CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

B.Sc. Computer Science (Data Science and Analytics)

Those who have joined in the Academic year 2023-24 onwards

1. Introduction

B.Sc. Computer Science (Data Science and Analytics)

Education is the key to development of any society. Role of higher education is crucial for securing right kind of employment and also to pursue further studies in best available world class institutes elsewhere within and outside India. Quality education in general and higher education in particular deserves high priority to enable the young and future generation of students to acquire skill, training and knowledge in order to enhance their thinking, creativity, comprehension and application abilities and prepare them to compete, succeed and excel globally. Learning Outcomes-based Curriculum Framework (LOCF) which makes it student- centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. LOCF also aims at ensuring uniform education standard and content delivery across the state which will help the students to ensure similar quality of education irrespective of the institute and location.

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. throughout the world in last couple of decades andit has carved out a space for itself like any other disciplines of basic science and engineering. Computer science is a discipline that spans theory and practice and it requires thinking both in abstract terms and in concrete terms. Nowadays, practically everyone is a computer user, and many people are even computer programmers. Computer Science can be seen on a higher level, as a science of problem solving and problem solving requires precision, creativity, and careful reasoning. The ever-evolving discipline of computer science also has strong connections to other disciplines. Many problems in science, engineering, health care, business, and other areas can be solved effectively with computers, but finding a solution requires both computer science expertise and knowledge of the particular application domain. Computer science has a wide range of specialties. These include Computer Architecture, Software Systems, Graphics,

Artificial Intelligence, Computational Science, and Software Engineering. Drawing from a common core of computer science knowledge, each specialty area focuses on specific challenges. Computer Science is practiced by mathematicians, scientists and engineers. Mathematics, the origins of Computer Science, provides reason and logic. Science provides the methodology for learning and refinement. Engineering provides

the techniques for building hardware and software.

Programme Outcome, Programme Specific Outcome and Course Outcome

Computer Science is the study of quantity, structure, space and change, focusing on problem solving, application development with wider scope of application in science, engineering, technology, social sciences etc. The key core areas of study in Mathematics include Algebra, Analysis (Real & Complex), Differential Equations, Geometry, and Mechanics. The

Students completing this programme will be able to present Software application clearly and precisely, make abstract ideas precise by formulating them in the Computer languages. Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in software industry, banking, insurance and investment sectors, data analyst jobs and jobs in various other public and private enterprises.

2. Programme Outcomes (PO) of B.Sc.degree programme in Computer Science(DataScience and Analytics)

- Scientific aptitude will be developed in Students
- Students will acquire basic Practical skills & Technical knowledge along with domainknowledge of different subjects in the Computer Science & humanities stream.
- Students will become employable; Students will be eligible for career opportunities ineducation field, Industry, or will be able to opt for entrepreneurship.
- Students will possess basic subject knowledge required for higher studies, professionaland applied courses.
- Students will be aware of and able to develop solution oriented approach towards variousSocial and Environmental issues.
- Ability to acquire in-depth knowledge of several branches of Computer Science and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Computer Science and applications.
- The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems.
- Utilize computer programming skills to solve theoretical and applied problems by criticalunderstanding, analysis and synthesis.
- To recognize patterns and to identify essential and relevant aspects of problems.
- Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.
- Mould the students into responsible citizens in a rapidly changing interdependent society.

The above expectations generally can be pooled into 6 broad categories and can be modifiedaccording to institutional requirements:

PO1: Knowledge

PO2: Problem Analysis

PO3: Design / Development of Solutions

PO4: Conduct investigations of complex problems

PO5: Modern tool usage

PO6: Applying to society

3. Programme Specific Outcomes of B.Sc. Degree Programme in Computer Science(Data Science and Analytics)

PSO1: Think in a critical and logical based manner

PSO2: Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real-time application related sciences.

PSO3: Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.

PSO4: Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.

PSO5: Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.

PSO6: Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.

