Academic Council: -/--/--
Item No. :

SIES College of Arts, Science & Commerce
RISE WITH EDUCATION
Sion (West), Mumbai – 400022.
(Autonomous)

Faculty: Science
Program: B.Sc.
Subject: Data Science
Academic year: 2023-2024

Syllabus for Semester- I and Semester – II

Credit Based Semester and Grading Syllabi (as per NEP) approved by Board of Studies in Data Science tobe brought into effect from June 2023.

PREAMBLE

Data has become the most important factor in this era of digital transformation. The technological advancements are seen in all walks of life and therefore we are flooded with enormous data. Every business relies on data to deliver better products as well as services. All data are stored in cloud, and so accessed and processed easily. Data analytics has helped in better decision making with sufficient data insights.

Predictive Analysis has played a crucial role in making businesses smarter with improvised strategies. Machine Learning and Artificial Intelligence are used together to optimize business operations and data management. Augmented analytics uses machine learning and natural language processing to automate the process of data analysis. Global data is predicted to grow due to data generated by the Internet of Things(IoT) and cloud computing advancements. These developments have given rise to a new area of study, called Data Science.

Data Science as an area has evolved out of the applications of various tools and techniques in the field of Computer Science, Mathematics and Statistics. There is an increasing demand to capture, analyse the enormous data present in a number of application domains. The data in these applications then needs to be converted into actionable strategies for effective decision making. So, the study of data science has become essential to cater to the growing need of data scientists and data analysts.

This course focuses on educating the students about the essentials of computer science, applied mathematics and applied statistics with respect to the data science applications.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

NO.	Details
PO1.	**Solving Complex Problems**:- Apply the knowledge gained in breaking down complex problems into simple components; and to design processes required for problem solving.
PO2.	**Critical Thinking: -** Ability to apply the acquired knowledge to identify assumptions and evaluate their accuracy and validity.
PO3.	**Reasoning ability and Rational thinking: -** Ability to analyse, interpret data and draw logical conclusions; to evaluate ideas rationally.
PO4.	**Research Aptitude: -** Ability to ask relevant questions to identify and define the problem, applying research tools for analysis and interpretation of data. Understand and comply with research ethics.
PO5.	**Effective Communication skill: -** Demonstrate the ability to listen and to clearly express ideas verbally. Equip to write reports, make presentations effectively.
PO6.	**Information and Digital Literacy: -** Equip to use appropriate tools and techniques inclusive of internet and electronic media for acquiring, assessing and analysing data from diverse resources.
PO7.	**Social Interactive Skills and team work: -** Exhibit networking and social interactive skills; function effectively as an individual and as a member in diverse groups; demonstrate leadership quality useful for employability
PO8.	**Self-directed and Lifelong Learning:** Ability to explore and gain knowledge in independent and self-reliant ways. Demonstrate ability to adapt and upgrade with the global , social and technological changes.
PSO1.	**Sound Knowledge:** Demonstrate the knowledge of core data science concepts and apply them to develop a user- friendly, scalable, and robust applications
PSO2.	**Critical and Rational Thinking:** Exhibit higher order skills to adapt to the everchanging technological environment
PSO3.	**Logic Building and Programming Skills:** The ability to apply logic to problem solving and acquire proficiency in various programming languages.
PSO4.	**Data Analysis :** Apply quantitative modelling and data analysis techniques to solve real world business problems, Learn tools and techniques for transformation of data and statistical data analysis
PSO5.	**Pursue Higher Education:** Make students competent to take up advanced degree courses like MSc(Data Science),MCA, MSc(CS), MSc(IT) and MBA etc.

FYBSc(DS) - Semester I

Course Code	Course Type	Course Title	Credits
SIUDSMJ111	Core Subject (Major)	Fundamentals of Data Science	**3**
SIUDSMN111	Core Subject (Minor)	Computer Oriented Statistical Techniques	**3**
SIUDSVS111	Core Subject (VEC)	Data Processing Using Excel	**1**
SIUDSSE111	Ability Enhancement Skill Course	Python Programming – I	**1**
SIUDSOE111	Open	Data Management in Excel	**3**
SIUENAE111	Ability Enhancement Course (AEC)	Communication Skills in English	**2**
SIUSFVE111	Value Education Course (VEC)	Environmental Studies	**2**
SIUSFIK111	Indian Knowledge System (IKS)	Indian Knowledge System	**2**
SIUDSMJP111	Core Subject Practical	Fundamentals of Data Science	**1**
SIUDSMNP111	Core Subject Practical	Computer Oriented Statistical Techniques	**1**
SIUDSVSP111	Core Subject Practical	Data Processing Using Excel	**1**
SIUDSSEP111	Ability Enhancement Skill Course	Python Programming – I	**1**
SIUDSOEP111	Open	Data Management in Excel	1
		TOTAL CREDITS	**22**

FYBSc(DS) - Semester I

Fundamentals of Data Science (SIUDSCA111)

Course Objective:

- Students can understand the digital logic design and structure of various functional modules of the computer and how they interact to provide the processing needs of the user.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Learner understands the key issues in big data management and its associated applications in intelligent business and scientific computing.

CO2: Learner is analysing problem and solving it by implementing suitable techniques.

CO3: Analyse the models using different Machine Learning techniques.

Unit	Contents	No. of Lectures
I	**Introduction:** What is Data Science? Big Data and Data Science hype – and getting past the hype, Why now? –Datafication, Current landscape of perspectives, A data Science Profile, Skill sets. Statistical Inference, Populations and samples, Big Data, new kinds of data, modelling, statistical modeling probability distributions, fitting a model **Exploratory Data Analysis and the Data Science Process:** Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA, The Data Science Process.	**15**
II	**Algorithms:** Machine Learning Algorithms – Supervised Learning, Unsupervised Learning and Reinforcement Learning, k-Nearest Neighbours (kNN), Simple Linear Regression, Naïve Bayes Algorithm, k-means clustering and Apriori Algorithm.	**15**
III	**AI problems, foundation of AI and history of AI intelligent agents:** Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation. Searching-Searching for solutions, uniformed search strategies – Breadth first search, depth first Search.Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms.	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Artificial Intelligence – A Modern Approach"	S. Russel and P. Norvig	Pearson Education	Second Edition,	
2	Artificial Intelligence: Structures and Strategies for complex problem solving	G. Luger	Pearson Education.	Fourth Edition,	
3	Doing Data Science- Straight Talk from the Frontline	Cathy O Neil, Rachel Schutt	Orielly		
4	Mining of Massive Data Sets	Jure Leskovek, Anand Rajaraman, Jeffrey Ullman	Cambridge University Press		2014

