th edition, 2016.
5. Sinha P.K, Dr. Vinod Singhania, Text Book of Indirect Tax, Taxman Publication, New Delhi
6. Taxmann, GST Manual with GST Law Guide & Digest of Landmark Rulings, 11th Edition,2019
7. P. P. S. Gogna, Mercantile Law, S. Chand & Co. Ltd., India, Fourth Edition, 2015.
8. Dr. Vinod K. Singhania, Direct Taxes Planning and Management, 11 th, 2007.
9. Richard Stim, Intellectual Property- Copy Rights, Trade Marks, and Patents, Cengage Learning,15 th edition 2017.
10. Daniel Albuquerque, Legal Aspect of Business, Oxford,2 nd edition, 2017
11. Ravinder Kumar– Legal Aspect of Business.– Cengage Learning, 4 th Edition-2016.
12. V.S. Datey, GST Ready Reckoner, 9 th edition, 2019

BN4101	MANAGERIAL DECISION SCIENCE	L T P C
		3 0 0 3

OBJECTIVES:

➢ To understand the role of Data Analytics in Decision making
➢ To familiarize the Spreadsheets in Data management and Visualization

UNIT – I   INTRODUCTION   9

Role of Data Analytics in Decision Making, Business Analytics and Classification. Understanding the significance of data-driven decision-making in modern business, Influence of analytics on managerial decisions, Data analytics lifecycle, Choosing the right tool for the right task. Introduction to Spreadsheets, Data Visualisation and Project Management Tools, Setting up software tools and resources.

UNIT – II   SPREADSHEETS FOR DATA ANALYSIS   9

Spreadsheets for Data Analysis: Spreadsheets as fundamental data analysis tool, Basic operations, data entry, and cell references, Using formulas and functions for data manipulation. Understanding PivotTables and their role in data summarization, Creating PivotTables and Pivot Charts, Customizing PivotTables for effective analysis. Using advanced Spreadsheet functions (e.g., VLOOKUP, IF, INDEX-MATCH).

UNIT – III   DATA VIZUALIZATION   9

 Principles of effective data visualization. Choosing the right chart type for different data scenarios. Customizing charts for clarity. Creating Advanced Charts in Spreadsheets, Building advanced charts (e.g., trendlines, combo charts, and waterfall charts). Case studies and exercises applying advanced functions.

UNIT – IV   INTERACTIVE REPORTS AND DASHBOARDS   9

Introduction to Data Visualization platforms, Data Import and Transformation, Building Interactive Reports and Dashboards, Creating Visualizations (Bar charts, Pie charts, etc.), Slicers and Filters, Sharing and Collaboration of data, Fundamentals of Tableau, Connecting to Data Sources, Creating Interactive Dashboards, Advanced Visualizations (Maps, Heatmaps, etc.), Calculations and Parameters in Tableau, Data Storytelling with Tableau

UNIT – V   OTHER TOOLS   9

Basics of Project Management, Using popular Tools to understand Project Interface and Basics, Task Scheduling and Dependencies, Resource Allocation and Tracking, Gantt Charts and Reporting, Tracking project progress and updates.

TOTAL: 45 PERIODS

 COURSE OUTCOMES:

➢ Appreciate the significance of Data Analytics in Business Decision making.

REFERENCES:

1. U Dinesh Kumar, "Business Analytics: The Science of Data-driven Decision Making",Wiley India, 2020.
2. Sanjiv Jaggia, Alison Kelly, Kevin Lertwachara and Leida Chen, Business Analytics. Tata McGraw Hill 2nd Edition,2023.
3. Anil Maheswari, Data Analytics, Anil Maheswari, 2nd Edition, McGraw Hill, 2023.
4. James R. Evans, "Business Analytics - Methods, Models and Decisions", Pearson Ed, 2012.

5. Manaranjan Pradhan, Dinesh Kumar, "Machine Learning using Python", Wiley, 2019
6. Wayne Winston (2017). Microsoft Excel 2016 Data Analysis and Business Modelling, 5th Edition
7. Uma Maheswari, Sujatha, "Introduction to Data Science: Practical approach with R and Python', Wiley, 2021.
8. "Learning Tableau", Joshua N. Milligan, Packt Publications, 2022.
9. "Practical Tableau", Ryan Sleeper, O'Reilly Media, Inc. 2018.
10. "Mastering Microsoft Power BI", Brett Powell

BN4102   **DATA MANAGEMENT AND DATA ENGINEERING**   **L T P C**
                                                                            3 0 0 3

OBJECTIVES:

- ➢ To understand the basics of Data Management.
- ➢ To Understand Big data and technologies behind Big data
- ➢ To Introduce the concepts of Cloud Computing and Key Data Mining Algorithms

UNIT – I   INTRODUCTION TO DATA MANAGEMENT   9
Database System Concepts – Database Architecture - Data model – Data Warehouse – Data Marts – Data Lake - Batch, Stream, and Micro-batch Processing - Concepts of ETL – SQL – The CAP Theorem - NOSQL Databases

UNIT – II   BIG DATA AND TECHNOLOGIES   9
What is Big Data? - Big Data Technologies Based on MapReduce and Hadoop - Hadoop Distributed File System (HDFS) – YARN– Case Study- Preventing Private Information Inference Attacks on Social Networks-Grand Challenge: Applying Regulatory Science and Big Data to Improve Innovation.

UNIT – III   CLOUD COMPUTING   9
Cloud Computing – Overview of Cloud Platforms - Detailed study of AWS Ecosystem - AWS Analytics Services - AWS Data Movement Services - AWS Predictive Analytics & Machine Learning Services – Amazon Redshift – Amazon EMR – Amazon MSK – Amazon Kinesis - AWS Serverless - AWS Lambda

UNIT – IV   DATA ENGINEERING AND GOVERNANCE   9
Key Data Mining Algorithms - Data Governance Tools – Data Stewardship, Data Quality, Master Data Management (MDM) - Data Security – Statistical Database Security – Flow Control - Encryption and Public Key Infrastructures.

UNIT - V   R LANGUAGE   9
Overview, Programming structures: Control statements -Operators -Functions -Environment and scope issues -Recursion -Replacement functions, R data structures: Vectors -Matrices and arrays -Lists -Data frames -Classes, Input/output, String manipulations.

                                                       TOTAL: 45 PERIODS

COURSE OUTCOMES:

- ➢ Appreciate the significance of Database Management Systems and understand computational software's and techniques for handling big data in business applications.

REFERENCES:
1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, Second Edition, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
3. Gardener, M. (2012). Beginning R: the statistical programming language. John Wiley & Sons.
4. Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. " O'Reilly Media, Inc.".
5. Kenneth C. Laudon and Jane P Laudon, Management Information Systems – Managing the Digital Firm, 15 th edition, 2018.
6. Panneerselvam. R, Database Management Systems, 3rd Edition, PHI Learning, 2018.

7. Norman Matloff, The Art of R Programming: A Tour of Statistical Software Design, No Starch Press, USA, 2011.

8. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge DataStreams with Advanced Analytics, John Wiley & sons, 2012.

9. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007.

BN4103   **FINANCIAL ACCOUNTING AND MANAGEMENT**   **L T P C**
                                                                  3 0 0 3
OBJECTIVE:

➢ To Acquire a reasonable knowledge in accounts analysis and evaluate financial statements
➢ To Understand the operational nuances of a Finance Manager.
➢ To Comprehend the technique of making decisions related to finance functions.

UNIT- I   FINANCIAL ACCOUNTING   9
Introduction to Financial, Cost and Management Accounting–Generally accepted accounting principles–Double Entry System–Preparation of Journal, Ledger and Trial Balance, Preparation of Final Accounts: Trading, Profit and Loss Account and Balance Sheet - Reading the financial statements

UNIT- II   ANALYSIS OF FINANCIAL STATEMENTS   9
Financial ratio analysis, Interpretation of ratio for financial decisions – Dupont Ratios — comparative statements - common size statements. Cash flow (as per Accounting Standard 3) and Funds flow statement analysis–Trend Analysis – Financial modeling

UNIT- III   FINANCING AND DIVIDEND DECISION   9
Introduction of Finance – nature and scope of finance functions – Indian Capital Market – New issues of market – Secondary market – sources of long-term finance

Leverages - Operating and Financial leverage – measurement of leverages – degree of Operating & Financial leverage – Combined leverage, EBIT – EPS Analysis- Indifference point - Determinants of Capital structure.
Dividend decision – Issues in dividend decisions, Importance – Factors determining dividend policy – Types of dividend policies – forms of dividend.

UNIT- IV   INVESTMENT DECISIONS   9
Capital Budgeting: Principles and techniques - Nature of capital budgeting- Identifying relevant cash flows - Evaluation Techniques: Payback, Accounting rate of return, Net Present Value, Internal Rate of Return, Profitability Index - Comparison of DCF techniques - Concept and measurement of cost of capital - Specific cost and overall cost of capital.

UNIT- V   WORKING CAPITAL MANAGEMENT   9
Principles of working capital: Concepts, Needs, Determinants, issues and estimation of working capital - Receivables Management – Inventory management — Cash management – Working capital finance: Commercial paper, Company deposit, Trade credit, Bank finance.

                                                        TOTAL: 45 PERIODS
COURSE OUTCOMES:

➢ A thorough grounding of financial accounting concepts
➢ Preparation of financial statement analysis
➢ Understand the finance function of an organization
➢ Acquire the knowledge on Financial decision making process

REFERENCES:
1. R. Narayanaswamy, Financial Accounting, PHI, sixth edition,2017.
2. T.S.Reddy & A.Murthy, Financial Accounting, Margham Publications,2014
3. Earl K. Stice & James D.Stice, Financial Accounting, Reporting and Analysis, 8th edition, Cengage Learning, 2015.
4. Ashish K.Battacharya, Introduction to Financial Statement Analysis, Elsiever, 2012.
5. M. Pandey Financial Management, Vikas Publishing House Pvt. Ltd., 11th edition, 2018
6. M.Y. Khan and P.K.Jain Financial management, Text, Problems and cases Tata McGraw Hill 8th edition, 2017.
7. Prasanna Chandra, Financial Management, 9th edition, Tata McGraw Hill, 2017.

BA4112   **BUSINESS COMMUNICATION (LABORATORY)**   **L T P C**
                                                                           0 0 4 2

OBJECTIVES:

➢ To help the students to acquire some of the necessary skills to handle day-to-day managerial responsibilities, such as - making speeches, controlling one-to-one communication, enriching group activities and processes, giving effective presentations, writing letters, memos, minutes, reports and advertising, and maintaining one's poise in private and in public.

UNIT- I   **INTRODUCTION AND TYPES OF BUSINESS COMMUNICATION**   **12**
Introduction to Business Communication: Principles of effective communication, Target group profile, Barriers of Communication, Reading Skills, Listening, Feedback. - Principles of Nonverbal Communication: Professional dressing and body language. Role Playing, Debates and Quiz. Types of managerial speeches - Presentations and Extempore - speech of introduction, speech of thanks, occasional speech, theme speech. - Group communication: Meetings, group discussions. - Other Aspects of Communication: Cross Cultural Dimensions of Business Communication Technology and Communication, Ethical & Legal Issues in Business Communication.

UNIT- II   **BUSINESS COMMUNICATION WRITING MODELS AND TOOLS**   **12**
Business letters, Routine letters, Bad news and persuasion letters, sales letters, collection letters, Maintaining a Diary, Resume/CV , job application letters, proposals. Internal communication through - notices, circulars, memos, agenda and minutes, reports. Case Studies. Exercises on Corporate Writing, Executive Summary of Documents, Creative Writing, Poster Making, Framing Advertisements, Slogans, Captions, Preparing Press Release and Press Notes

UNIT- III   **EFFECTIVE PRESENTATIONS**   **12**
Principles of Effective Presentations, Principles governing the use of audiovisual media.

UNIT- IV   **INTERVIEW SKILLS**   **12**
Mastering the art of giving interviews in - selection or placement interviews, discipline interviews, appraisal interviews, exit interviews, web /video conferencing, tele-meeting.