PSO7: Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.

PSO8: Develop a range of generic skills helpful in employment, internships& societal activities.

PSO9: Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of Computing sciences.

Mapping of Course Learning Outcomes (CLOs) with Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) can be carried out accordingly, assigning the appropriate level in the grids: (put tick mark in each row)

	POs							PSOs		
	1	2	3	4	5	6	…	1	2	…
CLO1										
CLO2										
CLO3										
CLO4										
CLO5										
CLO6										
…										

CHOICE BASED CREDIT SYSTEM - LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK

B.Sc Computer Science (Data Science and Analytics)

Part	Courses	Subject	Code	Cr.	Hrs
SEMESTER - I					
I	Lang. – I	பொதுத் தமிழ் - **I**	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 1	Programming in C	235603101	4	4
	CC – 2	Programming in C Lab	235603102	4	6
	EC – I	Discrete Mathematical Structure	235603103	3	4
IV	SEC –I (NME)	Office Automation	234603156	2	2
IV	FC	Problem Solving Techniques	234403156	2	2
	AECC – 1	Soft Skill - I	236003101	2	2
	Total			**23**	**30**
SEMESTER II					
I	Lang. -I	பொதுத் தமிழ் - **II**	230103201	3	6
II	Lang. -II	General English	231003201	3	4
III	CC – 3	Data Structure and Algorithms	235603201	4	4
	CC - 4	Data Structure and Algorithms Lab with C/C++	235603202	4	6
	EC – II	Numerical Methods	235603203	3	4
IV	SEC –II (NME)	Quantitative Aptitude	234603256	2	2
	SEC - III	Digital Computers Fundamentals	234403256	2	2
	AECC –II	Soft Skill - II	236003201	2	2
				23	**30**
SEMESTER III					
I	Lang. -I	பொதுத் தமிழ் - **III**	230103301	3	6
II	Lang. -II	General English	231003301	3	4
III	CC – 5	Python Programming	235603301	4	4
	CC - 6	Python Programming Lab	235603302	4	6
	EC –3	Probability and Statistics	233103322	3	4
IV	SEC –IV	PHP Programming Lab	234403356	1	1
	SEC – V	Advanced Excel	238203356	2	2
	AECC – III	Soft Skill - 3	236003301	2	2
	EVS	Environmental Studies	234103301	1	1
				23	**30**

Part	Courses		Code	Cr.	Hrs
SEMESTER IV					
I	Lang. – I	பொதுத் தமிழ் - **IV**	230103101	3	6
II	Lang. - II	General English	231003101	3	4
III	CC – 7	Java Programming	235603401	4	4
	CC - 8	Java Programming Lab	235603402	4	5
	EC – IV	Resource Management Techniques	233103422	3	4
IV	SEC –VI	Database Management Systems	234403456	2	2
IV	SEC –VII	Database Management Systems Lab	238203456	2	2
	AECC- IV	Soft Skill - IV	236003301	2	2
	EVS	Environmental Studies	234103401	1	1
	Total			**24**	**30**
SEMESTER V					
III	CC – 9	Software Engineering	235603501	4	5
	CC - 10	Data Preparation and Visualization	235603502	4	5
	CC - 11	Data Preparation and Visualization Lab	235603503	4	5
	Core 12	Project with Viva voce	235603504	4	4
	EC – V	Business Analytics	235603505	3	5
	EC – VI	Business Analytics Programming Lab	235603507	3	5
IV		Value Education	234303501	1	1
		Internship/Industrial Training(carried out in II year summer vacation)30 hrs	235603509	2	
				25	**30**
SEMESTER VI					
III	CC – 13	Computer Networks	235603601	4	5
	CC – 14	Big Data Analytics	235603602	4	5
	CC – 15	Statistical Data Analysis	235603603	4	5
	EC –7	Machine Learning	235603604	3	5
	EC - 8	Statistical data Analysis & Machine Learning Lab	235603606	3	5
IV	Professional competency skill enhancement course	Quantitative Aptitude	235603608	2	4
		Value Education	234303601	1	1
V		Extension Activity (outside college hrs)	235603609	1	
				22	**30**