FYBSc(DS) - Semester I

Fundaments of Data Science (SIUDSCAP111)

1.	Develop a program for Pandas Data Frame.
2.	Develop a program to read and write in .csv files.
3.	Develop a program for Basic plots using Matplotlib.
4.	Develop a program for Variability.
5.	Develop a program for Normal Curves.
6.	Develop a program for Correlation and scatter plots.
7.	Develop a program for Correlation Coefficient.
8.	Develop a program for Simple Linear Regression.
9.	Develop a program to implement and demonstrate KNN Algorithm.
10.	Develop a program to implement k-Means clustering algorithm to cluster the set of data stored in .CSV file.

FYBSc(DS) - Semester I

Computer Oriented Statistical Techniques - I (SIUDSCB111)

Course Objective:

- Students can apply the various statistical functions on any given data to analyse and take necessary decisions.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Assess the mean, median, mode of a data set which describes the whole set of data with a single value.

CO2: Predict whether data is uniformly distributed, based on the value taken by Skewness and Kurtosis.

CO3: Construct a Hypothesis, a testable statement of what the researcher(s) predict will be the outcome of the study.

Unit	Contents	No. of Lectures
I	**Statistical Methods:** Definition and scope of Statistics, concepts of statistical population and sample Data: quantitative and qualitative, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, consistency and independence of data with special reference to attributes. **The Mean, Median, Mode, and Other Measures of Central Tendency:** Index, or Subscript, Notation, Summation Notation, Averages, The Arithmetic Mean , The Weighted Arithmetic Mean ,Properties of the Arithmetic Mean ,The Arithmetic Mean Computed from Grouped Data ,The Median ,The Mode, The Empirical Relation Between the Mean, Median, and Mode, The Geometric Mean G, The Harmonic Mean H ,The Relation Between the Arithmetic, Geometric, and Harmonic Means, The Root Mean Square, Quartiles, Deciles, and Percentiles, Software and Measures of Central Tendency. The Standard Deviation and Other Measures of Dispersion: Dispersion, or Variation, The Range, The Mean Deviation, The SemiInterquartile Range, The 10–90 Percentile Range, The Standard Deviation, The Variance, Short Methods for Computing the Standard Deviation, Empirical Relations Between Measures of Dispersion, Absolute and Relative Dispersion; Coefficient of Variation, Standardized Variable; Standard Scores, Software and Measures of Dispersion.	15

II	**Moments, Skewness, and Kurtosis :** Moments , Moments for Grouped Data ,Relations Between Moments , Computation of Moments for Grouped Data, Charlie's Check and Sheppard's Corrections, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis. **Elementary Probability Theory**: Definitions of Probability, Conditional Probability; Independent and Dependent Events, Mutually Exclusive Events, Probability Distributions, Mathematical Expectation, Relation Between Population, Sample Mean, and Variance, Combinatorial Analysis, Combinations, Stirling's Approximation to n!, Relation of Probability to Point Set Theory, Euler or Venn Diagrams and Probability. **Elementary Sampling Theory :** Sampling Theory, Random Samples and Random Numbers, Sampling With and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Differences and Sums, Standard Errors, Software Demonstration of Elementary Sampling Theory.	**15**
III	**Curve Fitting and the Method of Least Squares:** Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting, The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least Squares Parabola, Regression, Applications to Time Series, Problems Involving More Than Two Variables. **Correlation Theory:** Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation, Coefficient of Correlation, Remarks Concerning the Correlation Coefficient, Product-Moment Formula for the Linear Correlation Coefficient, Short Computational Formulas, Regression Lines and the Linear Correlation Coefficient, Correlation of Time Series, Correlation of Attributes, Sampling Theory of Correlation, Sampling Theory of Regression	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Schaum's Outline of Statistics	Murray R. Spiegel, Larry J. Stephens.	Mcgraw – Hill International	6th	2018
2.	Fundamental of Mathematical Statistics	S.C. Gupta and V.K. Kapoor		12th	2020
3.	Mathematical statistics	J.N. Kapur and H.C. Saxena	S. Chand	20th	2016
4	Introduction to the Theory of Statistics	Mood, A.M. Graybill, F.A. and Boes, D.C	Tata McGraw-Hill Pub. Co. Ltd.	3rd	2017
5	Mathematical Statistics with Applications	Miller, Irwin and Miller, Marylees	Pearson Education, Asia	8th	2014

FYBSc(DS) - Semester I

Computer Oriented Statistical Techniques (SIUDSCBP111)

List of Practical: (Use Excel , Use data from Kaggle.com or any data repository from any website)

1.	Graphical representation of data.
2.	Execute the statistical functions: mean, median, mode
3.	Execute the statistical functions: quartiles, range, inter quartile range histogram
4	Calculate the standard deviation, variance, co-variance, correlation
5	Problems based on moments, skewness and kurtosis.
6	Problems based on Probability.
7	Correlation coefficient for a bivariate frequency distribution.
8	Fitting of polynomials, exponential curves.
9	Planes of regression and variances of residuals for given simple correlations.
10	Planes of regression and variances of residuals for raw data.

FYBSc(DS) - Semester I

Data Processing Using Excel (SIUDSVS111)

Course Objective:

- To familiarize the prospective learners with mathematical structures that are fundamentally discrete by introducing concepts of sets and functions, forming and solving recurrence relations and different counting principles.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Understand the advance formula use in excel.

CO2: Analysis of data in excel.

CO3: Understand the macros in excel.