UNIT- V   **REPORT WRITING**   **12**
Objectives of report, types of report, Report Planning, Types of Reports, Developing an outline, Nature of Headings, Ordering of Points, Logical Sequencing, Graphs, Charts, Executive Summary, List of Illustration, Report Writing.

Note: The emphasis of the entire subject should be on practical aspects.

Practical - Module 1-This module introduces both written and spoken communication skills to students to build their confidence in delivering clear and logical messages to their audience. They will develop written communication skills through crafting business messages such as business letters, emails, and meeting minutes. In addition, students will work through presentations and simulated meetings to refine their spoken communication skills, discussion techniques and people skills.

Practical - Module 2-This module builds on the foundation of Business Communication 1 and creates opportunities for students to strengthen their oral and written communication. Students will be required to enhance their presentation skills through impromptu speeches. Students will also learn how to prepare a formal business report. Job hunting and employment skills will be introduced to prepare students for a positive start to their careers. Students will be taught to write application letters and resumes. Additionally, students will learn job interview techniques through role-plays and simulations

Practical - Module 3-This practical module aims to help students be persuasive in the business world. Students will learn listening and data gathering skills to better understand their target

audience's needs and requirements and persuasive skills to convince the audience to accept a new policy/suggestion/product through role-playing a boardroom presentation. Students will also be taught business networking skills including conversation techniques, dining etiquette and personal branding through role-plays and simulations.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

- Develop good managerial communication skills
- Ability to excel in different forms of written communication required in a business context
- Develop good presentation skills
- In-depth understanding of interview skills
- Ability to prepare Business reports

REFERENCES :
1. Rajendra Pal, J.S. Korlahalli ,Essentials of Business Communication by, Sultan Chand &Sons, 13th Edition
2. Meenakshi Raman, Prakash Singh ,Business Communication by, Oxford, 2 nd edition,2012
3. Raymond V. Lesikar, Flatley, Basic Business Communication Skills for Empowering the Internet Generation by, M.E., TMGH , New Delhi , 10 th edition, 2004
4. Ludlow R , Panton ,The Essence of Effective Communications , Prentice Hall of India Pvt. Ltd.2, 1995
5. C. S. Rayadu , Communication by, HPH, 2015
6. R. C. Sharma , Krishna Mohan ,Business Correspondence & Report Writing , Tata McGraw Hill,5th Edition, 2017
7. Malcolm Goodale , Developing Communication Skills, 2nd Edition Professional Presentations,Cambridge University Press
8. Supplementary Reading Material Business Communication - Harvard Business EssentialsSeries, HBS Press
9. Adair, J , Effective Communication. , Pan Macmillan Excellence in Business Communication by Thill, J. V. &Bovee, G. L, McGraw Hill, New York. Business Communications: From Process to Product by Bowman, J.P. & Branchaw, P.P., Dryden Press, Chicago.

WEBSITES :
www.businesscommunicationskills.
comwww.kcitraining.com
www.mindtools.com
www.businesscmmunication.org

DATA SCIENCE TOOLS – I (LABORATORY) **L T P C**
0 0 4 2

COURSE DESCRIPTION:

This course introduces students to the fundamentals of business analytics with a focus on using spreadsheets for data analysis. Students will learn how to collect, clean, analyze, and visualize data to make informed business decisions. Topics include data manipulation, descriptive and inferential statistics, predictive modeling, and data visualization techniques.

OBJECTIVE:

- To Understand the role of business analytics in decision-making processes.
- To Learn how to collect, clean, and manipulate data using spreadsheets.
- To Apply descriptive and inferential statistical techniques to analyze data.
- To Build predictive models using regression analysis and other techniques.
- To Create data visualizations to effectively communicate insights.

DATA MANIPULATION USING SPREAD SHEET 5

Sorting and filtering data, Formulas and functions for data manipulation, PivotTables and Pivot Charts for data summarization.

DESCRIPTIVE STATISTICS 10

Descriptive Statistics - Measures of central tendency and variability, Frequency distributions and histograms, Summary statistics in Excel.
Inferential Statistics - Analysis of variance (ANOVA). Chi square test - Regression Analysis – Understanding regression analysis, Simple linear regression, Multiple linear regression.

DATA VISUALIZATION 15

Getting Started with Tableau, Dimensions vs. Measures, Discrete vs Continuous, Application of Discrete and Continuous Fields, Aggregation in Tableau.
Working with Metadata, Filters in Tableau, Applying Analytics to the worksheet, Dashboard in Tableau, Modifications to Data Connections, Edit Data Source, Unions, Joins Data blending.

DATA VISUALIZATION PLATFORMS 15

Introduction – Working with data – Importing from flat files, excel files, other Sources, Data Source, Loading Data , Views in Desktop, Query Editing, Transform, Clean, Shape, and Model Data Manage Data Relationship, editing a Relationship, Cross Filter Direction, Saving Work file Measures. Data Analysis Expressions – Introduction to Power Query – Introduction to Power View – Power View visualizations – Power View filtering options – Introduction to Power Map – Preparing geospatial data – Publish from data visualizations platforms – Publish Dashboard to Web.

INTRODUCTION TO BUSINESS ANALYTICS AND PYTHON 15

Overview of business analytics and its applications. Introduction to Python for data analysis. Setting up Python environment (Anaconda, Jupyter Notebooks).
Introduction to python variable declaration, Keywords, Indents in Python, Python input/output operations, Python's Built-in Data types, Conditional Statements & Loop Conditional Statements, Function in python, File Processing.
Modules - Concept of modularization, Importance of modules in python, Importing modules, Built in modules (ex: Numpy)

TOTAL : 60 PERIODS

COURSE OUTCOMES:

➢ Basic understanding of spreadsheets and familiarity with data visualization using PowerBI

REFERENCES:

1. Bharti Motwani, Data Analysis using Phython, 2020, Wiley Publications.

2. Jack A. Hyman, Microsoft Power BI For Dummies, 2023, Wiley Publications

3. David R. Anderson, et al, "An Introduction to Management Sciences: Quantitative approaches toDecision Making", (13th edition) South-Western College Pub, 2011.

4. William J. Stevenson, Ceyhun Ozgur, "Introduction to Management Science with Spreadsheet", TataMcGraw Hill, 2009.

5. Hansa Lysander Manohar, "Data Analysis and Business Modelling using Microsoft Excel" PHI,2017.

6. David M. Levine et al, "Statistics for Managers using MS Excel" (6th Edition) Pearson,2010.

7. Minnick, C. WebKit for Dummies. John Wiley & Sons, (2012).

BA4203   **HUMAN RESOURCE MANAGEMENT**   **L T P C**

                                                                          3 0 0 3

COURSE OBJECTIVE:
➢ To provide knowledge about management issues related to staffing, training, performance, compensation, human factors consideration and compliance with human resource requirements.

UNIT I   PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT   9
Evolution of human resource management – The importance of the human capital –Role of human resource manager –Challenges for human resource managers - trends in Human resource policies – Computer applications in human resource management – Human resource accounting and audit.

UNIT II   HUMAN RESOURCE PLANNING AND RECRUITMENT   9
Importance of Human Resource Planning ─ Forecasting human resource requirement – matching supply and demand - Internal and External sources- Organizational Attraction-. Recruitment, Selection, Induction and Socialization- Theories, Methods and Process.

UNIT III   TRAINING AND DEVELOPMENT   9
Types of training methods –purpose- benefits- resistance. Executive development programme – Common practices - Benefits – Self development – Knowledge management.

UNIT IV   EMPLOYEE ENGAGEMENT   9
Compensation plan ─ Reward ─ Motivation ─ Application of theories of motivation – Career management – Mentoring - Development of mentor – Protégé relationships- Job Satisfaction, Employee Engagement, Organizational Citizenship Behavior: Theories, Models.

UNIT V   PERFORMANCE EVALUATION AND CONTROL   9
Method of performance evaluation – Feedback – Industry practices. Promotion, Demotion, Transfer and Separation – Implication of job change. The control process – Importance – Methods – Requirement of effective control systems grievances – Causes – Implications – Redressal methods.

                                                            TOTAL: 45 PERIODS

COURSE OUTCOMES:
1. Students would have gained knowledge on the various aspects of HRM
2. Students will gain knowledge needed for success as a human resources professional.
3. Students will develop the skills needed for a successful HR manager
4. Students would be prepared to implement the concepts learned in the workplace.
5. Students would be aware of the emerging concepts in the field of HRM

REFERENCES :

1. Gary Dessler and Biju Varkkey, Human Resource Management, 14th Edition, Pearson   Education Limited, 2015.
2. David A. Decenzo, Stephen.P.Robbins, and Susan L. Verhulst, Human Resource Management, Wiley, International Student Edition, 11th Edition, 2014.
3. Luis R.Gomez-Mejia, David B.Balkin, Robert L Cardy. Managing Human Resource. PHI Learning. 2012
4. Bernadin , Human Resource Management ,Tata Mcgraw Hill ,8th edition 2012.
5. Wayne Cascio, Managing Human Resource, McGraw Hill, 2015.
6. Ivancevich, Human Resource Management, McGraw Hill 2012.
7. Uday Kumar Haldar, Juthika Sarkar. Human Resource management. Oxford. 2012

COURSE OBJECTIVES:
- ➢ To understand the changing business environment and the fundamental premise underlying market driven strategies.
- ➢ To identify the indicators of management thoughts and practices.

UNIT I   INTRODUCTION   9

Defining Marketing − Core concepts in Marketing — Evolution of Marketing − Marketing Planning Process − Scanning Business environment: Internal and External − Value chain − Core Competencies
– PESTEL − SWOT Analysis − Marketing interface with other functional areas – Production, Finance, Human Relations Management, Information System − Marketing in global environment – International Marketing − Rural Marketing − Prospects and Challenges.

UNIT II   MARKETING STRATEGY   9

Marketing strategy formulations — Key Drivers of Marketing Strategies - Strategies for Industrial Marketing – Consumer Marketing − Services marketing – Competition Analysis − Analysis of consumer and industrial markets − Influence of Economic and Behavioral Factors − Strategic Marketing Mix components.

UNIT III   MARKETING MIX DECISIONS   9

Product planning and development – Product life cycle – New product Development and Management – Defining Market Segmentation – Targeting and Positioning − Brand Positioning and Differentiation – Channel Management – Managing Integrated Marketing Channels − Managing Retailing, Wholesaling and Logistics − Advertising and Sales Promotions – Pricing Objectives, Policies and Methods

UNIT IV   BUYER BEHAVIOUR   9

Understanding Industrial and Consumer Buyer Behavior − Influencing factors – Buyer Behaviour Models – Online buyer behaviour − Building and measuring customer satisfaction – Customer relationships management – Customer acquisition, Retaining, Defection − Creating Long Term Loyalty Relationships.

UNIT V   MARKETING RESEARCH & TRENDS IN MARKETING   9

Marketing Information System – Marketing Research Process – Concepts and applications: Product –Advertising – Promotion – Consumer Behaviour – Retail research – Customer driven organizations - Cause related marketing − Ethics in marketing – Online marketing trends - social media and digital marketing

TOTAL: 45 PERIODS

COURSE OUTCOMES:
1. Applied knowledge of contemporary marketing theories to the demands of business and management practice.
2. Enhanced knowledge of marketing strategies for consumer and industrial marketing
3. Deep understanding of choice of marketing mix elements and managing integrated marketing channels
4. Ability to analyze the nature of consumer buying behaviour
5. Understanding of the marketing research and new trends in the arena of marketing

REFERENCES:
1. Philip T. Kotler and Kevin Lane Keller, Marketing Management, Prentice Hall India, 15th Edition, 2017.
2. KS Chandrasekar, "Marketing management-Text and Cases", Tata McGraw Hill Education, 2012
3. Lamb, Hair, Sharma, Mc Daniel– Marketing – An Innovative approach to learning and teaching-A south Asian perspective, Cengage Learning, 2012.
4. Paul Baines, Chris Fill, Kelly Page, Marketing, Asian edition, Oxford University Press,5 th edition, 2019.
5. Ramasamy, V.S, Namakumari, S, Marketing Management: Global Perspective Indian Context, Macmillan Education, New Delhi, 6 th edition, 2018.
6. A. NAG, Marketing successfully- A Professional Perspective, Macmillan 2008.
7. Micheal R.Czinkota, Masaaki Kotabe, Marketing Management, Vikas Thomson Learning, 2nd edition 2006.
8. Philip Kotler , Gay Armstrong, Prafulla Agnihotri, Principles of marketing, 7 th edition, 2018.