Title of the Course		**PYTHON PROGRAMMING**						
Part		**III**						
Category	Core - 5	**Year**	II	**Credits**	4	**Course Code**	**235603301**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		4	-	--	4	25	75	100

Learning Objectives

- ✍ Describe the core syntax and semantics of Python programming language.
- ✍ Discover the need for working with the strings and functions.
- ✍ Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
- ✍ Understand the usage of packages and Dictionaries

UNIT	**Details**	**No. of Periods for the Unit**
I	**Introduction**: The essence of computational problem solving – Limits of computational problem solving-Computer algorithms-Computer Hardware-Computer Software-The process of computational problem solving-Python programming language - Literals - Variables and Identifiers -Operators - Expressions and Data types, Input / output.	**12**
II	**Control Structures:** Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection -- Iterative Control- While Statement- Infinite loops- Definite vs. Indefinite Loops- Boolean Flag. String, List and Dictionary, Manipulations Building blocks of pythonprograms,Understandig and using ranges.	**12**
III	**Functions:** Program Routines- Defining Functions- More on Functions: Calling Value-Returning Functions- Calling Non- Value-Returning Functions- Parameter Passing - Keyword Arguments in Python - Default Arguments in Python-Variable Scope. Recursion: Recursive Functions	**12**
IV	**Objects and their use:** Software Objects - Turtle Graphics – Turtle attributes-Modular Design: Modules - Top-Down Design - Python Modules - Text Files: Opening, reading and writing text files – Database Programming: Connecting to a database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, String Processing - Exception Handling	**12**
V	**Dictionaries and Sets:** Dictionary type in Python - Set Data type. Object Oriented Programming using Python: Encapsulation - Inheritance – Polymorphism. Pythonpackages: Simple programs using the built-in functions ofpackages matplotlib, numpy, pandas etc.	**12**

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Develop and execute simple Python programs
CO2	Write simple Python programs using conditionals and looping for solving problems
CO3	Decompose a Python program into functions
CO4	Represent compound data using Python lists, tuples, dictionaries etc.
CO5	Read and write data from/to files in Python programs

Text Books (Latest Editions)	
1.	Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem Solving Focus", Wiley India Edition, 2015.
2.	Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1.	Mark Lutz, "Learning Python Powerful Object Oriented Programming", O"reilly Media 2018, 5th Edition.
2.	Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
3	John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Publications, 2013, ISBN 978-1590282410.
4	Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Publications, 2013, ISBN 978-1435455009.
Web Resources	
1.https://onlinecourses.swayam2.ac.in/cec22_cs20/preview 2. https://www.w3schools.com/python 3.https://www.javapoint.com/python-tutorial	

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**
CO1	S	S	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S
CO4	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	M	S	S	S

S – Strong, M – Medium , L - Low

CO/PO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of course contribution to Pos	3	3	3	3	3

Title of the Course		**PYTHON PROGRAMMING LAB**						
Part		**III**						
Category	Core 6	**Year**	II	**Credits**	4	**Course Code**	**235603302**	
		Semester	III					
Instructional Hours per week		**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
		-	-	6	6	25	75	100

Learning Objectives

- ✍ Acquire programming skills in core Python.
- ✍ Acquire Object-oriented programming skills in Python.
- ✍ Develop the skill of designing graphical-user interfaces (GUI) in Python.
- ✍ Develop the ability to write database applications in Python.
- ✍ Acquire Python programming skills to move into specific branches.

UNIT	**List of Experiment**	

1. Program to convert the given temperature from Fahrenheitto Celsius and vice versa depending upon user‟s choice.

2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:
   Grade A: Percentage >=80 Grade B:Percentage >=70 and 80
   Grade C: Percentage >=60 and <70 Grade D:Percentage >=40 and <60
   Grade E: Percentage < 40

3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.