Unit	Contents	No. of Lectures
I	**Creating Formulas.:** Using Formulas, Formula Functions – Sum, Average, if, Count, max, min, Proper, Upper, Lower, Using AutoSum,Offset. **Advance Formulas:** Concatenate, Vlookup, Hlookup, Match, Countif, Text, Trim. **Data Analysis:** Sorting, Filter, Text to Column, Data Validation. **PivotTables:** Creating PivotTables, Manipulating a PivotTable, Using the PivotTable Toolbar, Changing Data Field, Properties, Displaying a PivotChart, Setting PivotTable Options, Adding Subtotals to PivotTables. **Making Macros:** Recording Macros, Running Macros, Deleting Macros. Looping and flow control , Creating and manipulating names in VBA , Event programming, Arrays, Creating classes and collections . Using VBA to create pivot tables , Sample user-defined functions: Sorting and concatenating, Sorting numeric and alpha characters, Searching for a string within text.	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Microsoft Excel and VBA and Macros	Bill Jelen and Tracy Syrstad			
2	Learn Data Mining Through Excel: A Step-by-Step Approach for Understanding Machine Learning Methods	Hong Zhou	Apress	First Edition	

FYBSc(DS) - Semester I

Data Processing Using Excel (SIUDSVSP111)

List of Practical (ANY FIVE): (Implement using Excel)

1.	a. Data entry using spreadsheet : Text, Number, Formula, Function, Auto fill, Auto Correct and Data Validation. b. Using Total and Subtotal: +, sum() , Quick sum, subtotal(), sumif(), conditional sums, sorting of dat
2.	Lookup(), HLOOKUP(), VLOOKUP(), date functions, numeric functions, string functions, Index(), Match()
3.	Pivot Table: i. Creating a Pivot Table ii. Layout of the PivotTable
4.	In Excel import the data from text file, non-textual file, image file, web page and table.
5.	Demonstrate database connectivity in Excel.
6.	Demonstrate data tool of Excel. (Text to column , Flash fill, remove duplicate, Data validation, consolidating and relationship)
7.	Demonstrate What-if analysis tool of Excel.
8.	Using macro i. Add serial number. ii. Insert multiple column. iii. Auto fit row and column.
9.	Using macro i. Sort worksheets alphabetically. ii. Protect all worksheet at one go.

	iii. Unprotect all worksheet at one go.
10.	Demonstrate filter and sort in excel.

FYBSc(DS) - Semester I

Python Programming -I (SIUDSSE111)

Course Objective:

- Students can develop mini projects in Python for any real time situation they are exposed to.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Compare the different data types and operators in Python and use the IF statement in writing programs.

CO2: Design programs using loops and arrays, predict the use of string concepts to solve simple and complex problems.

CO3: Compose python statements using list, dictionary and tuples.

Unit	Contents	No. of Lectures
I	**Getting started with Python Language**: Python Data Types, Simple Mathematical Operators, Bitwise Operator, Variable Scope and Binding, Basic Input and Output, Conditional Statement **Loops**: For loops, Pass Statement, While Loop, Break and Continue in Loops **Functions:** Defining and calling functions, Defining functions with list arguments, Defining a function with an arbitrary number of arguments, Lambda (Inline/Anonymous),Recursive functions, Defining a function with arguments, Iterable and dictionary unpacking, Map Function, Reduce Function, Filter Function **Arrays**: Access individual elements through indexes, append(),insert(), extend(), fromlist() , remove() ,pop() , index() , reverse(), buffer_info(), count() method, tolist() method, Multidimensional arrays **String Formatting**: Basics of String Formatting, Float formatting, Named placeholders, String formatting with datetime, Formatting Numerical Values, **String Methods.** **Dictionary**, **List, Tuple**	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1 .	A Practical Introduction to Python Programming	Brian Heinold	*		2021

2 .	Python Basics: A Practical Introduction to Python 3	David Amos, Dan Bader, Joanna Jablonski, Fletcher Heisler	Not Known	4th	Copyright © Real Python (realpython.com), 2012–2020
3 .	Learning Python	Mark Lutz	O'Reilly Media, Inc.	5th	2013
4 .	Python Tutorial Release 3.7.0	Guido van Rossum	Python Software Foundation	3rd	2018
5 .	Think Python	Allen B. Downey	O'Reilly Media, Inc.	2nd	2015

FYBSc(DS) - Semester I

Python Programming-I (SIUDSSEP111)

(Implement using IDLE Python 3.8/Spyder(Anaconda3))

1.	**Code the following programs using if-elif-else:**
a.	Accept a number and check whether the number is positive or negative or a zero.
b.	Accept 3 numbers and find the largest of the 3 numbers.
c.	Swap 2 numbers using multiple assignment statement.
d.	A company insures its drivers in the following cases: − If the driver is married. − If the driver is unmarried, male & above 30 years of age. − If the driver is unmarried, female & above 25 years of age. In all other cases the driver is not insured. If the marital status, sex and age of the driver are the inputs, write a program to determine whether the driver is to be insured or not.
e.	i. Assign a name in the code and allow the use to guess the name and check if both are same. ii. Generate a random number in the code. Allow user to guess the number and check if both are the same.
2.	**Code the following programs using Loops and Functions:**
a.	i. Accept a number and find the factorial of the number ii. Accept a number and find the factorial of the number. Use Recursive Function. iii. Print Fibonacci series up to 10 terms. Use multiple assignment too. iv. Print Fibonacci series up to 10 terms. Use Recursive function. v. Accept a number and find the sum of the digits of that number.

b.	Accept a number and check whether the number is: i. An Armstrong number or not ii. Strong number or not iii. Perfect number or not iv. Palindrome
c.	Accept a number and print the number in words. Example 326 should be printed as Three Two Six.
d.	Write a menu driven program to: i. Accept a number and check if the number is odd or even ii. Accept a number and check whether the number is Prime or not
3.	**Code the following programs using Functions, Loops, Arrays, Strings:**
a.	Initialize an array with 5 integers and demonstrate the use of append((), insert(), extend(), fromlist(), remove(), pop(), index(), reverse(), buffer_info(), count(), tostring(), tolist() and fromstring()
b	Perform the following on Strings: i. Split a string based on '\n' ii. Check for the presence of a substring in a string iii. Replace a string with any other iv. Find the index of the first occurrence of a substring
c	Perform the following on Strings: i. Reverse a string by words ii. Generate password iii. Count the occurrences of a substring in a given string iv. Exchange the last and the first letter in a string v. Swapcase vi. Wrap text
4.	**Code the following programs using Functions, Loops, List:**
a.	Accept a string. Print smallcase letters first and then uppercase letters of the input string – Output to be stored in a list.
b.	Work on the following aspects using lists as input: i. Find largest number in the list ii. Remove duplicates in a list iii. Copy a list iv. To print any value from a given list

c.	Use lists as the data structure to do as directed: i. Count the number of occurrences of each element in a list ii. To concatenate any two lists iii. To check for a common element in two given lists

