ADIKAVI NANNAYA UNIVERSITY: RAJMAHENDRAVARAM

BCA Data Science

Single Major
From 2023-24 (Syllabus-Curriculum)
Course Structure

Semester	Course Number	Course Name	No. of Hrs/Week	No. of Credits
Semester-I	1	Fundamental of Commerce	4	4
	2	Business Organisation	4	4

SEMESTER-I

COURSE 1: FUNDAMENTALS OF COMMERCE

Theory	Credits: 4	4 hrs/week

Learning Objectives:
The objective of this paper is to help students to acquire conceptual knowledge of the Commerce, Economy and Role of Commerce in Economic Development. To acquire Knowledge on Accounting and Taxation.

Learning Outcomes:
At the end of the course, the student will able to
Identify the role commerce in Economic Development and Societal Development. Equip with the knowledge of imports and exports and Balance of Payments. Develop the skill of accounting and accounting principles. They acquire knowledge on micro and micro economics and factors determine demand and supply. An idea of Indian Tax system and various taxes levied on in India. They will acquire skills on web design and digital marketing.

Unit 1: Introduction: Definition of Commerce – Role of Commerce in Economic Development - Role Commerce in Societal Development. Imports and Exports, Balance of Payments. World Trade Organization.

Unit 2: Economic Theory: Macro Economics – Meaning, Definition, Measurements of National Income, Concepts of National Income. Micro Economics – Demand and Supply. Elasticity of Demand and Supply. Classification of Markets -Perfect Competition – Characteristics – Equilibrium Price, Marginal Utility.
.
Unit 3: Accounting Principles: Meaning and Objectives Accounting, Accounting Cycle - Branches of Accounting - Financial Accounting, Cost Accounting, Management Accounting. Concepts and Conventions of Accounting – GAAP.

Unit 4: Taxation: Meaning of Tax, Taxation - Types of Tax- Income Tax, Corporate Taxation, GST, Customs & Exercise. Differences between Direct and Indirect Tax – Objectives of Tax- Concerned authorities – Central Board of Direct Taxes (CBDT) and Central Board of Excise and Customs (CBIC).

Unit 5: Computer Essentials: Web Design - Word Press Basics, Developing a Simple Website. Digital Marketing - Social Media Marketing, Content Marketing, Search Engine Optimization (SEO), E-mail Marketing. Data Analytics- Prediction of customer behavior, customized suggestions.

Lab Exercise:
- Build a sample website to display product information.
- Provide wide publicity for your product over social media and e-mail
- Estimate the customer behavior and provide necessary suggestions regarding the products of his interest.

Activities:
- Assignment on GAAP.
- Group Activates on Problem solving.
- Collect date and report the role of Commerce in Economic Development.
- Analyze the demand and supply of a product and make a scheduled based on your analysis, problems on elasticity of demand.
- Identify the Tax and distinguish between Direct Tax and Indirect Tax.
- Assignments and students seminars on Demand function and demand curves
- Quiz Programs
- Assignment on different types of taxes which generate revenue to the Government of India.
- Invited lectures on GST and Taxation system
- Problem Solving Exercises on current economy situation.
- Co-operative learning on Accounting Principles.
- Group Discussions on problems relating to topics covered by syllabus
- Examinations (Scheduled and surprise tests)
- Any similar activities with imaginative thinking beyond the prescribed syllabus

Reference Books:
1. S.P. Jain & K.L Narang, Accountancy - I Kalyani Publishers.
2. R.L. Gupta & V.K. Gupta, Principles and Practice of Accounting, Sultan Chand
3. Business Economics -S.Sankaran, Margham Publications, Chennai.
4. Business Economics - Kalyani Publications.
5. Dr. Vinod K. Singhania: Direct Taxes – Law and Practice, Taxmann Publications.
6. Dr. Mehrotra and Dr. Goyal: Direct Taxes – Law and Practice, SahityaBhavan Publications
.

SEMESTER-I

COURSE 2: BUSINESS ORGANIZATION

Theory	Credits: 4	4 hrs/week

Learning Objectives:

The course aims to acquire conceptual knowledge of business, formation various business organizations. To provide the knowledge on deciding plant location, plan layout and business combinations.

Learning outcomes:

After completing this course a student will have:

Ability to understand the concept of Business Organization along with the basic laws and norms of Business Organization. The ability to understand the terminologies associated with the field of Business Organization along with their relevance and to identify the appropriate types and functioning of Business Organization for solving different problems. The application of Business Organization principles to solve business and industry related problems and to understand the concept of Sole Proprietorship, Partnership and Joint Stock Company etc.