4. Write a Python script that prints prime numbers less than20.
5. Program to find factorial of the given number usingrecursive function.

6. Write a Python program to count the number of even and odd numbers from array of N numbers.

7. Write a Python class to reverse a string word by word.

8. Given a tuple and a list as input, write a program to countthe occurrences of all items of the list in the tuple. (Input :tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)

9. Create a Savings Account class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).

10. Write a Python program to construct the followingpattern, using a nested loop

```
    *
   **
  ***
 ****
*****
 ****
  ***
   **
    *
```

11. Read a file content and copy only the contents at odd lines into a new file.

12. Create a Turtle graphics window with specific size.

13. Write a Python program for Towers of Hanoi using recursion
14. Create a menu driven Python program with a dictionary for words and their meanings. Devise a Python program to implement the HangmanGame.

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	To understand the problem solving approaches
CO2	To learn the basic programming constructs in Python
CO3	To practice various computing strategies for Python-based solutions to real world problems
CO4	To use Python data structures - lists, tuples, dictionaries.
CO5	To do input/output with files in Python.

Text Books (Latest Editions)	
1.	Charles Dierbach, "Introduction to Computer Science using Python - A computational Problem Solving Focus", Wiley India Edition, 2015.
2.	Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1.	Mark Lutz, "Learning Python Powerful Object Oriented Programming", O"reilly Media 2018, 5th Edition.
2.	Timothy A. Budd, "Exploring Python", Tata MCGraw Hill Education Private Limited 2011, 1 st Edition.
3	John Zelle, "Python Programming: An Introduction to Computer Science", Second edition, Course Technology Cengage Publications, 2013, ISBN 978-1590282410.
4	Michel Dawson, "Python Programming for Absolute Beginers" , Third Edition, Course Technology Cengage Publications, 2013, ISBN 978-1435455009.
Web Resources	
1.https://onlinecourses.swayam2.ac.in/cec22_cs20/preview 2. https://www.w3schools.com/python 3.https://www.javapoint.com/python-tutorial	

Title of the Course		**PHP PROGRAMMING LAB**						
Part		**IV**						
Category	SEC – 4	**Year**	II	**Credits**	1	**Course Code**	**234403356**	
		Semester	III					
Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**	
	-	-	1	1	25	75	100	

Learning Objectives

✍ The objective of this course is to teach the fundamentals of quantum information processing, including quantum computation, quantum cryptography, and quantum information theory.

Contents

1. Simple PHP programs using expressions andoperators.
2. Programs to demonstrate the usage of controlstructures
3. Programs using Looping structures
4. Programs using arrays
5. Programs using string functions
6. Simple and parameterized functions.
7. To process personal details using File
8. To design an student mark database using HTML Formand process using PHP
9. Programs using OOPS concepts
10. Program to design a web page using various formcontrols
11. Data validation in web pages.
12. Using cookies and session variables
13. Database Connectivity

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	**Use** PHP in-built functions and string functions.
CO2	Assessment of using files
CO3	Practice passing of parameters from HTML to PHP
CO4	Audit the usage of COOKIES and SESSIONS.
CO5	Design web pages for personal and business applications

References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1	Paul Deitel, Harvey Deitel, & Abbey Deitel. (2018). Internet and World Wide Web –How to Program, 5 th Edition. India: Pearson India Education.
Web Resources	
1.	https://www.w3schools.com/php/
2	https://www.javatpoint.com/php-tutorial

Title of the Course	**ADVANCED EXCEL**						
Part	**IV**						
Category	SEC – V	**Year** / **Semester**	II / III	**Credits**	2	**Course Code**	**238203356**

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
	2	-	--	2	25	75	100

Learning Objectives:

- ✍ The objective of this course is to help the students learn the advanced features of Excel, to summarise, analyse, explore, and present visualisations of data in the form of charts, graphs.