BA4204	OPERATIONS MANAGEMENT	L T P C
		3 0 0 3

COURSE OBJECTIVE:

➢ To provide a broad introduction to the field of operations management and explain the concepts, strategies, tools and techniques for managing the transformation process that can lead to competitive advantage.

UNIT I   INTRODUCTION TO OPERATIONS MANAGEMENT   9

Operations Management — Nature, Importance, historical development, transformation processes, differences between services and goods, a system perspective, functions, challenges, current priorities, recent trends. Operations Strategy – Strategic fit , framework. Productivity; World-class manufacturing practices

UNIT II   OPERATIONS AND THE VALUE CHAIN   9

Capacity Planning – Long range, Types, Developing capacity alternatives, tools for capacity planning. Facility Location – Theories, Steps in Selection, Location Models. Sourcing and procurement - Strategic sourcing, make or buy decision, procurement process, managing vendors.

UNIT III   DESIGNING OPERATIONS   9

Product Design - Criteria, Approaches. Product development process - stage-gate approach - tools for efficient development. Process - design, strategy, types, analysis. Facility Layout – Principles, Types, Planning tools and techniques.

UNIT IV   PLANNING AND CONTROL OF OPERATIONS   9

Demand Forecasting — Need, Types, Objectives and Steps - Overview of Qualitative and Quantitative methods. Operations planning - Resource planning - Inventory Planning and Control. Operations Scheduling - Theory of constraints - bottlenecks, capacity constrained resources, synchronous manufacturing

UNIT V   QUALITY MANAGEMENT   9

Definitions of quality, The Quality revolution, quality gurus; TQM philosophies; Quality management tools, certification and awards. Lean Management - philosophy, elements of JIT manufacturing, continuous improvement. Six sigma.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
1. Understanding of the evolution of operations management practices and world class manufacturing processes
2. Knowledge about capacity planning, strategic sourcing and procurement in organizations
3. Enhances the understanding of product development and design process
4. Ability to forecast demand and overcome bottlenecks
5. Provides insight to Quality management tools and practices.

REFERENCES:

1. Richard B. Chase, Ravi Shankar, F. Robert Jacobs, Operations and Supply Chain Management, McGraw Hill Education (India) Pvt. Ltd, 14th Edition, 2014.
2. Mahadevan B, Operations management: Theory and practice. Pearson Education India; 2015.
3. William J Stevenson, Operations Management, Tata McGraw Hill, 9th Edition, 2009.
4. Russel and Taylor, Operations Management, Wiley, 5th Edition, 2006.
5. Norman Gaither and Gregory Frazier, Operations Management, South Western Cengage Learning,9 th edition, 2015.
6. Cecil C. Bozarth, Robert B. Handfield, Introduction to Operations and Supply Chain Management, Pearson, 4th Edition, 2016.
7. Panneerselvam. R, Production and Operations Management, 3rd Edition,. PHI Learning, 2012.

BN4201	**PREDICTIVE MODELING FOR BUSINESS**	**L T P C**
		3 0 0 3

OBJECTIVE:

 ➢ To equip students in understanding the basic concepts of Predictive analytics
 ➢ To familiarize students with various predictive modeling techniques.

UNIT – I   INTRODUCTION TO PREDICTIVE ANALYTICS AND BASIC CONCEPTS   9

Introduction -Overview of Analytics and Predictive Analytics - Applications of Predictive Analytics in Business - Predictive Analytics Software (e.g., R, Python, SAS)- Supervised and Unsupervised Learning - Overview of Learning Types: Supervised vs. Unsupervised Introduction to Regression Models - Introduction to Classification Models - Basic Statistical Tools for Prediction - Descriptive Statistics, Inferential Statistics, Basic Statistical Techniques for Predictive Modeling

UNIT – II   REGRESSION AND CLASSIFICATION MODELS   9

Regression Analysis - Simple and Multiple Regression, Iterative Regression Techniques - Classification Models - K-Nearest Neighbors (KNN) - Evaluation Techniques for Classification (Confusion Matrix, ROC Curve) - Model Evaluation & Validation - Metrics for Model Evaluation: MSE, Accuracy, Precision, Recall - Techniques for Model Validation

UNIT – III   ADVANCED CLASSIFICATION TECHNIQUES AND ENSEMBLE METHODS   9

Ensemble Models - Overview of Ensemble Learning- Bagging and Boosting Techniques Bootstrapping - Introduction to Bootstrapping - Applications and Method- Advanced Classification Techniques - In-depth Study of Advanced Classification Models

UNIT – IV   CLUSTERING AND ASSOCIATION MODELS   9

Clustering Techniques - Introduction to Clustering - K-Means Clustering, Hierarchical Clustering - Association Models - Association Rules, Market Basket Analysis, Algorithms for Association Rules (e.g., Apriori, FP-Growth)

UNIT – V   NEURAL NETWORKS AND DEEP LEARNING   9

Introduction to Neural Networks - Basics of Neural Networks, Multi-Layer Perceptrons (MLP) - Introduction to Deep Learning - Overview of Deep Learning, Basic Deep Learning Architectures - Applications of Deep Learning - Use Cases and Real-world Applications, Tools and Libraries for Deep Learning (e.g., Tensor Flow, Keras) - Review and Case studies, Comprehensive Review of Key Concepts - Case Studies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

 ➢ Gain sufficient knowledge in Predictive modeling techniques and its usefulness in Business Analytics.

REFERENCES:

1. Dursun Delen, "Predictive Analytics: Data Mining, Machine Learning and Data Science for Practitioners", 2nd Edition, 2020 Pearson FT Press
2. "The Elements of Statistical Learning" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman, 2009, Springer Series
3. "Statistical Methods for Business and Economics" by David R. Anderson, West Publishing
4. "Applied Regression Analysis and Generalized Linear Models" by John Fox, 2015, Sage Publications.
5. "Data Mining: Practical Machine Learning Tools and Techniques" by Ian H. Witten, Eibe Frank, and Mark A. Hall, 2011, Elsevier.
6. "Pattern Recognition and Machine Learning" by Christopher M. Bishop, 2006, Springer.
7. "Neural Networks and Deep Learning" by Michael Nielsen, Determination Press, 2015
8. "Ensemble Methods in Machine Learning" by Zhi-Hua Zhou, Chapman and Hall/CRC, 2012.
9. "Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville, Taylor and Francis.
10. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron, O'Reilly Media, Inc.", 2019.

BA4205   **BUSINESS RESEARCH METHODS**   **L T P C**
                                                                               3 0 0 3

COURSE OBJECTIVE:
➢ To make the students of tourism understand the principles of scientific methodology in business enquiry, develop analytical skills of business research and to prepare scientific business reports.

UNIT I   INTRODUCTION   9
Business Research – Definition and Significance – the research process – Types of Research – Exploratory and causal Research – Theoretical and empirical Research – Cross –Sectional and time – series Research – Research questions / Problems – Research objectives – Research hypotheses – characteristics – Research in an evolutionary perspective – the role of theory in research.

UNIT II   RESEARCH DESIGN AND MEASUREMENT   9
Research design – Definition – types of research design – exploratory and causal research design –Descriptive and experimental design – different types of experimental design – Validity of findings –internal and external validity – Variables in Research – Measurement and scaling – Different scales –Construction of instrument – Validity and Reliability of instrument.

UNIT III   DATA COLLECTION   9
Types of data – Primary Vs Secondary data – Methods of primary data collection – Survey Vs Observation – Experiments – Construction of questionnaire and instrument – Types of Validity – Sampling plan – Sample size – determinants optimal sample size – sampling techniques – Sampling methods.

UNIT IV   DATA PREPARATION AND ANALYSIS   9
Data Preparation – editing – Coding –Data entry – Validity of data – Qualitative Vs Quantitative data analyses – Applications of Bivariate and Multivariate statistical techniques, Factor analysis, Discriminant analysis, Cluster analysis, Multiple regression and Correlation, Multidimensional scaling – Conjoint Analysis – Application of statistical software for data analysis.

UNIT V   REPORT DESIGN, WRITING AND ETHICS IN BUSINESS RESEARCH   9
Research report –Types – Contents of report – need for executive summary – chapterization – contents of chapter – report writing – the role of audience – readability – comprehension – tone – final proof – report format – title of the report – ethics in research – Ethics in research – Subjectivity and Objectivity in research.

                                                                     TOTAL : 45 PERIODS

COURSE OUTCOMES :

1. Students will understand and appreciate scientific inquiry

2. Students would know to write research proposals

3. The students would be able to undertake a systematic outlook towards business situations for the purpose of objective decision making, and the method of conducting scientific inquiry to solve organizational problems

4. Students would be able to analyze data and find solutions to the problems.

5. Students could prepare research reports

REFERENCES:

1. Donald R. Cooper, Pamela S. Schindler and J K Sharma, Business Research methods, 11thEdition, Tata Mc Graw Hill, New Delhi, 2012.
2. Alan Bryman and Emma Bell, Business Research methods, 3rd Edition, Oxford University Press,New Delhi, 2011.
3. Uma Sekaran and Roger Bougie, Research methods for Business, 5th Edition, Wiley India, NewDelhi, 2012.
4. William G Zikmund, Barry J Babin, Jon C.Carr, AtanuAdhikari,Mitch Griffin, Business Researchmethods, A South Asian Perspective, 8th Edition, Cengage Learning, New Delhi, 2012.
5. Panneerselvam. R, Research Methodology, 2nd Edition, PHI Learning, 2014.

BA4201   **QUANTITATIVE TECHNIQUES FOR DECISION MAKING**   **L T P C**
                                                                       3 0 0 3

COURSE OBJECTIVE:
➢ To apply quantitative techniques in modeling and solving business related problems.

UNIT I   INTRODUCTION TO LINEAR PROGRAMMING (LP)   9
Relevance of quantitative techniques in management decision making. Linear Programming-formulation, solution by graphical and simplex methods (Primal - Penalty, Two Phase), Special cases. Sensitivity Analysis.

UNIT II   LINEAR PROGRAMMING EXTENSIONS   9
Transportation Models (Minimising and Maximising Problems) – Balanced and unbalanced Problems – Initial Basic feasible solution by N-W Corner Rule, Least cost and Vogel's approximation methods. Check for optimality. Solution by MODI / Stepping Stone method. Case of Degeneracy. Transshipment Models.

Assignment Models (Minimising and Maximising Problems) — Balanced and Unbalanced Problems. Solution by Hungarian and Branch and Bound Algorithms. Travelling Salesman problem. Crew Assignment Models.

UNIT III   DECISION AND GAME THEORIES   9
Decision making under risk – Decision trees – Decision making under uncertainty.

Game Theory-Two-person Zero sum games-Saddle point, Dominance Rule, Convex Linear Combination (Averages), methods of matrices, graphical and LP solutions.

UNIT IV   INVENTORY AND REPLACEMENT MODELS   9
Inventory Models – EOQ and EBQ Models (With and without shortages), Quantity Discount Models.

Replacement Models-Individual replacement Models (With and without time value of money) – Group Replacement Models.

UNIT V   QUEUING THEORY AND SIMULATION   9
Queuing Theory - single and multi-channel models – infinite number of customers and infinite calling source.