5.	**Code the following programs using Functions, Loops, Dictionary:**
a.	Print the key value in a given Dictionary to demonstrate the use of Dictionary Comprehension
b.	Find the occurrences of each word in a string and print it as a key value pair using Dictionary.
c.	Use a Dictionary data structure and Sort a dictionary by key and by value.
6.	**Code the following programs using Functions, Loops, Tuples:**
a.	Do the following taking a tuple(s) as an input: i. Unpack a tuple ii. Convert a tuple to a string iii. Minimum element in a tuple iv. Remove an element form a tuple
b	Using tuple as an input print tuples applying various Slicing on these tuples.
c	i. Initialize 2 or 3 tuples and concatenate the same. ii. Initialize tuples and Concatenate a particular position element in the tuple to form a list
7.	**Code the following programs using Functions, Loops, Modules:**
a.	Programs using Operator Module.
b	Programs using Random Module.
c	Programs using OS and Math Module.
8.	**Code the following programs using Functions, Loops, Custom Modules:**
a.	Create a module to find the largest and smallest number in a list. Use this module in a python code.

b	Create a module to count the number of digits, smallcase letters, uppercase letters and special characters in a string data. Use this module in a python code.
c	Create a module to count the occurrences of all letters in a string and output the same as a dictionary. Use this module in a python code.
9.	**Code the following programs using Functions, Loops, Exception handlers:**
a.	Display the type of exception occurred in any snippet of the python code.
b	Demonstrate the use of raise statement with respect to exception.
c	Write a python code to throw Assertion Error.

FYBSc(DS) - Semester I

Data Management in Excel (SIUDSOE111)

Course Objectives:

- To build a strong understanding on the Basics of Microsoft Excel.
- To understand data crunching and data presentation.

Course Outcome:

CO1. Learning the use and utility of functions and formulas on excel.

CO2. Manipulate data using data names and ranges, filters and sort, and validation lists .

CO3. Analyzing data using Pivot Tables and Pivot Chart.

Unit	Contents	No. of Lectures
I	**Introduction to Excel :** About Excel & Microsoft, Uses of Excel, Excel software, Spreadsheet window pane, Title Bar, Menu Bar, Standard Toolbar, Formatting Toolbar, the Ribbon, File Tab and Backstage View, Formula Bar, Workbook Window, Status Bar, Task Pane, Workbook & sheets. **Columns & Rows:** Selecting Columns & Rows, Changing Column Width & Row Height, Autofitting Columns & Rows, Hiding/Unhiding Columns & Rows, Inserting & Deleting Columns & Rows, Cell, Address of a cell, Components of a cell – Format, value, formula, Use of paste and paste special. **Functionality Using Ranges:** Using Ranges, Selecting Ranges, Entering Information Into a Range, Using AutoFill. **Performing Calculations on Data:** Naming Groups of Data , Creating Formulas to calculate values, Summarizing Data that meets specific conditions, Finding and Correcting Errors in Calculations. **Focusing on Specific Data by using Filters:** Limiting Data that appears on screen, Manipulating worksheet data, Selecting list rows at random, summarizing worksheets with hidden and filtered rows, finding unique values within data set, Defining valid sets of values for ranges of cells	**15**

II	**Reordering and Summarizing Data:** Sorting worksheet data, Organizing data into levels , Looking up information in a worksheet. **Analyzing Alternative Data Sets:** Defining an alternative Data Set , Defining Multiple alternative Data Set, Varying Data to Get a Desired Result by using Goal Seek , Finding Optimal Solutions by Using Solver , Analyzing Data by using Descriptive Statistics. **Creating Dynamic Worksheets by Using Pivot Tables:** Analyzing Data Dynamically by Using PivotTables, Filtering, Showing, and Hiding PivotTable Data, Editing PivotTables, Formatting PivotTables, Creating PivotTables from External Data. **Creating Charts and Graphics :** Creating Charts, Customizing the Appearance of Charts, Finding Trends in Data , Summarizing Data by Using Sparkline, Creating Dynamic Charts by Using PivotCharts, Creating Diagrams by Using SmartArt, Creating Shapes and Mathematical Equations. **Printing :** Adding Headers and Footers to Printed Pages, Preparing Worksheets for Printing, Printing Worksheets.	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1 .	Step by step ,Microsoft Excel 2010	Curtis D. Frye	Microsoft Press		
2 .	Step by step, Microsoft Excel (Office 2021 and Microsoft 365)	Joan Lambert , Curtis Frye	Microsoft Press		

FYBSc(DS) - Semester I

Data Management in Excel (SIUDSOEP111)

1.	i. Enter data into a Spreadsheet ii. Use AutoFill with labels, data and formulas iii. Format Cell Borders and Contents iv. Calculate the total across the rows v. Calculate the total for each column
2.	Create worksheet with following fields Empno, Ename, Basic Pay(BP), Travelling Allowance(TA), Dearness Allowance(DA), House Rent Allowance(HRA), Income Tax(IT), Provident Fund(PF), Net Pay(NP) i. Given: DA= 30% of BP, HRA=20% of BP, TA=17.5% of BP, IT=15% of BP, PF=12.5% of BP ii. Calculate the Net Pay by using the formulae iii. Gross Pay= DA+TA+HRA+BP iv. Deductions=IT+PF v. Net Pay= Gross Pay-Deduction
3.	Create an Excel Worksheet with fields as Roll no. , Name ,Marks of Five subjects. i. Find the Total Number & Average in all Subjects in Each Student. ii. Find Grade Using If Function - If Average Greater >15 then "A" Grade otherwise "B" Grade. iii. How Many Students "A" and "B" Grade ? iv. How Many Students in any two subjects Number Grater Then > 20 and <15 ? v. Represent the Data by inserting the Pie Chart
4.	Create an Excel Worksheet to apply Text Function on Full Name of the person. i. Calculate First Name ii. Calculate Last Name iii. Calculate Email id
5.	Create an Excel Worksheet with fields Roll no, Name , Marks i. Use hlookup function to display student's name ii. Use vlookup function to find the computer score of the students