Units	**Details**	**No. of Periods for the Unit**
I	Basics of Excel- Customizing common options- Absolute and relative cells- Protecting and un-protecting worksheets and cells- Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions- VlookUP with Exact Match, Approximate Match- Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges- Nested VlookUP with Exact Match- Using VLookUP to consolidate Data from Multiple Sheets	**6**
II	Data Validations - Specifying a valid range of values - Specifying a list of valid values- Specifying custom validations based on formula - Working with Templates Designing the structure of a template- templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables- multiple-level sorting- custom sorting- Filtering data for selected view - advanced filter options- Working with Reports Creating subtotals- Multiple-level subtotal.	**6**
III	Creating Pivot tables Formatting and customizing Pivot tables- advanced options of Pivot tables- Pivot charts- Consolidating data from multiple sheets and files using Pivot tables- external data sources- data consolidation feature to consolidate data- Show Value As % of Row, % of Column, Running Total, Compare with Specific Field- Viewing Subtotal under Pivot- Creating Slicers.	**6**
IV	More Functions Date and time functions- Text functions- Database functions- Power Functions - Formatting Using auto formatting option for worksheets- Using conditional formatting option for rows, columns and cells- WhatIf Analysis - Goal Seek- Data Tables- Scenario Manager.	**6**
V	Charts - Formatting Charts- 3D Graphs- Bar and Line Chart together- Secondary Axis in Graphs- Sharing Charts with PowerPoint / MS Word, Dynamically- New Features Of Excel Sparklines, Inline Charts, data Charts- Overview of all the new features.	**6**

Course Outcomes

Course Outcomes	On completion of this course, students will;
CO1	Handle large amounts of data
CO2	Aggregate numeric data and summarise into categories and subcategories
CO3	Filtering, sorting, and grouping data or subsets of data
CO4	Create pivot tables to consolidate data from multiple files
CO5	Presenting data in the form of charts and graphs

Text Books (Latest Editions)	
1	Excel 2019 All-in-One For Dummies – 2018- Greg Harvey
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Microsoft Excel 2019 Pivot Table Data Crunching-2019,Bill Jelen and Michael Alexander

Web Resources	
1	Web resources from NDL Library, E-content from open sourcelibraries

Mapping with Programme Outcomes:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
CO1	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	S	M	S	S	M
CO3	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S

S – Strong, M – Medium , L - Low

CO/PO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of course contribution to Pos	3	3	3	3	3

Title of the Course	**JAVA PROGRAMMING**
Part	**III**

Category	Core - 7	**Year**	II	**Credits**	4	**Course Code**	**235603401**
		Semester	IV				

Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	**CIA**	**External**	**Total**
	4	-	--	4	25	75	100

Learning Objectives:

- To provide fundamental knowledge of object-oriented programming.
- To equip the student with programming knowledge in Core Java from the basics up.
- To enable the students to use AWT controls, Event Handling and Swing for GUI.

Units	**Details**	**No. of Periods for the Unit**
I	**Introduction:** Review of Object Oriented concepts – History of Java – Java buzzwords – JVMarchitecture – Data types - Variables - Scope and life time of variables - arrays - operators – control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data – Static Method String and String Buffer Classes	**12**
II	**Inheritance**: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super key word - Method Overloading - Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. **Packages**: Definition-Access Protection – Importing Packages. **Interfaces**: Definition– Implementation–Extending Interfaces. **Exception Handling**: *try – catch - throw - throws – finally* – Built-in Exceptions - Creating own Exception classes.	**12**
III	**Multithreaded Programming**: Thread Class - Runnable interface –Synchronization– Using synchronized methods– Using *synchronized* statement- Inter thread Communication –Deadlock. **I/O Streams:** Concepts of streams - Stream classes- Byte and Character stream - Reading console Input and Writing Console output - File Handling.	**12**
IV	**AWT Controls:** The AWT class hierarchy - user interface components- Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frameclass - Colour - Fonts and layout managers. **Event Handling:** Events - Event sources - Event Listeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Inner classes.	**12**
V	**Swing:** Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame -JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel, JTextField - JTextArea - JList - JComboBox–JscrollPane	**12**