Monte Carlo simulation – use of random numbers, application of simulation techniques

                                                                    TOTAL: 45 PERIODS
COURSE OUTCOMES:

 To understand the applications of

1. Linear programming in product mix decisions
2. Transportation and assignment in logistics and job allocation scenarios
3. Game theory and heuristics of decision making in real time decisions
4. Inventory management and replacement models in manufacturing context
5. Queuing and simulation in real time scenario optimisation

REFERENCES:

1. N. D Vohra, Quantitative Techniques in Management, Tata Mcgraw Hill, 2010.
2. G. Srinivasan, Operations Research – Principles and Applications, 2nd edition, PHI, 2011.
3. Paneerselvam R., Operations Research, Prentice Hall of India, Fourth Print, 2008.
4. Hamdy A Taha, Introduction to Operations Research, Prentice Hall India, Tenth Edition, ThirdIndian Reprint 2019.
5. Bernard W.Taylor III, Introduction to Management Science, 9th Edition, Pearson Ed.
6. Frederick & Mark Hillier, Introduction to Management Science – A Modeling and case studiesapproach with spreadsheets, Tata Mcgraw Hill, 2010.
7. Nagraj B, Barry R and Ralph M. S Jr., Managerial Decision Modelling with Spreadsheets, SecondEdition, 2007, Pearson Education.

BA4032   **ENTREPRENEURSHIP DEVELOPMENT**   **L T P C**

COURSE OBJECTIVES:
- To equip and develop the learners entrepreneurial skills and qualities essential to undertake business.
- To impart the learners entrepreneurial competencies needed for managing business efficiently and effectively.

UNIT I   ENTREPRENEURAL COMPETENCE   9
Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality -Characteristics of Successful Entrepreneurs – Knowledge and Skills of an Entrepreneur.

UNIT II   ENTREPRENEURAL ENVIRONMENT   9
Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organisational Services - Central and State Government Industrial Policies and Regulations.

UNIT III   BUSINESS PLAN PREPARATION   9
Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital Budgeting- Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT IV   LAUNCHING OF SMALL BUSINESS   9
Finance and Human Resource Mobilisation - Operations Planning - Market and Channel Selection -Growth Strategies - Product Launching – Incubation, Venture capital, Start-ups.

UNIT V   MANAGEMENT OF SMALL BUSINESS   9
Monitoring and Evaluation of Business - Business Sickness - Prevention and Rehabilitation of Business Units - Effective Management of small Business - Case Studies.

                                                        TOTAL : 45 PERIODS

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

1. The learners will gain entrepreneurial competence to run the business efficiently.

2. The learners are able to undertake businesses in the entrepreneurial environment

3. The learners are capable of preparing business plans and undertake feasible projects.

4. The learners are efficient in launching and develop their business ventures successfully

5. The learners shall monitor the business effectively towards growth and development..

REFERENCES:
1. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2016.
2. R.D.Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2018.
3. Rajeev Roy ,Entrepreneurship, Oxford University Press, 2nd Edition, 2011.
4. Donald F Kuratko,T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning, 2012.

5. Dr. Vasant Desai, "Small Scale Industries and Entrepreneurship", HPH,2006.
6. Arya Kumar. Entrepreneurship, Pearson,2012.
7. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, TataMcGraw-Hill, 8 th edition ,2017.

BN4211   **DATA SCIENCE TOOLS – II (LABORATORY)**   **L T P C**
                                                                                  0 0 4 2

COURSE DESCRIPTION:

This course introduces students to the fundamentals of business analytics with a focus on using Python for data analysis. Students will learn how to collect, clean, analyze, and visualize data to make informed business decisions. Topics include data manipulation, descriptive and inferential statistics, predictive modeling, and data visualization techniques using Python libraries such as Pandas, NumPy, Matplotlib, and Scikit-learn.

OBJECTIVES:
- ➢ To Understand the role of business analytics in decision-making processes.
- ➢ To Learn how to collect, clean, and manipulate data using Python.
- ➢ To Apply descriptive and inferential statistical techniques to analyze data.
- ➢ To Build predictive models using machine learning algorithms.
- ➢ To Create data visualizations to effectively communicate insights using Python libraries.

Introduction to Python for data analysis   12

Setting up Python environment (Anaconda, Jupyter Notebooks). Data Manipulation with Pandas : Introduction to Pandas library for data manipulation. , Working with Series and Data Frames., Data cleaning and preprocessing techniques.

Descriptive Statistics with NumPy   12

Introduction to NumPy library for numerical computing. Calculating descriptive statistics (mean, median, variance, etc.). Exploring data distributions. Data Visualization with Matplotlib, Introduction to Matplotlib library for data visualization. Creating line plots, scatter plots, histograms, and bar charts. Customizing plot aesthetics and adding annotations.

Inferential Statistics   12

Hypothesis testing with Python (t-tests, chi-square tests). Confidence intervals and hypothesis testing for proportions. Introduction to ANOVA for comparing means across groups. Predictive Modeling with Scikit-learn, Introduction to machine learning with Scikit-learn. ,Building and evaluating predictive models (linear regression, logistic regression). Model selection and hyper parameter tuning.

Advanced Predictive Modeling   12

Introduction to decision trees and ensemble methods (Random Forest,Gradient Boosting). Evaluating model performance (cross – validation, ROC curves, AUC)., Introduction to feature engineering and selection.

Time Series Analysis   12

Introduction to time series data., Exploratory data analysis for time series. Building time series forecasting models (ARIMA, Exponential Smoothing). Real-world case studies applying business analytics techniques with Python.

LIST OF EXERCISES:

Data Manipulation with Pandas:
Load a dataset into a Pandas Data Frame and inspect its structure.
Perform basic data manipulation tasks such as selecting columns, filtering rows, and sorting data.
Handle missing values by imputing or removing them from the dataset.

Descriptive Statistics with NumPy:
Calculate descriptive statistics (mean, median, mode, variance, standard deviation) for numerical variables using NumPy.
Explore data distributions and visualize them using histograms or density plots.

Data Visualization with Matplotlib:
Create basic line plots, scatter plots, and bar charts to visualize relationships between variables.
Customize plot aesthetics such as colors, labels, and titles.
Generate subplots and combine multiple plots into a single figure.

Inferential Statistics with SciPy:
Conduct hypothesis testing (t-tests, chi-square tests) to make inferences about population parameters.
Calculate confidence intervals to estimate the range of plausible values for a population parameter.
Perform correlation analysis to explore relationships between variables.

Predictive Modeling with Scikit-learn:
Split the dataset into training and testing sets for model evaluation.
Build and evaluate predictive models using linear regression, logistic regression, and decision trees.
Apply cross-validation techniques to assess model performance and generalization.

Feature Engineering and Selection:
Create new features by transforming existing variables (e.g., polynomial features, logarithmic transformations).
Select relevant features using techniques such as correlation analysis, feature importance, or recursive feature elimination.

Time Series Analysis:
Convert a dataset into a time series format and visualize temporal patterns.
Apply time series decomposition to separate trend, seasonality, and noise components.
Build and evaluate time series forecasting models (e.g., ARIMA, Exponential Smoothing).

Clustering Analysis with Scikit-learn:
Explore unsupervised learning techniques such as K-means clustering to identify natural groupings in the data.
Visualize clustering results using scatter plots or heat maps.
Evaluate clustering performance using metrics such as silhouette score or Davies – Bouldin index.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

➢ Basic understanding of Python programming language and fundamental statistical concepts.

REFERENCES:

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd Edition, O'Reilly Publishers, 2016.
2. Karl Beecher, "Computational Thinking: A Beginner's Guide to Problem Solving and Programming", 1st Edition, BCS Learning & Development Limited, 2017.
3. Paul Deitel and Harvey Deitel, "Python for Programmers", Pearson Education, 1st Edition, 2021.
4. G.Venkatesh and Madhavan Mukund, "Computational Thinking: A Primer for Programmersand Data Scientists", 1st Edition, Notion Press, 2021.
5. John V Guttag, "Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data", Third Edition, MIT Press,2021.
6. Eric Matthes, "Python Crash Course, A Hands – on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019.

SOCIAL MEDIA CONTENT CREATION (LABORATORY) **L T P C**
0 0 4 2

COURSE DESCRIPTION:

This course provides a comprehensive overview of social media content creation, including strategies for developing engaging content, understanding different platforms, and utilizing tools and techniques for maximum impact. Students will learn how to create, manage, and analyze content across various social media channels.

OBJECTIVE:
➢ To Develop skills to create engaging and relevant content for various social media platforms.
➢ To Learn to use tools and analytics to measure the success of social media campaigns.
➢ To Build a social media strategy tailored to specific goals and audiences.

INTRODUCTION TO SOCIAL MEDIA : **12**
Overview of major social media platforms (Facebook, Instagram, Twitter, LinkedIn, TikTok, etc.) Importance of social media in modern marketing - Understanding audience demographics and behaviors

CONTENT STRATEGY, PLANNING, TYPES AND FORMATS: **12**
Defining content goals and objectives - Creating a content calendar - Identifying target audience and personas- Developing a brand voice and style guide.

Content Types and Formats - Understanding different content types (text, images, videos, stories, live streams, etc.) Best practices for each content type - Using multimedia to enhance engagement Writing for Social Media - Crafting compelling headlines and captions - Writing for different platforms - SEO and keyword strategies for social media.

VISUAL CONTENT CREATION USING CANVA **12**
Basics of graphic design - Tools for creating visual content (Canva, Adobe Spark, etc.) - Canva Introduction, Canva Pro & Free , Beginner Canva Hacks , Master Your Canva Workflow.

CANVA FOR SOCIAL MEDIA **12**
Inspirational Quote Graphics , Interactive Instagram Stories, Post Your Instagram Stories , Master Transparent Backgrounds , Create Instagram Highlights, Add Highlights to Your Profile , Captivating Carousels , GIFs & Memes ,Turn Yourself Into a GIF, Easy Instagram Reels , Plan Your Grid in Canva , GIFs & Memes , Easy Instagram Reels , Facebook Banners , LinkedIn Cover Story & Banner , YouTube Channel Banner , Clickable YouTube Thumbnails , Animated YouTube End Screens , YouTube Intro Video Social Media Video Ads Advanced Reel Tricks.

CANVA FOR BUSINESS **12**
Design Amazing eBooks ,Clickable & Fillable PDFs , Compress Images & PDFs, Impressive Business Cards , Animate Your Email Signature Powerful Presentations, Design a Simple Website , Make Stunning Mockups ,Add Flair to Your Desktop , Tips for creating eye-catching visuals

Practical Exercises:

Video Content Creation: Basics of video production, Tools for creating and editing videos
Best practices for live streaming , Content Creation and User-Generated Content , Strategies for curtaining content , Encouraging and leveraging user-generated content Legal and ethical considerations.

Social media Analytics and Metrics

Understanding social media metrics (engagement, reach, impressions, etc.) , Tools for tracking and analyzing performance , Using data to refine content strategy, Collaborating with influencers , Handling negative feedback and crises ,Building and nurturing an online community ,Best practices for customer service on social media

TOTAL: 60 PERIODS

COURSE OUTCOMES:

➢ By the end of this course, students will understand the principles of effective social media content creation.

BA4301   **STRATEGIC MANAGEMENT**   **L T P C**
                                                                     3 0 0 3

COURSE OBJECTIVE:
- To learn the major initiatives taken by a company's top management on behalf of corporate, involving resources and performance in external environments. It entails specifying the organization's mission, vision and objectives, and to equip with skills required to manage business and non-business organizations at senior levels. The course adopts a functional approach to management developing policies and plan to understand the analysis and implementation of strategic management in strategic business units.

UNIT I   STRATEGY AND PROCESS   9
Conceptual framework for strategic management, the Concept of Strategy and the Strategy Formation Process – Stakeholders in business – Vision, Mission and Purpose – Business definition, Objectives and Goals - Corporate Governance and Social responsibility-case study.

UNIT II   COMPETITIVE ADVANTAGE   9
External Environment - Porter's Five Forces Model-Strategic Groups Competitive Changes during Industry Evolution-Globalisation and Industry Structure - National Context and Competitive advantage Resources- Capabilities and competencies–core competencies-Low cost and differentiation Generic Building Blocks of Competitive Advantage- Distinctive Competencies-Resources and Capabilities durability of competitive Advantage- Avoiding failures and sustaining competitive advantage-Case study.