6.	Create an Excel Worksheet with fields ordered, product, category(fruit, vegetable), amount, date and county. i. Create Pivot Table using Data Separate Fruit and Vegetable. ii. How many Fruit and Vegetable Items in a List? iii. Total Apple and Banana amount.
7.	Create an Excel Worksheet to perform i. alphabetical sort ii. numerical sort iii. Date-Time iv. Specify the cell color v. Apply Icon to cell.
8.	Create an Excel Worksheet to perform i. Text filter ii. Number filter
9.	Create an Excel Worksheet to perform data validation i. Allow only numeric or text values in a cell. ii. Allow only numbers within a specified range. iii. Allow data entries of a specific. iv. Restrict dates and times outside a given time frame.
10.	Create an Excel Worksheet to perform data validation i. Restrict entries to a selection from a drop-down list. ii. Validate an entry based on another cell. iii. Show an input message when the user selects a cell. iv. Show a warning message when incorrect data has been entered

FYBSc(DS) - Semester I
Indian Knowledge System (SIUSFIK111)

Learning Objectives –
Gain an understanding of Indian Knowledge System.
Understand the development of Science and Technology in areas such as Astronomy, Mathematics, Surgical techniques, Metallurgy, Town planning and Architecture.

Learning Outcomes –
1. Explain the key concepts of IKS and discuss the multi-faceted nature of knowledge contained in the Traditional Systems of India.
2. Identify the basic elements of Indian Calendar, development of Mathematics, Science and Technology in India.
3. Recognize the Vedic perspective of plant anatomy, its classifications, physiology and pathology.

Unit	Contents	No. of lectures
I	**IKS an Overview:** Explain the key concepts of IKS and discuss the multi-faceted nature of knowledge contained in the Traditional Systems of India, Identify the basic elements of Indian Calendar, development of Mathematics, Science and Technology in India, Recognize the Vedic perspective of plant anatomy, its classifications, physiology and pathology.	**15**
II	**Science and Technology in Ancient India:** Ancient Indian Mathematics: Unique aspects, Great Mathematicians and their contribution, Sulba-sutras, Baudhayana formula for right angle triangle, Number system-Features, Concept of zero, representation of large numbers, place value of numerals, Bhuta sankya system, Indian Science and Technology heritage, Mining and ore extraction, Metals and Metal work technology, Gold extraction Process, Physical structures in India, Temples-Khajuraho temples, Irrigation and water management, surgical techniques, ship buildings, Plants in Vedas, Morphology, Plant Taxonomy & Nomenclature, Classification of Plants, Plant anatomy, Plant Physiology, Nourishment, Plant Pathology,Consciousness in Plants, Germination, Reproduction, Sex and Heredity, medicinal botany.	**15**

Books for References:

Sr.	Books
1.	Kapoor, Kapil, and Singh Avadesh Kumar, Indian Knowledge System Vol.1, DK Print World, Ltd., 2005.
2.	Mahadevan B., Bhat V R, Nagendra Pavana R.N., Indian Knowledge System Concepts and Application, PHI Learning Pvt. Ltd., 2022.
3.	Penna, Madhusudan. Sanskrit Vagvilas 2nd Edition , Kavikulguru Kalidas Sanskrit International University Press. 2013

FYBSc(DS) - Semester II

Course Code	Course Type	Course Title	Credits
SIUDSCA121	Core Subject (Major)	Data Structure using Python	3
SIUDSCB122	Core Subject (Minor)	Time Series Analysis	3
SIUDSVS121	Core Subject (VOC)	Introduction to Statistical Analysis Software(SAS)	1
SIUDSAE121	Ability Enhancement Skill Course	Python Programming -II	1
SIUDSOE121	Open electives	Data Handling using MySQL	3
SIUDSAE121	Ability Enhancement Course (AEC)	English	2
SIUDSVE121	Value Education Course (VEC)	Understanding India	2
SIUDSIK121	Co-Curricular Course	NCC/NSS/Sports/Cultural/Yoga	2
SIUDSCAP121	Core SubjectPractical	Data Structure using Python	1
SIUDSCBP122	Core SubjectPractical	Time Series Analysis	1
SIUDSVSP121	Core SubjectPractical	Introduction to SAS	1
SIUDSAEP121	Ability Enhancement Skill Course	Python Programming II	1
SIUDSOEP121	Open electives	Data Handling using MySQL	1
TOTAL CREDITS			**22**

In this semester, the students will be granted 1 credit on completion of a value added credit based course on "Redefining Life Skills -Part 1"

FYBSc(DS) - Semester II

Data Structure using Python (SIUDSCA121)

Course Objective:

- To acquaint learners about the importance of various data models in designing a database along with usage of SQL queries.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: To understand the different methods of organizing large amount of data.

CO2: To efficiently implement the different data structures.

CO3: To efficiently implement solutions for specific problems.

Unit	Contents	No. of Lectures
I	**Introduction:** Data and Information, Collection Module in Python – Deques , Chain Map, Counter, Ordered dictionaries default dictionaries, Named Tuple **Types of Data Structures:** Linear and Non-Linear Data Structures **Arrays**: Overview, Types of Arrays, Operations on Arrays, Searching – Linear Search and Binary Search, Sorting - Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort.	**15**

II	**Stacks:** Overview of Stack, Operations on Stack, Applications of stack : Function call and recursion, String reversal, palindrome checking ,Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix) **Queues**: Overview of Queue, Operations on Queue. Types of Queue - Linear Queue, Circular Queue, Priority Queue, Double Ended Queue (with implementation) **Linked Lists**: Types of Linked List – Singly, Doubly, Circular. Operations on Linked List - create, traverse, insert, delete and search.	**15**
III	**Tree**: Terminology, Binary Tree – Terminology and Properties, Tree Traversals, Expression Trees – Binary Search Trees – operations in BST – insertion, deletion, finding min and max, Finding the kth minimum element in a BST, Balanced Tree-AVL Trees (basic operations : rotation, insertion and deletion) **Graph**: Basic definition and Terminology – Representation of Graph – Graph Traversal: Breadth First Search (BFS), Depth First Search (DFS) - Minimum Spanning Tree: Prim's, Kruskal's- Single Source Shortest Path: Dijkstra's Algorithm. **Hashing**- Hash functions, open hashing-separate chaining, closed hashing - linear probing, quadratic probing, double hashing, random probing, rehashing, extendible hashing. **Heaps:** Overview of Heap, min heap and max heap	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Data structures and algorithms in python	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	Wiley		
2.	Data Structures and Algorithmic Thinking with Python	Narasimha Karumanchi	CareerMonk		
3.	Hands-On Data Structures and Algorithms with Python	Dr. Basant Agarwal, Benjamin Baka	Packt Publishing	3rd Edition	