Course Outcomes

Course Outcomes	On completion of this course, students will;
CO1	Understand the basic Object-oriented concepts and Implement the basic constructs ofCore Java
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.
CO3	Implement multi-threading and I/O Streams of Core Java
CO4	Implement AWT and Event handling.
CO5	Use Swing to create GUI.

Text Books (Latest Editions)	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7thEdition, 2010.
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
References Books	

(Latest editions, and the style as given below must be strictly adhered to)	
1	Head First Java, O"Rielly Publications,
2	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**
CO1	S	S	S	S	S	S	S	S	M
CO2	S	S	M	S	S	M	S	S	S
CO3	S	S	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S

S – Strong, M – Medium , L - Low

CO/PO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of course contribution to Pos	3	3	3	3	3

Title of the Course	JAVA PROGRAMMING LAB						
Part	III						
Category	Core - 8	Year / Semester	II / IV	Credits	4	Course Code	235603402

Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
	-	1	4	5	25	75	100

Learning Objectives:

- To gain practical expertise in coding Core Java programs
- To become proficient in the use of AWT, Event Handling and Swing.

Units	List of Exercises

1. Write a Java program that prompts the user for an integer and then prints out all the prime numbers up tothat Integer?
2. Write a Java program to multiply two given matrices.
3. Write a Java program that displays the number ofcharacters, lines and words in a text?
4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.
5. Write a program to do String Manipulation using Character Array and perform the following string operations:
   a. String length
   b. Finding a character at a particular position
   c. Concatenating two strings
6. Write a program to perform the following string operations using String class:
   a. String Concatenation
   b. Search a substring
   c. To extract substring from given string
7. Write a program to perform string operations using StringBuffer class:
   b. Length of a string
   c. Reverse a string
   d. Delete a substring from the given string
8. Write a java program that implements a multi-threadapplication that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
9. Write a threading program which uses the same method asynchronously to print the numbers1to10 usingThread1and to print 90 to100 using Thread2.
10. Write a program to demonstrate the use of following exceptions.
    a. Arithmetic Exception
    b. NumberFormat Exception
    c. ArrayIndexOutofBound Exception
    d. NegativeArraySize Exception
11. Write a Java program that reads on file name from theuser, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes?
12. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.
13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).

	14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for thedigits and for the +, -,*, % operations. Add a text fieldto display the result. Handle any possible exceptions like divide by zero. **15.** Write a Java program that simulates a traffic light. Theprogram lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "stop" or "ready"or "go" should appear above the buttons in a selected color. Initially there is no message shown.

Course Outcomes	
Course Outcomes	On completion of this course, students will;
CO1	Code, debug and execute Java programs to solve the given problems
CO2	Implement multi-threading and exception-handling
CO3	Implement functionality using String and String Buffer classes
CO4	Demonstrate Event Handling.
CO5	Create applications using Swing and AWT

Text Books (Latest Editions)	
1	Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7thEdition, 2010.
2	Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.
References Books **(Latest editions, and the style as given below must be strictly adhered to)**	
1	Head First Java, O"Rielly Publications,
2	Y. Daniel Liang, *Introduction to Java Programming*, 7th Edition, Pearson Education India, 2010.
Web Resources	
1.	Web resources from NDL Library, E-content from open-source libraries

Title of the Course	DATABASE MANAGEMENT SYSTEMS						
Part	IV						
Category	EC – IV	Year	II	Credits	2	Course Code	234403456
		Semester	IV				

Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
	2	-	-	2	25	75	100

Learning Objectives:

- To enable the students to learn the designing of data base systems, foundation on the relational model of data and normal forms.
- To understood the concepts of data base management system, design simple Database models
- To learn and understand to write queries using SQL, PL/SQL.