UNIT III   STRATEGIES   9
The generic strategic alternatives – Stability, Expansion, Retrenchment and Combination strategies -Business level strategy- Strategy in the Global Environment-Corporate Strategy- Vertical Integration- Diversification and Strategic Alliances- Building and Restructuring the corporation-Strategic analysis and choice – Managing Growth - Environmental Threat and Opportunity Profile (ETOP) - Organizational Capability Profile - Strategic Advantage Profile - Corporate Portfolio Analysis - SWOT Analysis – GAP Analysis - Mc Kinsey's 7s Framework - GE 9 Cell Model – Distinctive competitiveness - Selection of matrix - Balance Score Card-case study.

UNIT IV   STRATEGY IMPLEMENTATION & EVALUATION   9
The implementation process, Resource allocation, Designing organisational structure-Designing Strategic Control Systems- Matching structure and control to strategy-Implementing Strategic change- Politics-Power and Conflict-Techniques of strategic evaluation & control-case study.

UNIT V   OTHER STRATEGIC ISSUES   9
Managing Technology and Innovation - Strategic issues for Non Profit organisations. New Business Models and strategies for Internet Economy-case study Challenges in   Strategic Management: Introduction, Strategic Management as an Organisational Force, Dealing with Strategic Management in Various Situations, Strategic Management Implications and Challenges

Recent Trends in Strategic Management: Introduction, Strategic Thinking, Organisational Culture and its Significance, Organisational Development and Change, Change Management, Strategic management in a new globalised economy

                                                          TOTAL: 45 PERIODS

COURSE OUTCOMES:

1. Ability to understand the Strategic management process and social responsibility of business organizations
2. In-depth understanding about the need for developing competitive advantage for organizations
3. Provides insights into various corporate and business level strategies
4. Facilitates to identify the various control systems required for organizational strategy implementation process
5. Enhances the cognitive knowledge about various strategic issues and development of new business models

REFERENCES:

1. Hill. Strategic Management: An Integrated approach, 2009 Edition Wiley (2012).
2. John A.Parnell. Strategic Management, Theory and practice Biztantra (2012).
3. Azhar Kazmi, Strategic Management and Business Policy, 3rd Edition, Tata McGraw Hill, 2008
4. AdriauH Aberberg and Alison Rieple, Strategic Management Theory & Application, Oxford UniversityPress, 2008.
5. Lawerence G. Hrebiniak, Making strategy work, Pearson, 2 nd edition, 2013.
6. Gupta, Gollakota and Srinivasan, Business Policy and Strategic Management — Concepts andApplication, Prentice Hall of India, 2005.
7 Dr.Dharma Bir Singh, Strategic Management & Business Policy, KoGent Learning Solutions Inc.,Wiley, 2012.
8. John Pearce, Richard Robinson and Amitha Mittal, Strategic Management, McGraw Hill, 12th Edition,2012
9. Lafley AG and Roger L Martin, Playing to Win : Strategy really works, Harvard Business ReviewPress

BN4301   **ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**   **L T P C**
                                                                            3 0 0 3

OBJECTIVES:
- To expose various algorithms related to Artificial Intelligence machine learning.
- To prepare students to apply suitable algorithm for the specified applications.
- To introduce Learners to the basic concepts and techniques of Machine Learning.
- To give new insights on how to apply machine learning to solve a new problem.

UNIT - I   INTELLIGENT SYSTEMS   9
Introduction to Artificial Intelligence: Intelligent Systems - Foundations of AI - Applications - Tic-Tac-Toe Game Playing - Problem Solving: State-Space Search and Control Strategies: Introduction - General Problem Solving - Exhaustive Searches - Heuristic Search Techniques.

UNIT - II   KNOWLEDGE REPRESENTATION   9
Advanced Problem-Solving Paradigm: Planning: Introduction - Types of Planning Systems - Knowledge Representation: Introduction - Approaches to Knowledge Representation - Knowledge Representation using Semantic Network - Knowledge Representation using Frames.

Expert Systems and Applications: Blackboard Systems - Truth Maintenance Systems - Applications of Expert Systems.

UNIT - III   INTRODUCTION TO MACHINE LEARNING   9
Human Learning - Types of Human Learning, Machine Learning - Types of Machine Learning, Applications, Tools, Issues, Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, data Pre-Processing, Selecting and Training a Model, Model Representation and Interpretability, Evaluating and Improving performance of a Model.

UNIT- IV   BAYESIAN LEARNING   9
Bayes Theorem and Concept Learning, Maximum Likelihood and Least-squared Error Hypotheses, Maximum Likelihood Hypotheses for Predicting Probabilities, MinimumDescription Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naive Bayes Classifier, Bayesian Belief Networks, EM Algorithm.

UNIT- V   SUPERVISED AND UNSUPERVISED LEARNING   9
Classification Model, Classification Learning Steps, Common Classification Algorithms, Understanding the Biological Neuron, Exploring the Artificial Neuron, Types of Activation Functions, Early Implementations of Artificial Neural Networks, Architectures of Neural Networks, Learning Process in Artificial Neural Networks. Unsupervised vs Supervised Learning, Applications of Unsupervised Learning, Clustering, Finding pattern using Association Rule, Other Unsupervised Learning Problems – Principal Component Analysis, Topic Modeling.

                                                      TOTAL: 45 PERIODS

COURSE OUTCOMES :
- Knowledge of Algorithms of Artificial Intelligence and machine learning.
- Knowledge of applying Algorithm to specified applications.
- Ability to understand intelligent systems and Heuristic Search Techniques

- ➢ Understanding of Knowledge Representation, Semantic Networks and Frames
- ➢ Understand complexity of Machine Learning algorithms and their limitations.
- ➢ Be capable of performing experiments in Machine Learning using real-world data.
- ➢ Knowledge of Expert systems, applications and Machine learning.

REFERENCES :

1. SarojKaushik, "Artificial Intelligence", Cengage Learning India Pvt. Ltd.
2. Deepak Khemani, "A First Course in Artificial Intelligence", McGraw Hill Education(India) Private Limited, NewDelhi.
3. Elaine Rich, Kevin Night, Shivashankar B Nair, "Artificial Intelligence" Third Edition, McGraw Hill, 2008.
4. YoshuaBengio, "Learning Deep Architectures for AI", Foundations and Trends in Machine Learning.
5. Saikat Dutt, Subramanian Chandramouli and Amit Kumar Das, Machine Learning,Pearson Education, 2019
6. Anuradha Srinivasaraghavan, Vincy Elizabeth Joseph, Machine Learning, Wiley,2019
7. Gopinath Rebala, Ajay Ravi, Sanjay Churiwala, An Introduction to Machine Learning Springer, 7 May 2019
8. Thom Mitchell, Machine Learning, McGraw Hill Education, 2017
9. Oliver Theobald, Machine Learning for Absolute Beginners, 2017
10. Ethem Alpaydin, Introduction to Machine Learning, 3rd edition, 2014

OBJECTIVE:

> ➢ The course aims to train students in R programming language and its applications in the business world as well as to provide hands-on-training to use various tools and packages of R for advanced data analytics with real and simulated datasets to analyze and solve real and complex analytics problems including data visualization and machine learning.

INTRODUCTION TO R & R ENVIRONMENT AND EXPLORATORY
DATA ANALYSIS   12

Overview of R Language, Installation of R and RStudio, Scripts, Data Types in R, Data Structure in R, Loading Packages, Operators and functions in R, Data Extraction and Wrangling, Exporting Data from R. Pre-processing of data, Exploratory Data Analysis.

DATA VISUALIZATION FOR INSIGHTS USING R   6

Perceptual mapping through Advanced R packages: ggplot2, Lattice, high charter, R Color Brewer, Plotly, etc. Charts, Graphs, and Maps.

INFERENTIAL STATISTICS   10

Testing assumptions, Parametric and non-parametric tests, Correlation, Regression: Linear & Logistic, Dimensionality Reduction techniques: EFA & PCA, Multidimensional Scaling, ANOVA, Time Series Analysis: Stationarity AR, MA, ARMA and ARIMA, Forecasting

CLUSTER ANALYSIS AND CLASSIFICATION   12

Introduction to Cluster Analysis, Clustering models and Analysis, Hierarchical Clustering, Non-Hierarchical Clustering, K means Clustering, C means Clustering, KNN Classification, Decision Tree and Random Forests,

DATA MINING AND MACHINE LEARNING USING R   20

Text Mining, Text Mining Algorithms, Sentiment Analysis, Supervised and Unsupervised Machine Learning Algorithms, R-packages for Machine Learning: caret, e1071, xg boost, random Forest, data table.

Practical Exercises:
    The learners are required to:
    1. Conduct an exploratory study on real data..
    2. Apply R and obtain the results from a data set regarding data visualisation.
    3. Evaluate the survey results of a pilot study related to primary data.
    4. Analyze the results related to the Decision Tree by taking primary data.
    5. Collect a stock market data set and apply data mining tools.

List of exercises suitable for a Business Analytics course using R programming:

DATA IMPORT AND CLEANING:
    Import a dataset from a CSV file into R using read.csv() or other appropriate functions.
    Identify and handle missing values, outliers, and duplicates in the dataset.
    Convert data types and ensure consistency in variable naming and formatting.

DATA MANIPULATION WITH DPLYR:
    Use dplyr functions (filter(), select(), mutate(), arrange(), group_by(), summarize()) to manipulate and summarize data.
    Chain multiple dplyr functions together using the pipe operator (%>%).

DESCRIPTIVE STATISTICS:
    Calculate summary statistics (mean, median, standard deviation, etc.) for numerical variables.
    Generate frequency tables and histograms for categorical variables.
    Explore relationships between variables using correlation analysis.

INFERENTIAL STATISTICS:
    Conduct hypothesis testing (t-tests, chi-square tests, ANOVA) to make inferences about population parameters.
    Calculate confidence intervals for population means and proportions.
    Perform regression analysis to examine relationships between variables.

PREDICTIVE MODELING WITH CARET:
    Split the dataset into training and testing sets for model evaluation.
    Build predictive models using machine learning algorithms (e.g., linear regression, logistic regression, decision trees, random forests) with the caret package.
    Evaluate model performance using metrics such as accuracy, precision, recall, and ROC curves.

TIME SERIES ANALYSIS:
    Import time series data into R and convert it into a time series object.
    Explore temporal patterns and trends using time series plots and decomposition techniques.
    Build time series forecasting models (e.g., ARIMA, exponential smoothing) and assess forecast accuracy.

DATA VISUALIZATION WITH GGPLOT2:
    Create various types of plots (scatter plots, line plots, bar plots, box plots) using ggplot2.
    Customize plot aesthetics (titles, labels, colors, themes) and add annotations.
    Generate faceted plots and combine multiple plots into a single visualization.

INTERACTIVE DATA VISUALIZATION WITH SHINY:
    Develop interactive web applications for data visualization using the Shiny package.
    Create reactive components (input controls, output plots) and define server logic to update visualizations dynamically.

TEXT MINING AND SENTIMENT ANALYSIS:
    Preprocess text data by tokenizing, stemming, and removing stop words.
    Perform sentiment analysis to assess the sentiment polarity of textual content.
    Visualize sentiment scores using word clouds, bar plots, or sentiment heat maps.

CUSTOMER SEGMENTATION AND MARKET BASKET ANALYSIS:
    Use clustering algorithms (e.g., K-means clustering) to segment customers based on demographic or behavioral attributes.
    Perform market basket analysis to identify frequently co-occurring products and association rules.

TOTAL : 60 PERIODS

COURSE OUTCOMES:
 After completion of the course, learners will be able to:
   ➢ Learn R Programming language and data wrangling in R,
   ➢ Visualize the Business Data using R for key insights,
   ➢ Analyze statistical models and estimate future prospects for Business,
   ➢ Leverage data mining techniques using R to solve real life problems,
   ➢ Apply machine learning techniques to solve Business Analytics Problems.