Unit 1: Business: Concept, Meaning, Features, Stages of development of business and importance of business. Classification of Business Activities. Meaning, Characteristics, Importance and Objectives of Business Organization.. Difference between Industry & Commerce and Business & Profession, Modern Business and their Characteristics.

Unit 2: Promotion of Business: Considerations in Establishing New Business. Qualities of a Successful Businessman. Forms of Business Organization - Sole Proprietorship, Partnership, Joint Stock Companies & Co-operatives and their Characteristics, relative merits and demerits, Difference between Private and Public Company, Concept of One Person Company.

Unit 3: Plant Location and Layout: Meaning, Importance, Factors affecting Plant Location. Plant Layout - Meaning, Objectives, Importance, Types of Layout. Factors affecting Layout. Size of Business Unit - Criteria for Measuring the Size and Factors affecting the Size. Optimum Size and factors determining the Optimum Size.

Unit 4: Business Combination: Meaning, Characteristics, Objectives, Causes, Forms and Kinds of Business Combination. Rationalization: Meaning, Characteristics, Objectives, Principles, Merits and demerits, Difference between Rationalization and Nationalization.

Unit 5: Computer Essentials: Milestones of Computer Evolution – Computer, Block diagram, generations of computer . Internet Basics - Internet, history, Internet Service Providers,

Types of Networks, IP, Domain Name Services, applications. Ethical and Social Implications - Network and security concepts- Information Assurance Fundamentals, Cryptography - Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques, privacy and data protection

Activities:
- Assignment on business organizations and modern business.
- Group Discussion on factors that influence plan location
- Seminars on different topics related to Business organization
- Case study could be given to present business plan of students choice.
- Identifying the attributes of network (Topology, service provider, IP address and bandwidth of your college network) and prepare a report covering network architecture.
- Identify the types of malwares and required firewalls to provide security.
- Latest Fraud techniques used by hackers.

Reference Books:
1. Gupta, C.B., "Business Organisation", Mayur Publiction, (2014).
2. Singh, B.P., Chhabra, T.N., "An Introduction to Business Organisation & Management", Kitab Mahal, (2014).
3. Sherlekar, S.A. &Sherlekar, V.S, "Modern Business Organization & Management Systems Approach Mumbai", Himalaya Publishing House, (2000).
4. Bhusan Y. K., "Business Organization", Sultan Chand & Sons.
5. Prakash, Jagdish, "Business Organistaton and Management", Kitab Mahal Publishers (Hindi and English)
6. Fundamentals of Computers by V. Raja Raman
7. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson

Course – I & II Model Paper (70 Marks)

SECTION A (Multiple Choice Questions)   **30 x 1 = 30 M**

30 Multiple Choice Questions (Each Unit 6 Questions)

SECTION B (Fill in the blanks)   **10 x 1 = 10 M**

10 Fill in the Blanks (Each Unit 2 Questions)

SECTION C (Very short answer questions)   **10 x 1 = 10 M**

10 Very short answer questions (Each Unit 2 Questions)

SECTION D (Matching) (From 5 Units)   **2 x 5 = 10 M**

1   A
     B
     C
     D
     E

2   A
     B
     C
     D
     E

SECTION E (True or False)   **10 x 1 = 10 M**

10 True or False (Each Unit 2 Questions)

Programme: B.C.A. DATA SCIENCE (Major)
SEMESTER – II

COURSE STRUCTURE

Year	Semester	Course	Title of the Course	No. of Hrs /Week	No. of Credits
	II	3	Data Science & R Language	3	3
			Data Science & R Language Lab	2	1
		4	Data Analytics using Excel	3	3
			Data Analytics using Excel Lab	2	1

SEMESTER-II
COURSE 3: Data Science & R Language

Theory	Credits: 3	3 hrs/week

Aim and objectives of Course:

Data Science is a fast-growing interdisciplinary field, focusing on the analysis of data to extract knowledge and insight. This course will introduce students to the collection. Preparation, analysis, modeling and visualization of data, covering both conceptual and practical issues. Examples and case studies from diverse fields will be presented, and hands-on use of statistical and data manipulation software will be included.