Units	List of Exercises	
I	**Database Concepts:** Database Systems - Data vs Information - Introducing the database -File system - Problems with file system – Database systems. Data models - Importance - Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction	6
II	**Design Concepts:** Relational database model - logical view of data-keys -Integrity rules - relational set operators - data dictionary and the system catalog - relationships -data redundancy revisited -indexes - codd's rules. Entity relationship model - ER diagram	6
III	**Normalization of Database Tables**: Database tables and Normalization – The Need for Normalization –The Normalization Process – Higher level Normal Form. **Introduction to SQL**: Data Definition Commands – Data Manipulation Commands – SELECT Queries – AdditionalData Definition Commands – Additional SELECT Query Keywords – Joining Database Tables.	6
IV	**Advanced SQL**: Relational SET Operators: UNION – UNION ALL – INTERSECT – MINUS. **SQL Join Operators:** Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. **Sub Queries and Correlated Queries**: WHERE – IN – HAVING – ANY and ALL – FROM. SQL **Functions:** Date and Time Function – Numeric Function – String Function – Conversion Function	6
V	**PL/SQL**:A Programming Language: History – Fundamentals - Block Structure – Comments – Data Types – Other Data Types – Variable Declaration – Assignment operation – Arithmetic operators. **Control Structures and Embedded SQL**: Control Structures – Nested Blocks – SQL in PL/SQL - Data Manipulation – Transaction Control statements. **PL/SQL Cursors and Exceptions**: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops - SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.	6

Course Outcomes

Course Outcomes	On completion of this course, students will;
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).

CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions

Text Books (Latest Editions)	
1	Coronel, Morris,Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2	Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016
References Books (Latest editions, and the style as given below must be strictly adhered to)	
1	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition.
2	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition
Web Resources	
1	Web resources from NDL Library, E-content from open-source libraries

Mapping with Programme Outcomes:

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**
CO1	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	M	S	S	S

S – Strong, M – Medium , L - Low

CO/PO	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of course contribution to Pos	3	3	3	3	3

Title of the Course	DATABASE MANAGEMENT SYSTEM LAB						
Part	IV						
Category	SEC – VII	Year / Semester	II / IV	Credits	2	Course Code	238203456

Instructional Hours per week	Lecture	Tutorial	Lab Practice	Total	CIA	External	Total
	-	-	2	2	25	75	100

Learning Objectives:

- ✍ Students can learn various SQL and PL/SQL commands, cursor andvarious application programs.

List of Exercises

I. SQL

1. DDLCOMMANDS
2. DMLCOMMANDS
3. TCLCOMMANDS

II. PL/SQL

4. FIBONACCISERIES
5. FACTORIAL
6. STRINGREVERSE
7. SUM OFSERIES
8. TRIGGER

III. CURSOR

9. STUDENT MARK ANALYSIS USINGCURSOR

IV. APPLICATION

10. LIBRARY MANAGEMENTSYSTEM
11. STUDENT MARKANALYSIS

Course Outcomes

Course Outcomes	On completion of this course, students will;
CO1	Understand the various basic concepts of Data Base System. Difference between file system and DBMS and compare various data models.
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML).
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.
CO5	Learn to design Data base operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions

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1	Abraham Silberschatz, Henry F.Korth and S.Sudarshan,"Database System Concepts", McGraw Hill International Publication ,VI Edition.
2	Shio Kumar Singh , "Database Systems ",Pearson publications ,II Edition
2	Albert Lulushi, "Developing ORACLE FORMS Applications", Prentice Hall ,1997
Web Resources	
1	Web resources from NDL Library, E-content from open-source libraries