REFERENCES:

1. Gardener, M. (2012). Beginning R: the statistical programming language. John Wiley & Sons.
2. Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. " O'Reilly Media, Inc.".
3. Field, A., Miles, J., & Field, Z. (2012). Discovering statistics using R (2012). Great Britain: Sage Publications, Ltd, 958.
4. Kumar, M. (2022). Business Analytics using R. Excellence Brings Success
5. Cornillon, P. A., Guyader, A., Husson, F., Jegou, N., Josse, J., Kloareg, M., ... & Rouvière, L. (2012). R for Statistics. CRC press.
6. Eric Pimpler, "Data Visualization and Exploration with R: A practical guide to using R, R Studio, and Tidyverse for data visualization, exploration, and data science applications", Amazon Asia-Pacific Holdings Private Limited, 2017.
7. Peter Dalgaard. Introductory Statistics with R (Paperback) 1st Edition Springer-Verlag New York, Inc. ISBN 0-387-95475-9

BN4312   CLOUD COMPUTING AND BIG DATA TOOLS FOR BUSINESS ANALYTICS L T P C
(Laboratory)   0 0 4 2

OBJECTIVES:
  ➢ To Provide practical insights of cloud computing along with virtualization and cloud computing.
  ➢ To Provide learns hands on experience in cloud based platforms.

LIST OF EXPERIMENTS FOR CLOUD COMPUTING:

  1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows7 or 8.
  2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs.
  3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
  4. Use GAE launcher to launch the web applications.
  5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
  6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
  7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
  8. Install Hadoop single node cluster and run simple applications like word count.

List of experiments for AWS:
  9. Foundational Exercises: AWS Management Console Navigation, Explore the AWS Management Console. Understand how to navigate and use basic features. Setting Up IAM Users and Policies: Create IAM users, groups, and roles. Assign permissions using IAM policies. Set up Multi-Factor Authentication (MFA).

  10. **Core AWS Services:** Amazon EC2 (Elastic Compute Cloud): Launch, connect to, and manage an EC2 instance. Configure security groups and key pairs. Automate deployment using EC2 Auto Scaling. Amazon S3 (Simple Storage Service): Create and configure S3 buckets.
      Upload, retrieve, and manage objects. Set bucket policies and enable versioning.
      Amazon RDS (Relational Database Service):Launch and configure an RDS instance.
      Connect to the database and perform basic operations. Implement automated backups and snapshots.

  11. **Advanced Services and Scenarios:** Amazon VPC (Virtual Private Cloud): Design and configure a VPC with subnets, route tables, and gateways. Set up security groups and network ACLs. Implement VPC Peering.

List of exercises suitable for learning open-source Hadoop:
  12. Setting up a Single-Node Hadoop Cluster: Install Hadoop on your local machine and configure it as a single-node cluster. Perform basic file operations on HDFS such as creating directories, uploading files, and listing files.

13. HDFS Operations: Write scripts to automate common HDFS operations such as copying files, moving files, and deleting files. Explore the HDFS file system using command-line tools and perform tasks like checking file status, setting permissions, and changing ownership.

14. Map Reduce Programming: Write a Map Reduce program in Java to count the occurrences of words in a text file. Implement a Map Reduce program to calculate the average temperature from a dataset containing temperature readings. Develop a Map Reduce program to find the most frequent words in a large collection of documents.

15. Map Reduce Optimization: Experiment with different data partitioning techniques and observe their impact on job performance. Implement a Combiner function to optimize the intermediate data processing in a Map Reduce job. Tune the memory configuration and parallelism settings to optimize the performance of a Map Reduce job.

16. Hive Exercises: Create tables in Hive and load data into them from existing datasets.
    Write Hive QL queries to perform data manipulation tasks such as filtering, sorting, and aggregating. Practice joining multiple tables in Hive to perform more complex analytical queries.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

➢ Acquire practical insights on cloud computing along with virtualization.
➢ Provide students with hands on experience in Big Data and cloud based platforms.

REFERENCES:
1. Paul Zikopoulos, Chris Eaton "Understanding Big Data: Analytics for EnterpriseClass Hadoop and Streaming Data", McGraw Hill, 2012.
2. Paul Zikopoulos, Dirk de Roos, Krishnan Parasuraman, Thomas Deutsch , James Giles, David Corrigan, "Harness the Power of Big data - The big data platform", McGraw Hill, McGraw-Hill Osborne Media, 2012.
3. Glenn J. Myatt, "Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining", John Wiley & Sons, Second

BN4313 **MINI PROJECT (MP) / COURSE OF INDEPENDENT RESEARCH** **L T P C**
0 0 4 2

The Students will be carrying out a Mini Project for **4 weeks**. This Internship encourages the student to attach with an organization in order to understand the working and its functional activities.

- In this regard, a student shall look for doing a mini project in a business organization / A startup / an NGO in which they study and report the functioning of an organization. A work completion certificate issued by the organization must be present in the report.
- Alternatively, a student need not attach themselves to any organization, but may select to do a Course of Independent Research (CIR) under a faculty supervisor. The student may carry out a research study wherein the selected research topic may entail data collection (primary/secondary), application of tools & techniques of Business Analytics. The same may be submitted as research report/industry report/working paper to the University.
- Students may be encouraged to use secondary open data sources like Kaggle, NIC, World Bank, IMF, RBI DBIE, etc with due citations for their Mini Project work. A Certificate from the Organization must be submitted in the report.

TOTAL : 60 PERIODS

BN4411	**PROJECT WORK**	**L T P C**
		0 0 20 10

MAJOR PROJECT:

The students are expected to carry out a major project for duration of 16 weeks. The students are encouraged to carry out their Project work in any of the following domains:

- Financial Analytics
- Human Resource Analytics
- Marketing Analytics
- Operations Analytics
- Any other Analytics domain

Here the student is expected to attach themselves to any organization and choose to do the Course of Organization based Research under a faculty supervisor. The student can carry out a research study wherein the chosen research topic requires data collection (primary/secondary), application of tools & techniques of business analytics, and submit a research report/industry report/working paper to the University. Students can also use secondary open data sources like Kaggle, NIC, World Bank, IMF, RBI DBIE, etc with due citations for their research work. A Project completion Certificate from the Organization must be submitted in the Project report.

TOTAL: 300 PERIODS

BN4001   **HUMAN RESOURCE ANALYTICS**   **L T P C**
                                                                                      3 0 0 3

OBJECTIVES:
➢   To develop the ability of the learners to define and implement HR metrics that a realigned with the overall business strategy.
➢   To know the different types of HR metrics and understand their respective impact and application.
➢   To understand the impact and use of HR metrics and their connection with HR analytics.
➢   To understand the common workforce issues and resolving them using people analytics.

UNIT - I   INTRODUCTION TO HR ANALYTICS   9
HR analytics - People Analytics : Definition- context - stages of maturity - Human Capital in the Value Chain : impact on business. HR Analytics vs HR Metrics – HR metrics and KPIs.

UNIT – II   HR ANLYTICS I: RECRUITMENT   9
Recruitment Metrics : Fill-up ratio - Time to hire - Cost per hire - Early turnover - Employee referral hires - Agency hires - Lateral hires - Fulfillment ratio- Quality of hire- Recruitment to HR cost - Recruitment analysis.

UNIT - III   HR ANALYTICS - TRAINING AND DEVELOPMENT   9
Training & Development Metrics : Percentage of employee trained- Internally and externally trained - Training hours and cost per employee - ROI - Optimising the ROI of HR Programs -Training and Development analysis.

UNIT – IV   HR ANALYTICS EMPLOYEE ENGAGEMENT AND CAREERPROGRESSION   9
Employee Engagement Metrics :Talent Retention - Retention index - Voluntary and involuntary turnover- Turnover by department , grades, performance, and service tenure - Internal hired index - Engagement Survey Analysis.
Career Progression Metrics : Promotion index - Rotation index - Career path index - Level wise succession readiness index.

UNIT - V   HR ANALYTICS IN WORKFORCE DIVERSITY AND DEVELOPMENT   9
Workforce Diversity and Development Metrics : Employees per manager - Workforce age profiling - Workforce service profiling - Churnover index - Workforce diversity index - Gender mix - Differently abled index- Revenue per employee - Operating cost per employee - PBT per employee - HR cost per employee- HR budget variance - Compensation to HR cost.

                                                                    TOTAL: 45 PERIODS
COURSE OUTCOMES:
➢   The learners will be conversant about HR metrics and ready to apply at work settings.
➢   The learners will be able to resolve HR issues using people analytics**.**

REFERENCES:
1. JacFitzenz , The New HR Analytics, AMACOM , 2010.
2. Edwards M. R., & Edwards K, Predictive HR Analytics: Mastering the HR Metric. London: Kogan Page.2016.
3. Human Resources kit for Dummies – 3 rd edition – Max Messmer, 2003
4. Dipak Kumar Bhattacharyya, HR Analytics , Understanding Theories and Applications, SAGEPublications India ,2017.
5. Sesil, J. C. , Applying advanced analytics to HR management decisions: Methods for selection,

developing incentives, and improving collaboration. Upper Saddle River, New Jersey: Pearson Education,2014.

6. Pease, G., & Beresford, B, Developing Human Capital: Using Analytics to Plan and Optimize Your Learning and Development Investments. Wiley , 2014.

7. Phillips, J., & Phillips, P.P, Making Human Capital Analytics Work: Measuring the ROI of Human Capital Processes and OUTCOME. McGraw-Hill,2014. HR Scorecard and Metrices, HBR, 2001.

BN4002   **MARKETING AND SOCIAL MEDIA WEB ANALYTICS**   **L T P C**
                                                                          3 0 0 3

OBJECTIVE:
  ➢ To showcase the opportunities that exist today to leverage the power of the web and social media

UNIT- I   MARKETING ANALYTICS   9
Introduction to Marketing Analytics-Marketing Budget and Marketing Performance Measure, Marketing Metrics and its application- Financial Implications of various Marketing Strategies- Geographical Mapping, Data Exploration, Market Basket Analysis

UNIT- II   COMMUNITY BUILDING AND MANAGEMENT   9
History and Evolution of Social Media-Understanding Science of Social Media -Goals for using Social Media- Social Media Audience and Influencers-Social theory and social media - technological determinism-Keys to Community Building - Promoting Social Media Pages- Linking Social Media Accounts-The Viral Impact of Social Media- Digital PR-Encourage Positive Chatter in Social Media - Identity in social media:formation of identities, communities, activist movements, and consumer markets -Social Media as business.

UNIT- III   SOCIAL MEDIA POLICIES AND MEASUREMENTS   9
Social Media Policies-Etiquette, Privacy- ethical problems posed by emerging social media technologies - The road ahead in social media- The Basics of Tracking Social Media - social media analytics- Insights Gained From Social Media- Customized Campaign Performance Reports - Observations of social media use.

UNIT- IV   WEB ANALYTICS   9
Web Analytics - Present and Future, Data Collection - Importance and Options, Overview of Qualitative Analysis, Business Analysis, KPI and Planning, Critical Components of a Successful Web Analytics Strategy, Web Analytics Fundamentals, Concepts, Proposals & Reports, Web Data Analysis.

UNIT- V   SEARCH ANALYTICS   9
Search engine optimization (SEO), non-linear media consumption, user engagement, user generated content, web traffic analysis, navigation, usability, eye tracking, online security, online ethics, content management system, data visualization, RSS feeds, Mobile platforms, User centered design, Understanding search behaviors.

                                                            TOTAL: 45 PERIODS

COURSE OUTCOMES:
  ➢ The Learners will understand social media, web and social media analytics and their potential impact.

REFERENCES:
1. K. M. Shrivastava, Social Media in Business and Governance, Sterling Publishers Private Limited, 2013
2. Christian Fuchs, Social Media a critical introduction, SAGE Publications Ltd, 2014
3. Bittu Kumar, Social Networking, V & S Publishers, 2013
4. Rajkumar Venkatesan, Paul W. Farris, Ronald T. Wilcox, Marketing Analytics: Essential Tools for Data-Driven Decisions, University of Virginia Press, 13 Jan 2021.
5. Jerry Rackley Marketing Analytics Roadmap: Methods, Metrics, and Tools Apress, 30 May 2015. Avinash Kaushik, Web Analytics - An Hour a Day, Wiley Publishing, 2007
6. ric T. Peterson, Web Analytics Demystified, Celilo Group Media and Café Press,2004

7. Alex Gonçalves, Social Media Analytics Strategy: Using Data to Optimize Business Performance, Apress, 2017.

8. Takeshi Moriguchi, Web Analytics Consultant Official Textbook, 7th Edition, 2016

FINANCIAL ANALYTICS **L T P C**
3 0 0 3

OBJECTIVE:
➢ This course introduces a core set of modern analytical tools that specifically target finance applications.