4.	Data Structures and Algorithms with Python	Kent D. Lee and Steve Hubbard	Springer		

FYBSc(DS) - Semester II

Data Structure Practical (SIUDSCAP121)

List of Practical: (Implement using Python)

1.	Implementation of searching algorithms to search an element using: Linear Search, Binary Search (with time complexity)
2.	Implementation of sorting algorithms: Bubble Sort, Insertion Sort, Selection Sort.
3.	Write Python Program to implement stack and demonstrate push, pop and peek operations.
4.	Write Python Program to implement stack and do the following: i. Implementation of an algorithm that reverses string of characters using stack and checks whether a string is a palindrome. ii. Infix to Postfix conversion. iii. Evaluation of postfix expression
5.	Write Python Program to implement queue and demonstrate enqueue and dequeue operations.
6.	Write Python Program to implement Singly Linked List to perform following operations: 1. Create, Insert, Delete, Display, Search 2. Create a list in the sorted order.
7.	Write Python Program to implement Doubly Linked List to perform following operations: Create, Insert, Delete, Display, Search
8.	Write Python Program to implement Circular Linked List to perform following operations: Create, Insert, Delete, Display, Search
9.	Write Python Program to implement tree data structure and demonstrate depth- first traversal
10.	Write Python Program to implement binary search tree to find the minimum and maximum node

FYBSc(DS) - Semester II

Time Series Analysis (SIUDSCB122)

Course Objective:

- To familiarize students with basics of Statistics, essential for prospective researchers and professionals.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Estimate models for time series data sets.

CO2: Interpret the results of implemented techniques.

CO3: Gain and explore the knowledge of time and space domains.

Unit	Contents	No. of Lectures
I	**Characteristics of Time Series:** Introduction, Nature of Time Series Data, Time Series Statistical Models, Measures of dependence: Auto correlation and cross correlation, Stationary Time Series, Estimation of Correlation, Vector Values and Multidimensional series **Time Series Regression and Exploratory Data Analysis:** Introduction, Classical Regression in the Time Series Context, Exploratory Data Analysis, Smoothing in the Time Series Context **ARIMA Models:** Introduction, Autoregressive Moving Average Models, Difference Equations, Autocorrelation and Partial Autocorrelation, Forecasting, Estimation, Integrated Models for Nonstationary data,Building ARIMA Models, Multiplicative ARIMA Seasonal Models	**15**
II	**Spectral Analysis and Filtering:** Introduction, Cyclical Behavior and Periodicity, Spectral Density, Periodogram and Discrete Fourier Transform, Non Parametric Spectral Estimation, Multiple series and Cross Spectra, Linear Filters, Dynamic Fourier Analysis and Wavelets, Lagged Regression Models, Signal Extraction and Optimum Filtering, Spectral Analysis of Multidimensional Series. **Additional Time Domain Topics:** Introduction, Long Memory ARMA and Fractional Differencing, Unit Root Testing, GARCH Model, Threshold Models, Regression with Auto correlated Errors **Lagged Regression:** Transfer Function Modeling, Multivariate ARMAX Models	**15**

III	**State Space Models:** Introduction, Filtering, Smoothing and Forecasting, Maximum Likelihood Estimation, Missing Data Modifications, Structural Models: Signal Extraction and Forecasting. **State-Space Models with Correlated Errors**: ARMAX Models, Multivariate Regression with Auto correlated errors, Bootstrapping State-Space Models, Dynamic Linear Models with Switching, Stochastic Volatility, Non-Linear and Non-Normal State Space Models Using Monte Carlo Methods **Statistical Methods in the Frequency Domain:** Introduction, Spectral Matrices and Likelihood Functions, Regression for Jointly Stationary Series, Regression with Deterministic Inputs, Random Coefficient Regression, Analysis of Designed Experiments, Discrimination and Cluster Analysis, Principal Components and Factor Analysis, The Spectral Envelope	**15**

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1 .	Time Series Analysis and its Applications with R examples	Robert H. Shumway, David H. Stoffer	Springer	Third Edition	
2 .	Time Series Analysis With Applications in R	Jonathan D Cryer & Kung Silk Chan	Springer	Second Edition	2008

3 .	Introduction to Time Series and Forecasting	Peter J. Brockwell Richard A. Davis	Springer	Second Edition	
4 .	Practical Time Series Analysis Prediction with Statistics and Machine Learning	Aileen Nielsen	O'Reilly	first edition	2019

FYBSc(DS) - Semester II

Time Series Analysis Practical (SIUDSCBP122)

List of Practical: (To be implemented using Excel/Python/R)

1.	Write a program to demonstrate time series characteristics.
2.	Write a program to implement Linear and Non-linear regression model
3.	Write a program to implement the ARIMA model.
4.	Write a program to implement the SARIMA model.
5.	Write a program to implement ARMAX.
6.	Write a program to implement Bootstrapping and Bagging.
7.	Write a program to implement Judgemental forecasting.
8.	Write a program to implement correlation and autocorrelation.
9.	Write a program to implement exponential smoothing.
10.	Write a program on implementing filtering, smoothing and forecasting.

FYBSc(DS) - Semester II

Introduction to SAS (SIUDSVS121)

Course Objective:

To familiarize students with basics of Statistics, essential for prospective researchers and professionals.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Understand the Data Processing Step.

CO2: Analyse the Observation on selected dataset.

CO3: Gain and explore the knowledge of Data Processing and Analysing.