Learning outcomes of Course:

- Recognize the various discipline that contribute to a successful data science effort.
- Understand the processes of data science identifying the problem to be solved, data collection, preparation, modeling, evaluation and visualization.
- Be aware of the challenges that arise in Data Sciences.
- Be able to identify the application of the type of algorithm based on the type of the problem.
- Be comfortable using commercial and open source tools such as the R/Python language and its associated libraries for data analytics and Visualization.

UNIT I: Defining Data Science and Big data, Benefits and Uses, facets of Data, Data Science Process. History and Overview of R, Getting Started with R, R Nuts and Bolts

UNIT II: The Data Science Process: Overview of the Data Science Process-Setting the research goal, Retrieving Data, Data Preparation, Exploration, Modeling, data Presentation and Automation. Getting Data in and out of R, Using reader package, Interfaces to the outside world.

UNIT III: Machine Learning: Understanding why data scientists use machine learning-What is machine learning and why we should care about, Applications of machine learning in data science, Where itis used in data science, The modeling process, Types of Machine Learning-Supervised and Unsupervised.

UNIT IV: Handling large Data on a Single Computer: The problems we face when handling large data, General Techniques for handling large volumes of data, Generating programming tips for dealing with large datasets.

UNIT V: Sub setting R objects, Vectorised Operations, Managing Data Frames with the dplyr, Control structures, functions, Scoping rules of R, Coding Standards in R, Loop Functions, Debugging, Simulation. Case studies on preliminary data analysis.

TEXT BOOKS:

1. DavyCielen, Arno.D.B.Maysman, Mohamed Ali, "Introducing Data Science"Manning Publications, 2016.
2. Roger D. Peng, "R Programming for Data Science" Lean Publishing, 2015.

REFERENCE BOOKS:

1. Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, AbhijitDasgupta, "PracticalData Science Cookbook", Packt Publishing Ltd., 2014.

WebReferences for case studies:
1. https://www.kaggle.com/datasets
2. https://github.com/

SEMESTER-II
COURSE 3: Data Science & R Language Lab

Practical   Credits: 1   2 hrs/week

List of Experiments

1. Installing R and R studio, with proper notes on version management, cosmetic settings and different libraries.
2. Basic operations in r with arithmetic and statistics.
3. Getting data into R, Basic data manipulation, Loading Data into R
4. Basic plotting
5. Loops and functions
6. Create Vectors, Lists, Arrays, Matrices, Data frames and operations on them.
7. Demonstrate the visualization and graphics using visualization packages like ggplot2.
8. Implement Loop functions with lapply(), sapply(), tapply(), apply(), mapply().
9. Explore data using Single Variables: Unimodal, Bimodal, Histograms, Density Plots, Barcharts
10. Explore data using two Variables: Line plots, Scatter Plots, smoothing cures, Bar charts
11. Explore and implement commands using dplyr package
12. Download a dataset and work on basic data manipulation followed by inferential statistics

RECOMMENDED TEXT BOOKS:
1. Mark Gardener, "Beginning R - The Statistical Programming Language", John Wiley &Sons, Inc., 2012.
2. W. N. Venables, D. M. Smith and the R Core Team, "An Introduction to R", 2013. Recommended Reference books:
3. The art of R Programming: A tour of Statistical Software design. Norman Matloff.KindleEdition
4. The book of R : The first course in Programming and Statistics by Tilman M. Davies.

Recommended Co-curricular activities: (Co-curricular Activities should not promote copying from text book or from others' work and shall encourage self/independent and group learning)

A. Measurable:
1. Assignments on:
2. Student seminars (Individual presentation of papers) on topics relating to:
3. Quiz Programmes on:
4. Individual Field Studies/projects:
5. Group discussion on:
6. Group/Team Projects on:

B. General

1. Collection of news reports and maintaining a record of paper-cuttings relating to topics covered in syllabus
2. Group Discussions on:
3. Watching TV discussions and preparing summary points recording personal observations etc., under guidance from the Lecturers
4. Any similar activities with imaginative thinking.
5. Recommended Continuous Assessment methods:

SEMESTER-II
COURSE 4: Data Analytics using Excel

Theory	Credits: 3	3 hrs/week

Course Objectives:

l. The objective of the course is to introduce the concepts of computer fundamental & their applications for the efficient use of Excel software in data analysis.

Course Learning Outcomes:

Upon successful completion of the course, a student will be able to:
1. Understand the evolution and functionality of a Digital Computer.
2. Understand hardware and software components
3. Have exposure to Excel software package
4. Understand various functions & formulae used in data analysis, preparing charts etc.
5. Apply data analysis tools like pivot table, goal seek, scenarios etc.