UNIT- I   CORPORATE FINANCE ANALYSIS **9**
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.

UNIT- II   FINANCIAL MARKET ANALYSIS **9**
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 series-examining nature of data, EWMOA, Value at risk, ARMA, ARCH and GARCH.

UNIT- III   PORTFOLIO ANALYSIS **9**
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.

UNIT- IV   TECHNICAL ANALYSIS **9**
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.

UNIT- V   CREDIT RISK ANALYSIS **9**
Credit Risk analysis- Data processing, Decision trees, logistic regression and evaluating credit risk model.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
➢ The learners should be able to perform financial analysis for decision making using excel,Python and R.

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, 25Oct 2013 by Pavel Ryzhov.
3. Financial analytics with R by Mark J. Bennett, Dirk L. Hugen, Cambridge university press., 2016.
4. Quantitative Financial Analytics: The Path To Investment Profits Paperback –Import, 11 Sep 2017 by Edward E Williams (Author), John A Dobelman.
5. Python for Finance - Paperback – Import, 30 Jun 2017 by Yuxing Yan (Author).
6. Mastering Python for Finance Paperback – Import, 29 Apr 2015 by James Ma Weiming.

BN4004   **OPERATION AND SUPPLY CHAIN ANALYTICS**   **L T P C**
                                                                       3 0 0 3

OBJECTIVE:
➢ To treat the subject in depth by emphasizing on the advanced quantitative models and methods in logistics and supply chain management and its practical aspects and the latest developmentsin the field.

UNIT- I   INTRODUCTION   9
Introduction to analytics – descriptive, predictive and prescriptive analytics, Data Driven Supply Chains – Basics, transforming supply chains, Barriers to implementation, Road Map.

UNIT- II   WAREHOUSING DECISIONS   9
Mathematical Programming Models - P-Median Methods - Guided LP Approach - Balmer – Wolfe Method, Greedy Drop Heuristics, Dynamic Location Models, Space Determination and Layout Methods

UNIT- III   INVENTORY MANAGEMENT   9
Inventory aggregation Models, Dynamic Lot sizing Methods, Multi-Echelon Inventory models, Aggregate Inventory system and LIMIT, Risk Analysis in Supply Chain - Measuring transit risks, supply risks, delivering risks, Risk pooling strategies.

UNIT- IV   TRANSPORTATION NETWORK MODELS   9
Notion of Graphs, Minimal Spanning Tree, Shortest Path Algorithms, Maximal Flow Problems, Multistage Transshipment and Transportation Problems, Set covering and Set Partitioning Problems, Traveling Salesman Algorithms, Advanced Vehicle Routing Problem Heuristics, Scheduling Algorithms-Deficit function Approach and Linking Algorithms.

UNIT- V   MCDMMODELS   9
Analytic Hierarchy Process(AHP), Data Envelopment Analysis (DEA), Fuzzy Logic and Techniques, the analytical network process (ANP), TOPSIS-Application in SCM.

                                                 TOTAL: 45 PERIODS

COURSE OUTCOMES:

➢ To enable quantitative solutions in business decision making under conditions of certainty, risk and uncertainty.

REFERENCES:
1. Nada R. Sanders, Big data driven supply chain management: A framework for implementing analytics and turning information into intelligence, Pearson Education, 2014.

2. Michael Watson, Sara Lewis, Peter Cacioppi, Jay Jayaraman, Supply Chain Network Design: Applying Optimization and Analytics to the Global Supply Chain, Pearson Education, 2013.

3. Anna Nagurney, Min Yu, Amir H. Masoumi, Ladimer S. Nagurney, Networks Against Time: Supply Chain Analytics for Perishable Products, Springer, 2013.

4. Kurt Y. Liu, Supply Chain Analytics: Concepts, Techniques and Applications Springer Nature, 7 Apr 2022.

5. Muthu Mathirajan, Chandrasekharan Rajendran, Sowmya narayanan Sadagopan, Arunachalam Ravindran, Parasuram Balasubramanian, Analytics inOperations/Supply Chain Management, I.K. International Publishing House Pvt. Ltd., 2016.

BN4005   **TIME SERIES ANALYSIS**   **L T P C**
3 0 0 3

OBJECTIVE:

➢ To familiarizes the learners and researchers to the theory and practice of time seriesanalysis.

UNIT- I   **UNIVARIATE STATIONARY TIME-SERIES MODELS**   **9**

Introduction to stochastic process, stationary processes, Wold representation theorem, auto covariance functions, autocorrelation and partial autocorrelation, auto regressive and moving average models, conditions for stationary and invertible process, Box- Jenkins approach, forecasting.

UNIT- II   **UNIVARIATE NONSTATIONARY PROCESSES**   **9**

Nonstationary process, deterministic and stochastic trends, Integrated process and random walk, random walk with drift, Unit root process-, test for unit root- Dicky Fuller tests, , ARIMA process. Fractional integrated process.

UNIT- III   **MODELING VOLATILITY CLUSTERING**   **9**

Volatility-Meaning and measurement, Volatility clustering, Econometric models of volatility, ARCH model, GARCH model and its various extensions, testing for ARCH/GARCH effects.

UNIT- IV   **MULTIVARIATE STATIONARY AND NON-STATIONARY PROCESSES**   **9**

Vector autoregressive model, Granger causality, impulse response function, variance decomposition.

UNIT- V   **MULTIVARIATE NON-STATIONARY PROCESSES**   **9**

Introduction to cointegration, testing for cointegration: Single-equation approaches: Engle Granger method, Johansen test for cointegration, Vector error correction model.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

➢ Learners will be able to understand the techniques of using Time series data for decision making.

REFERENCES:

1. Brooks, C., Introductory Econometrics for Finance, 3rd Edition, Cambridge University Press,2014.
2. Enders, W., Applied Econometric Time Series, second edition, John Wiley and Sons, 2006.
3. Hamilton, J. D., Time Series Analysis, Princeton University Press, 1994.
4. Johnston J. and Di Nardo, J. Econometric Methods. 4th Ed. McGraw-Hill 1997.
5. Maddala G.S. and In-Moo Kim, Unit Roots, Cointegration, and Structural Change, 1998.

OBJECTIVE:

➢   To understand Blockchain and its main application.
➢   To give new insights to the learns on how the Blockchain technology system work

UNIT - I   INTRODUCTION   9

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

UNIT – II   BLOCKCHAIN & APPLICATIONS   9

Introduction to Blockchain, Gartner's Hype Curve and Evolution of Blockchain Technology, Blockchain Need & Genesis, Key Characteristics of Blockchain, Blockchain Structure, Blockchain types and Network, Mining and Consensus, How BlockchainWorks, Bitcoin Whitepaper, Understanding Bitcoin, Components of a Block, Forks: soft& hard forks, Ummer blocks, Different forks from Bitcoin, Wallets, Transactions, Public& Private keys, Blockchain Applications : Internet of Things, Medical Record Management System, Do-main Name Service and future of Blockchain.

UNIT - III   CRYPTOCURRENCY   9

History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin. Cryptocurrency Regulation: Stakeholders, Roots of Bitcoin, Legal Aspects - Cryptocurrency Exchange, Black Market and Global Economy.

UNIT - IV   ETHEREUM   9

Need of Ethereum, Ethereum Foundation, Ethereum Whitepaper, How Ethereum Works, Ethereum network, Ethereum Virtual Machine, Transactions and Types, Mining& Consensus, Smart Contracts.

UNIT - V   HYPERLEDGER FABRIC   9

Hyperledger, Hyperledger Fabric, Comparison between Fabric & Other Technologies, Fabric Architecture, Components of Hyperledger Fabric, Advantages of Hyperledger Fabric Blockchain, How Hyperledger Fabric Works.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
➢   Understand key features, different types of platforms & Languages of Blockchain Technology.

REFERENCES:
1. Imran Bashir, Mastering Blockchain, Packt Publishing, March 2017.
2. Debajani Mohanty, BlockChain : From Concept to Execution, BPB Publications, 2ndedition, 2018
3. Artemis Caro, Blockchain: Bitcoin, Ethereum &Blockchain: The Beginners Guide to
    Understanding the Technology Behind Bitcoin & Cryptocurrency, 2017
4. Andreas M. Antonopoulos, Gavin Wood, Mastering Ethereum: Building Smart Contracts and
    DApps, O'REILLY, 2018
5. Nitin Gaur, Luc Desrosiers, Venkatraman Ramakrishna, Petr Novotny, Dr. Salman A. Baset and
    Anthony O'Dowd, Hands-on Blockchain with Hyperledger, Packt Publishing, 2018.

BN4007   **CLOUD COMPUTING TOOLS AND TECHNIQUES**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:
➢ To Give new insights of cloud computing along with virtualization.
➢ To recognize benefits and limitations of cloud computing.
➢ To familiarize the cloud service the modal.

UNIT - I   CLOUD COMPUTING OVERVIEW   9
Origins of Cloud computing – Cloud components - Essential characteristics – On-demand selfservice, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers, Roots of cloud computing - Cloud Insights Architectural influences – High-performance computing, Utility and Enterprise grid computing, Cloud scenarios – Benefits: scalability ,simplicity ,vendors ,security, Limitations – Sensitive information - Application development- security level of third party - security benefits, Regularity issues: Government policies.

UNIT - II   CLOUD ARCHITECTURE- LAYERS AND MODELS   9
Layers in cloud architecture, Software as a Service (SaaS), features of SaaS and benefits, Platform as a Service (PaaS), features of PaaS and benefits, Infrastructure as a Service (IaaS), features of IaaS and benefits, Service providers, challenges and risks in cloud adoption.
Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.

UNIT - III   CLOUD SIMULATORS- CLOUDSIM AND GREENCLOUD   9
Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim, Introduction to GreenCloud

UNIT - IV   INTRODUCTION TO VMWARE SIMULATOR   9
Basics of VMWare, advantages of VMware virtualization, using Vmware workstation, creating virtual machines-understanding virtual machines, create a new virtual machine on local host, cloning virtual machines, virtualize a physical machine, starting and stopping a virtual machine.

UNIT - V   AWS CLOUD   9
The basic global infrastructure of the AWS Cloud , The core AWS services, including compute, network, databases, and storage, AWS Well-Architected Framework, Model responsibility, the AWS Cloud core security services and the basics of AWS Cloud migration.

                                                                    TOTAL: 45 PERIODS

COURSE OUTCOMES:
➢ Students will be familiarised with core concepts of Cloud Computing and virtualization.

REFERENCES:
1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010
2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008
3. Cloud computing for dummies- Judith Hurwitz , Robin Bloor , Marcia Kaufman ,Fern Halper, Wiley Publishing, Inc, 2010
4. Cloud Computing (Principles and Paradigms), Edited by Rajkumar Buyya, James Broberg, Andrzej Goscinski, John Wiley & Sons, Inc. 2011

BN4008	ENTERPRISE INFORMATION SYSTEM	L T P C
		3 0 0 3

OBJECTIVE:
- To understand the importance of information management and enterprise resource planning in business
- To know about the recent information systems and enterprise resource planning technologies.

UNIT – I   SYSTEM ANALYSIS AND DESIGN   9
Data, Information, Information System, evolution, types based on functions and hierarchy, Enterprise and functional information systems, System development methodologies, Systems Analysis and Design, Data flow Diagram (DFD), Decision table, Entity Relationship (ER), Object Oriented Analysis and Design(OOAD), UML diagram.

UNIT – II   DATABASE MANAGEMENT SYSTEMS   9
DBMS – types and evolution, RDBMS, OODBMS, RODBMS, Data warehousing – Star, Snowflake, Fact Constellation, open source database systems, Scripting Language, JDBC, ODBC, Data Mart, Data mining.