Unit	Contents	No. of Lectures
I	**Introduction to the SAS system:** Introduction, Components of Base SAS Software, Output Produced by the SAS System, Ways to Run SAS Programs, Running Programs in the SAS Windowing Environment, Review of SAS Tools. **Introduction to DATA Step Processing:** The SAS Data Set: Your Key to the SAS System, How the DATA Step Works: A Basic Introduction, Supplying Information to Create a SAS Data Set **Starting with Raw Data:** Examine the Structure of the Raw Data: Factors to Consider, Reading Unaligned Data, Reading Data That Is Aligned in Columns, Reading Data That Requires Special Instructions, Reading Unaligned Data with More Flexibility, Mixing Styles of Input, Testing a Condition before Creating an Observation, Creating Multiple Observations from a Single Record, Reading Multiple Records to Create a Single Observation, Problem Solving: When an Input Record Unexpectedly Does Not Have Enough **Starting with SAS Data Sets:** Understanding the Basics, Input SAS Data Set for Examples, Reading Selected Observations, Reading Selected Variables. **Understanding DATA Step Processing:** Introduction , Input SAS Data Set for Examples, Adding Information to a SAS Data Set, Defining Enough Storage Space for Variables, Conditionally Deleting an Observation **Working with Numeric Variables:** Introduction ,About Numeric Variables in SAS, Input SAS Data Set for Examples, Calculating with Numeric Variables, Comparing Numeric Variables, Storing Numeric Variables Efficiently **Working with Character Variables:** Introduction, Input SAS Data Set for Examples, Identifying Character Variables and Expressing Character Values, Setting the Length of Character Variables, Handling Missing Values, Creating New Character Values, Saving Storage Space by Treating Numbers as Characters.	**15**

	Acting on Selected Observations: Introduction, Selecting Observations, Constructing Conditions , Comparing Characters. **Creating Subsets of Observations:** Introduction, Selecting Observations for a New SAS Data Set, Conditionally Writing Observations to One or More SAS Data Sets	

Books and References:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1	Step-by-Step Programming with Base SAS® Software		SAS Publishing		
2	An Introduction to SAS University Edition	Ron Cody	SAS Publication		
3	The Little SAS Book	Lora D. Delwiche , Susan J. Slaughter	A Primer	Fifth	
4	Practical and Efficient SAS® Programming: The Insider's Guide	Martha Messineo			2017

SAS Tutorial: Hands-On Approach for Beginners to Advanced Users (listendata.com)

FYBSc(DS) - Semester II

Introduction to SAS Practical (SIUDSVSP121)

List of Practical (SAS/ Altair/ Fractal Analytics, etc.)

1.	Install and configure SAS.
2.	Demonstrate concatenating string, converting number to character and concatenate strings with a delimiter.
3.	Demonstrate CATX() , STRIP() , TRIM() function.
4.	Create a table with missing character values and handle blank values with COALESCE() function. i. Creating a Datetime Value with No Time Value. ii. Creating a Datetime Value with Date and Time Values.
5.	Finding the Last Word with a Negative Counter. i. Using COUNTW() to Get the Number of Words. ii. Using COUNTW to Split a Name.
6.	Replacing Parts of a String Using TRANSTRN(). i. Using %SYSFUNC() with NOTDIGIT(). ii. Using %SYSFUNC() with Dates.
7.	Demonstrate pattern matching in SAS.
8.	Demonstrate arrays and loop in SAS.
9.	Demonstrate joining and merging in SAS.
10.	Send SAS output to Excel.

FYBSc(DS) - Semester II

Python Programming - II (SIUDSAE121)

Course Objective:

Students can develop projects with Python GUI as front end and MySQL as backend for any real time situation using Object oriented approach.

Course Outcomes:

Upon completion of this course, student will be able to:

CO1: Design programs using Object oriented approach and multiprogramming concepts .

CO2: Compare various file handling methods and perform validations and pattern matching using regular expressions

CO3: Compose python GUI programs.

Unit	Contents	No. of Lectures
I	**Object Oriented Methodology:** Class Definition, Creating Objects, Instances as Arguments, Inheritance, Method Overriding, Data Encapsulation, Data Hiding **Python File Input-Output** **Iterables, iterators** and their problem solving applications. **Regular Expressions** **GUI Programming in Python (using Tkinter/wxPython/Qt) :** What is GUI, Advantages of GUI, Introduction to GUI library. **Widgets,** Layout Management , Look and Feel Customization **Database connectivity in Python:** Installing mysql connector, accessing connector module module, using connect, cursor, execute & close functions, reading single & multiple results of query execution, understanding exceptions in database connectivity. GUI and Database Connection. **Working with Jupyter Notebook** **Introduction to NumPy, Introduction to Pandas**	**15**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1 .	Practical Programming: An Introduction to Computer Science Using Python 3	Paul Gries , Jennifer Campbell, Jason Montojo	Pragmatic Bookshelf	2nd	2014
2 .	Python 3 Object Oriented Programming	Dusty Phillips	Packt Publishing		2010
3 .	Python Tutorial Release 3.7.0	Guido van Rossum	Python Software Foundation	3rd	2018
4 .	Think Python	Allen B. Downey	O'Reilly Media, Inc.	2nd	2015
5 .	MySQL for Python: Database Access Made Easy,	A. Lukaszewski	Packt Publisher		2010

Additional References:

1. https://www.dataquest.io/blog/jupyter-notebook-tutorial/
2. https://pandas.pydata.org/pandas-docs/stable/user_guide/10min.html

FYBSc(DS) - Semester II

Python Programming -II Practical (SIUDSAEP121)

List of Practical: (To be implemented using

1.	**OOP**: i. Write a python program to implement a class employee with data as empid, empname, basicpay, leavebal, and methods excluding initializer function are payslip(), DA=90% of bp, a. HRA=40% of bp, TA=20% of bp, leaveapplication(), display() ii. Write a python program to implement a super class publication (title, price) with a subclass book (author, no_of_pages) and a subclass Magazine (issueno).
2.	**Multithreading:** i. Program to display Summation of numbers using thread ii. Program to display the prime numbers using thread iii. Program to display the Fibonacci series using thread
3.	**File Handling** : i. Write a python program to input a file nums.txt with some numbers and create a file results,txt which contains the sum,mean and square-sum of numbers in the input file ii. Write a python program to input a file emp.txt with data empname,empid and basicpay of n employees. Create a file Payslip.txt which contains empid,basic pay,da,hra ,ta and netsalary. a. (da=85% of basicpay,hra=50% of basicpay ,ta=12% of basicpay , netsalary=basicpay+da+hra+ta iii. Write a program to read numbers from a file file1 and perform the factorial of each number and store into file2.
4.	**Iterators and Iterables :** 1. Write a program to implement traversing through a list using while loop 2. Create a user defined iterable class PowTwo which on iteration gives powers of two like 1,2,4,8,16….(By using __iter__() and __next_() functions with in the class definition)
5	**i. Regular Expressions :** ii. Write a python program accept from user following information and validate as per the constraints using regular expressions iii. UserName-Starts with an alphabet and can contain a minimum 8 characters and maximum 15 characters of alphanumeric characters. iv. Mobile number- Contains 10 digits