Syllabus

UNIT - I:
Introduction to Computers: Characteristics and limitations of computer, Block diagram of computer, types of computers, uses of computers, computer generations, Types of Hardware: Input devices and output devices, Memories: Primary memory, Secondary Memory, and cache memory,

UNIT - II:
Types of Software: System software, Application software, commercial, open source, domain and free ware software Microsoft Excel: Fundamentals of Excel : Features of MS-Excel, Excel Program Screen, the Ribbon, Office button and Quick Access tool bar, Worksheets, rows, columns, cells.

UNIT-III
Worksheet basics: Creating a new workbook, Opening a Workbook, Saving a Workbook, Workbooks, Entering labels, values, and formulas in worksheet Editing a worksheet: Editing cell contents - cutting, copying and pasting cells Find and Replace - Undo, Inserting rows and columns, Deleting rows and columns
Formatting Options: Adjusting row height and column width - Formatting cell values, conditional formatting

UNIT-IV
Formulas and Functions: Formulas: Enter and edit formula in Excel, operators used ln formula, cell references in formula Functions: Definition, Inserting a function in Excel, Types of functions in Excel: Mathematical, Statistical, Logical, Text, Date & Time functions Working with Data ranges: Sorting: Sorting on single column, sorting on multiple columns, Filtering: Filtering data using AutoFilter

UNIT-V
Working with Charts: Different types of charts, Creating a chart, Parts of chart, Changing chart type, changing chart options Analyzing and Organizing Data: Data Validation, Scenarios, SubTotals Working with PivotTables: Creating a PivotTable, Specifying PivotTable data, Working with PivotTable Layout

Text Books:

l. Fundamentals Of Computers by Reema Thareja from Oxford University Press
2. Microsoft Excel 2007, Custom Guide Inc, 2007

Reference Books:
l. Rajaraman, Introduction to Information Technology, PHI
2. Peter Norton, Introduction to Computers, Sixth edition, Tata Mccraw Hill (2007).
3. Microsoft Office 2007 Fundamentals, lst Edition By Laura Story, Dawna Walls
4. Working in Microsoft Office - Ron Mansfield – TMH.
5. MS Offrce 2007 in a Nutshell -Sanjay Saxena - Vikas Publishing House.

SEMESTER-II
COURSE 4: Data Analytics using Excel Lab

Practical   Credits: 1

2 hrs/weekList of Experiments

1. Prepare your class time table using different Text formatting
2. Create a payslip with details of employee salary
3. prepare an Excel sheet to calculate students result and grades based on their marks
4. Prepare an excel sheet to enter some strings and perform the following text functions

- a. Find length of strings
- b. Convert strings into uppercase and lowercase
- c. Remove extra spaces in the strings
- d. Extract substrings from the strings

5. Prepare an excel sheet to perform the following statistical analysis
    a. Find mean of the values
    b. Find mode of the values
    c. Calculate standard deviation
    d. Find largest and smallest values
6. Draw different types of charts for weather analysis of 5 successive years
7. Prepare an excel sheet for creating a pie chart for budget analysis
8. Prepare an excel sheet to illustrate the sorting
9. Prepare an excel sheet to illustrate the filtering
10. Prepare an excel sheet to illustrate the concept of sub totals
11. Prepare an excel sheet for restricting data entry using data validation feature
12. Create and demonstrate to analyze the data using a pivot table
    uous series.

MODEL QUESTION PAPER - THEORY

Time: 3 Hours.   Max Marks: 70

SECTION – A

Answer any 5 questions. Each question carries 4 marks   (5 X 4 = 20M)
        (Total 8 questions, questions 1-5 from Units 1-5 & questions 6-8 from any of the units)

1. Unit -I
2. Unit-II
3. Unit-III
4. Unit-IV
5. Unit-V
6. From any Unit
7. From any Unit
8. From any Unit

SECTION – B

Answer all the questions. Each question carries 10 marks.   (5 X 10 = 50M)
        (Each question (both 'A' or 'B') from each Unit.

9. from Unit I
(OR)
 from Unit I

10. from Unit II
(OR)
from Unit II

11. from Unit III
(OR)
 from Unit III

12. from Unit IV
(OR)
 from Unit IV

13. from Unit V
(OR)
 from Unit V