UNIT – III   INTEGRATED SYSTEMS, SECURITY AND CONTROL   9
Knowledge based decision support systems, Integrating social media and mobile technologies in Information system, Security, IS Vulnerability, Disaster Management, Computer Crimes, Securing the Web.

UNIT – IV   ENTERPRISE SYSTEMS   9
Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - warehouse management, Overview of ERP software solutions, BPR, Project management, Functional modules-Organisational data, master data and document flow.

UNIT – V   ERP IMPLEMENTATION   9
Planning Evaluation and selection of ERP systems - Implementation life cycle - ERP implementation, Methodology and Frame work- Training – Data Migration. People Organization in implementation-Consultants, Vendors and Employees, Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of ERP Implementation.

TOTAL: 45 PERIODS

COURSE OUTCOMES:
- Gains knowledge on effective applications of information systems and enterprise resource planning in business.

REFERENCES:
1. AlexisLeon,ERPdemystified,secondEditionTataMcGraw-Hill,2008.
2. Simha R. Magal, Jeffrey Word, Integrated Business processes with ERP systems, John Wiley &Sons, 2012.
3. JaganNathanVaman,ERPinPractice,TataMcGraw-Hill,2008
4. AlexisLeon,EnterpriseResourcePlanning,secondedition,TataMcGraw-Hill,2008.
5. MahadeoJaiswalandGaneshVanapalli,ERPMacmillanIndia,2009
6. Vinod Kumar Grag and N.K.Venkitakrishnan, ERP-Concepts and Practice, Prentice Hall of India, 2006.
7. Summer, ERP, Pearson Education,2008.

BN4009   **BIG DATA ANALYTICS**   **L T P C**
                                                                          3 0 0 3

OBJECTIVES:

> ➢ To understand the computational approaches to big data analytics
> ➢ To understand the various search methods and visualization techniques
> ➢ To learn to use various techniques for mining data stream
> ➢ To understand the applications using Map Reduce Concepts.

UNIT - I   INTRODUCTION TO BIG DATA   9

Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligentdata analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.

UNIT - II   MINING DATA STREAMS   9

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.

UNIT – III   HADOOP   9

History of Hadoop- the Hadoop Distributed File System — Components of Hadoop Analysing 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 Reduce Features Hadoop environment.

UNIT – IV   FRAMEWORKS   9

Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hiveservices – Hive QL – Querying Data in Hive - fundamentals of HBase and Zoo Keeper -IBM Info Sphere Big Insights and Streams.

UNIT – V   VISUALIZATION TECHNIQUES   9

Predictive Analytics- Simple linear regression- Multiple linear regression- Interpretation of regression coefficients. Visualizations - Visual data analysis techniques- interaction techniques - Systems and applications.

                                                          TOTAL: 45 PERIODS

COURSE OUTCOMES:

> ➢ Appreciate the computational software's and techniques for handling big data in business applications

REFERENCES:

1. Frank J Ohlhorst, "Big Data Analytics: Turning Big Data into Big Money", Wiley and SAS Business Series, 2013.

2. Colleen Mccue, "Data Mining and Predictive Analysis: Intelligence Gathering andCrime Analysis", Elsevier, Second Edition, 2015.

3. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, Second Edition, 2007.

4. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.

5. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", Wiley and SAS Business Series, 2012.

6. Paul Zikopoulos, Chris Eaton "Understanding Big Data: Analytics for EnterpriseClass Hadoop and Streaming Data", McGraw Hill, 2012.

7. Paul Zikopoulos, Dirk de Roos, Krishnan Parasuraman, Thomas Deutsch , James Giles, David Corrigan, "Harness the Power of Big data - The big data platform", McGraw Hill, McGraw-Hill Osborne Media, 2012.

8. Glenn J. Myatt, "Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining", John Wiley & Sons, Second Edition, 2014.

9. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

10. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Elsevier, Third Edition, 2011.

11. Tom White "Hadoop: The Definitive Guide" Third Edition, O'reilly Media, 2012

12. William Stallings, "Crpyptography and Network security: Principles and Practices", Pearson/PHI, 5th Edition, 2010.

13. Mark Talabis, Robert McPherson, I Miyamoto and Jason Martin, "Information Security Analytics: Finding Security Insights, Patterns, and Anomalies in Big Data", Syngress Media, U.S., 2014.

BN4010	**DISRUPTIVE TECHNOLOGIES FOR DIGITAL TRANSFORMATION IN BUSINESS**	L T P C
		3 0 0 3

OBJECTIVES:

➢ To equip the students with awareness of the digital technologies,
➢ To Understand the Artificial Intelligence, Cognitive Computing, Extended Reality and Internet of Things in a business context.
➢ To articulate the components of blockchain, business use cases for the same and the challenges of use of blockchain.

UNIT - I   INTRODUCTION AND OVERVIEW   9

Digital Transformation – Understanding Digital Transformation – Common Business and Technology Drivers for Transformation - Benefits and goals - - Risks and Challenges - - Data Intelligence Basics – Intelligent decision making - Industry 4.0 and Service 4.0. Spotting Digital Threats and Opportunities. Gartner Hype Cycle. The 5 Principles of Disruptive Innovation for Business Success.

UNIT - II   ARTIFICIAL INTELLIGENCE AND COGNITIVE COMPUTING   9

Review of Artificial Intelligence and Cognitive Computing. Understanding Computer Vision and Conversational Platforms – Latest technology and development.

UNIT - III   EXTENDED REALITY   9

Basics of Virtual Reality, Mixed Reality, Immersive Reality Experiencing Augmented Reality - Blockchain - Understanding components of Blockchain – Hashing, Encryption, Distributed Ledger. Hands-on session on Ethereum blockchain, including development of simple business applications, using Metamask and Solidity.

UNIT - IV   INTERNET OF THINGS   9

Elements of IoT And Its Ecosystem. Understanding IoT Business Value Proposition. Adopting IoT into organization. IoT Security Essentials.

UNIT – V   ROBOTIC PROCESS AUTOMATION AND EMERGING TRENDS   9

Basics of Robotic Process Automation. Hands-on session using Automation Anywhere RPA platform. Review of Cloud, Big Data, Edge Computing, Micro Services. Latest Published Technology Trends - Ethical and Societal Challenges Associated with Digital Technologies.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

➢   Gain sufficient understanding on significance and benefits of Digital Transformation in Business

REFERENCES:
1. Thomas Erl Roger Stoffers, "A Field Guide to Digital Transformation", Pearson
2. Schwab, K. (2017). The Fourth Industrial Revolution. Portfolio Penguin.
3. Christensen, C.M. (2013). Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, Harvard Business Press.
4. Christensen, C.M., Raynor. M.E. (2013). Innovator's Solution: Creating and Sustaining Successful Growth, Harvard Business Press.
5. Fingar, P. (2015). Cognitive Computing: A brief guide for Game Changers. Meghan Kiffer Press
6. Frankish, K., Ramsey, W (eds.). (2014). The Cambridge Handbook of Artificial Intelligence. Cambridge University Press

OBJECTIVES:
- To know various multivariate data analysis techniques for business research.

UNIT I   INTRODUCTION   **9**
Introduction – Basic concepts – Uni-variate, Bi-variate and Multi-variate techniques – Types of multivariate techniques – Classification of multivariate techniques – Guidelines for multivariate analysisand interpretation – Approaches to multivariate model building.

UNIT II   PREPARING FOR MULTIVARIATE ANALYSIS   **9**
Introduction – Conceptualization of research problem – Identification of technique - Examination of variables and data – Measurement of variables and collection of data – Measurement of errors – Statistical significance of errors. Missing data – Approaches for dealing with missing data – Testing the assumptions of multivariate analysis – Incorporating non-metric data with dummy variables.

UNIT III   MULTIPLE LINEAR REGRESSION ANALYSIS, FACTOR ANALYSIS   **9**
Multiple Linear Regression Analysis – Introduction – Basic concepts – Multiple linear regression model – Least square estimation – Inferences from the estimated regression function – Validation of the model. Factor Analysis: Definition – OBJECTIVE – Approaches to factor analysis – methods of estimation – Factor rotation – Factor scores - Sum of variance explained – interpretation of results.

UNIT IV   LATENT VARIABLE TECHNIQUES   **9**
Confirmatory Factor Analysis, Structural equation modeling, Mediation models, Moderation models, Conditional processes, longitudinal studies, latent growth model, Bayesian inference

UNIT V   ADVANCED MULTIVARIATE TECHNIQUES   **9**
Multiple Discriminate Analysis, Logistic Regression, Cluster Analysis, Conjoint Analysis, multidimensional scaling.

                                                                TOTAL: 45 PERIODS

COURSE OUTCOMES:
- Knowledge on the applications of multivariate data analysis.

REFERENCES :
1. Joseph F Hair, Rolph E Anderson, Ronald L. Tatham & William C. Black, Multivariate Data Analysis, Pearson Education, New Delhi, 2005.
2. Barbara G. Tabachnick, Linda S.Fidell, Using Multivariate Statistics, 6th Edition, Pearson, 2012.
3. Richard A Johnson and Dean W.Wichern, Applied Multivariate Statistical Analysis, Prentice Hall,New Delhi, 2005.
4. David R Anderson, Dennis J Seveency, and Thomas A Williams, Statistics for Business and Economics, Thompson, Singapore, 2002

BN4012   **NATURAL LANGUAGE PROCESSING (NLP)**   **L T P C**

                                                                        3 0 0 3

OBJECTIVES:

➢   To familiarize the concept and fundamentals of Natural Language Processing

UNIT – I   INTRODUCTION TO TEXT MINING   9
Introduction to text mining; NLP – Purpose of using text for analysis - Text mining vs NLP - Challenges in NLP - Syntaxes Semantics - Introduction to language models - NLP methods & Workflow - Applications of NLP.

UNIT – II   FUNDAMENTALS OF TEXT MINING   9
Data extraction – Introduction to pre-process text - Steps in text pre- processing - Tokenization –Stop Words removal - Removing HTML tags, emojis, smileys etc., - Stemming & Lemmatization - Text vectorization and DTM - TFIDF and Topic modeling – Text visualization.

UNIT – III   WORD EMBEDDING   9
Introduction to Word embedding - Limitations of count vectorizers - Cosine Similarity - Co-occurrence Matrix - Pre-trained word embedding - Applications of word embedding – Vector space models – Manipulating words in Vector spaces.

UNIT – IV   SENTIMENT ANALYSIS WITH LOGISTIC REGRESSION   9
Supervised ML & Sentiment Analysis - Vocabulary & Feature Extraction - Negative and Positive Frequencies - Feature Extraction with Frequencies – Preprocessing - Logistic Regression – Training and Testing – Visalizing Tweets and building Logistic Regression Models.

UNIT – V   APPLICATION OF PYTHON FOR NLP   9
Application of Python for NLP – Processing Text files – PDF files – Utilizing regular expressions for pattern searching – Tokenization using Python – Vocabulary matching with Spacy – Speech Tagging – Entity recognition – Chatbots – Natural language generation.

                                                                        TOTAL: 45 PERIODS
COURSE OUTCOMES:
➢   Appreciate the significance and important of NLP in Business analytics.

REFERENCES:
1.   "Natural Language Processing with Python" by Steven Bird, Ewan Klein, and Edward Loper, 2009 O'Reilly.
2.   "Text Analytics with Python" by Dipanjan Sarkar, 2019, APRESS
3.   Speech and Language Processing, Dan Jurafsky, James H. Martin Prentice Hall, 2009.

4.   Introduction to Information Retrieval, Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schütze, 2008, Cambridge University Press.
5.   Deep Learning for Natural Language Processing, Palash Goyal, Sumit Pandey, and Karan Jain, 2018, APRESS.
6.   Machine Learning for Text, Charu C. Aggarwal, Springer International Publishing, 2023.
7.   Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurélien Géron, 2019, O'REILLY
8.   Practical Natural Language Processing, Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta,and Harshit Surana (Chapter 9), 2020, O;REILLY. Edition, 2014.