	v. Email id- starts with lower case alphabet followed by any number of lower case alphanumeric charcters or "." charcater followed by @ symbol followed by alphanumeric characters and then end with ".com". vi. Write a Python function text_match() that matches a string that has an ' a' followed by zero or more occurences of 'b''s anywhere in the input string.(use search) vii. Write a Python function text_match() that matches a string that has an 'a' followed by zero or more occurrences of anything, ending in 'b'. viii. Write a python program to accept an address and replace occurrences of Road by Rd., District by Dst. And Street by St.
6.	**GUI Programs:** i. Write a GUI python program to accept two numbers and find sum, difference, product and quotient using different buttons. ii. Write a GUI python program to create a login form that accepts username and password and checks if it is correct as per predefined values, if so, a successful login message is displayed else invalid login message is displayed. iii. #Program to use check buttons for representing RGB to set the background colour of a Label (Graphics colours with RGB are represented as a string colour="#(FF|00)(FF|00)(FF|00)" where the first FF or 00 is for Red, second FF or 00 is for green and third FF or 00 is for Blue) iv. Write a Python GUI program to create an Order form for ABC Pizza Corner. The program should use labelled frame for collecting Customer details and Pizza Details. On click of submit button, Customer details and pizza details should be displayed on message box along with Total cost incurred.(Cost for Large Pizza-Rs.250,Regular-200,Medium150,Small-100,Veg Pizza-100,Non-Veg-150,Each extra topping Rs.50)
7.	**Database Applications :** Write a database program to perform the following i.Show all databases in the DBMS. ii.Create a Database named "Company". iii. Create a table Employee in Company Database(empid int,empname varchar(50), designation varchar(50),basic int) iv. Insert 10 records into employee table v.Display all records of employee table vi.Display the employees details with designation as entered by the user at runtime vii.Display the employee details with basic<20000 viii.Update the basic of Manager by 10%
8.	**Socket Programming :** Echo Client and Echo Server
9.	**S**end email using Python SMTP

FYBSc(DS) - Semester II

Data handling using MySQL (SIUDSOE121)

Unit	Contents	No. of Lectures
I	**Introduction:** Why is MySQL so Popular, Elements of MySQL and Its Environment , Installing MySQL : Installation Choices and Platforms , Using the command-line Interface , Using a Text Editor , Installing Under Windows. **Modeling and Designing Databases :** The database design process. **Basic SQL:** SELECT statement, INSERT statement , DELETE statement , UPDATE statement, Exploring Database and Tables with SHOW and mysqlshow.	**8**
II	**Working with Database Structures:** Creating and using Database , Creating Tables, Altering Structures , Renaming Tables, Dropping Tables, Truncating Tables, Backing Up and Restoring databases. **Advanced Querying:** Aggregating Data ,Nested Queries , User Variables , Transactions and Locking , Table Types.	**8**
III	**Functions** – String Functions (concat, instr, left, right, mid, length, lcase/lower,ucase/upper, replace, strcmp, trim, ltrim, rtrim), Math Functions (abs, ceil, floor, mod,pow, sqrt, round, truncate) Date Functions (adddate, datediff, day, month, year, hour,min, sec, now, reverse) **Joining Tables** – inner join, outer join (left outer, right outer, full outer) **Managing Users and Privileges:** Understanding Users and Privileges, Creating and using new users , GRANT OPTION privilege.	**8**

Books and References

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Learning MySQL	Seyed M.M. "Saied" Tahaghoghi and Hugh E. Williams	O'Reilly Media		
2 .	Fundamentals of Database Systems	Ramez Elmasri & Shamkant B.Navathe	Pearson Education	Sixth Edition	2010
3 .	Database Management Systems	Ramakrishnam, Gehrke	McGraw-Hill		2007
4 .	Begning MySQL	Robert Sheldon, Geoff Moes	Wrox Press		2005

FYBSc(DS) - Semester II

Data handling using MySQL (SIUDSOEP121)

1.	Perform the following: i. Viewing all databases ii. Creating a database iii. Viewing all Tables in a database iv. Creating Tables(With and Without Constraints)
2.	Perform the following: i. Inserting Records in a Table. ii. Updating Records in a Table. iii. Deleting Records in a Table.
3.	Perform the following: i. Altering a Table ii. Dropping/Truncating/Renaming Tables iii. Backing up / Restoring a Database
4.	Perform the following: i. Simple Queries ii. Simple Queries with Aggregate functions iii. Queries with Aggregate functions (group by and having clause)
5.	Subqueries With IN clause
6.	Subqueries With EXISTS clause
7.	Write a Queries involving Date Functions.
8.	Write a Queries involving String Functions.
9.	Write a Queries involving Math Functions.
10.	Join Queries i. Inner Join ii. Outer Join

Evaluation Scheme

Semester – I					
	Credits		Marks		Distribution
	Theory	Practical	Theory	Practical	
Subject 1	3	1	75	25	**Sem end**: 45 **Internal** :30 **Practical**: 25
Subject 2	3	1	75	25	**Sem end**: 45 **Internal** :30 **Practical**: 25
OE	2	2	50	50	**Sem end**: 50 **Tutorial**: 50
VSC	1	1			
SEC	1	1			
IKS	2	-	50	-	**Sem end**: 30 **Internal** :20
AEC	2	-	50	-	**Sem end:** 30 **Internal** :20
VEC	2	-	50	-	**Sem end**: 30 **Internal** :20
Total					**22**

Semester – II					
	Credits		Marks		Distribution
	Theory	Practical	Theory	Practical	
Subject 1	3	1	75	25	**Sem end**: 45 **Internal** :30 **Practical**: 25
Subject 2	3	1	75	25	**Sem end:** 45 **Internal** :30 **Practical**: 25
OE	2	2	50	50	**Sem end**: 50 **Tutorial**: 50
VSC	1	1			
SEC	1	1			
AEC	2	-	50	-	**Sem end**: 30 **Internal** :20
VEC	2	-	50	-	**Sem end**: 30 **Internal** :20
CC	2	-	50	-	
Total					**22**