



M. C. E. Society's
Abeda Inamdar Senior College of Arts, Science and Commerce
(Autonomous), Camp, Pune-1
Affiliated to Savitribai Phule Pune University
NAAC accredited "A" Grade

Syllabus of B.C.A. **(Science)**

Applicable for the Autonomous
College affiliated to

Savitribai Phule Pune
University

BCA (Science) Degree Course
(Choice Based Credit System)

(2021Pattern)

With effect from June-2024



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Semester -I (First Year B.C.A (Science))

Course Type	Course Code	Course / Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
CC – I	21SBCA111	Computer Fundamental	4	-	40	60	100
CC – II	21SBCA112	Problem Solving and C Programming	4	-	40	60	100
CC – III	21SBCA113	Applied Mathematics and Statistics	4	-	40	60	100
CC – IV	21SBCA114	Database Management System	4	-	40	60	100
Core Practical	21SBCA115	Lab I: MS Office and VBA	-	1.5	20	30	50
Core Practical	21SBCA116	Lab II: Programming in C	-	1.5	20	30	50
Core Practical	21SBCA117	Lab III: Statistics Practical using R	-	1.5	20	30	50
Core Practical	21SBCA118	Lab -IV :Database Management System	-	1.5	20	30	50
Total			16	6	240	360	600

Note: Non CGPA course to be conducted in Semester I

21SDG11M2: DEMOCRACY, ELECTIONS AND GOOD GOVERNANCE DEMOCRACY (GROUP-II, SEM-I)

Semester II (First Year B.C.A (Science))

Course Type	Course Code	Course / Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
CC – I	21SBCA121	Data Structures using C	4	-	40	60	100
CC – II	21SBCA122	Introduction to Web Technology	4	-	40	60	100
CC – III	21SBCA123	Advanced Database Management System	4	-	40	60	100
CC – IV	21SBCA124	Introduction to Computer Organization	4	-	40	60	100
Core Practical	21SBCA125	Lab I: Data Structures using C	-	1.5	20	30	50
Core Practical	21SBCA126	Lab II: WebTechnology	-	1.5	20	30	50
Core Practical	21SBCA127	Lab III: Advanced Database Management System	-	1.5	20	30	50
Core Practical	21SBCA128	Lab IV: Computer Organization	-	1.5	20	30	50
Total			16	6	240	360	600

Note: Non CGPA course to be conducted in Semester II 21SPE12M2: PHYSICAL EDUCATION (GROUP-I, SEM-II)



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Semester III (Second Year B.C.A (Science))

Course Type	Course Code	Course / Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
CC – I	21SBCA231	Object Oriented Programming using C++	4	-	40	60	100
CC – II	21SBCA232	Advanced Web Technology using PHP	4	-	40	60	100
CC – III	21SBCA233	Software Engineering	4	-	40	60	100
Core Practical	21SBCA234	Lab I: Object Oriented C++ Programming	-	2	20	30	50
Core Practical	21SBCA235	Lab-II Advanced Web Technology using PHP	-	2	20	30	50
Core Practical	21SBCA236	Lab III: Software Testing Tools (Testing using open source tools)	-	2	20	30	50
AECC –I	21SBHENT23	Health and Nutrition	2	-	20	30	50
AECC –II	21SBAEEL23	Language –I	2	-	20	30	50
Total			16	6	220	330	550

Note: Non CGPA course to be conducted in Semester III

21SBCM23SD: Certificate Course on Content Management System using WordPress

Semester IV (Second Year B.C.A (Science))

Course Type	Course Code	Course / Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
CC – I	21SBCA241	Core JAVA Programming	4	-	40	60	100
CC – II	21SBCA242	Programming in Python	4	-	40	60	100
CC – III	21SBCA243	Programming in GO	4	-	40	60	100
Core Practical	21SBCA244	Lab I: Core JAVA	-	2	20	30	50
Core Practical	21SBCA245	Lab II: Programming in Python	-	2	20	30	50
Core Practical	21SBCA246	Lab-III: Programming in GO	-	2	20	30	50
AECC –I	21SBAEEV24	Environmental Science Awareness Course -II	2	-	20	30	50
AECC –II	21SBAEEL24	Language –II	2	-	20	30	50
Total			16	06	220	330	550



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Semester V (Third Year B.C.A (Science))

Course Type	Course Code	Course/Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
DSCT1	21SBCA351	Advanced Java Programming	4	-	40	60	100
DSCT2	21SBCA352	Introduction to Data Science using Python	4	-	40	60	100
DSCT3	21SBCA353	Computer Networks	4	-	40	60	100
DSCP1	21SBCA354	Lab I: Advanced Java	-	2	20	30	50
DSCP2	21SBCA355	Lab II : Data Science using Python	-	2	20	30	50
DSCP3	21SBCA356	Lab III: Project	-	2	20	30	50
SEC-1*	21SBCA357A	Angular JS	2	-	20	30	50
SEC-1*	21SBCA357B	C#.Net					
SEC-2*	21SBCA358A	Data Visualization using Power BI	2	-	20	30	50
SEC-2*	21SBCA358B	Artificial Intelligence					
Total			16	06	220	330	550

Note: *: Choose one course from SEC1 and SEC2

Semester VI (Third Year B.C.A (Science))

Course Type	Course Code	Course/Paper Title	Credits		Evaluation		
			T	P	CIE	SEE	Total
DSCT1	21SBCA361	Android Programming	4	-	40	60	100
DSCT2	21SBCA362	Data Mining	4	-	40	60	100
DSCT3	21SBCA363	Operating System	4	-	40	60	100
DSCP1	21SBCA364	Lab I: Android Programming	-	2	20	30	50
DSCP2	21SBCA365	Lab II: Data Mining using Python	-	2	20	30	50
DSCP3	21SBCA366	Lab III: Project	-	2	20	30	50
SEC-1*	21SBCA367A	React Native	2	-	20	30	50
SEC-1*	21SBCA367B	ASP .Net					
SEC-2*	21SBCA368A	Network Security	2	-	20	30	50
SEC-2*	21SBCA368B	Cloud Computing					
Total			16	06	220	330	550

Note: *: Choose one course from SEC1 and SEC2

SEMESTER – V



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T.Y.B.C.A (Science) 21SBCA351 Advanced Java Programming
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Advanced Java Programming
Course Code	21SBCA351
Semester	V
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To learn the creation of pure Dynamic Web Application using JDBC.
2.	To understand concept of multithreading and networking.
3.	To learn Server-Side Programming using Servlets and Java Server Pages.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Know the concepts of JDBC Programming.
2.	Understand the concepts of Multithreading
3.	Learn the concepts of Network and Socket Programming
4.	Develop the project by using JSP and JDBC.
5.	Understand the concepts of Spring and Hibernate.

Unit No	Title with Contents	No. of Lectures
Unit I	JDBC	8 Hrs.
	<ol style="list-style-type: none"> 1. Introduction to JDBC 2. Basic JDBC Program Concept 3. Drivers 4. JDBC Architecture. 5. JDBC Process 6. Working with JDBC <ol style="list-style-type: none"> i. Establishing Connection ii. Statements iii. Prepared Statement iv. Callable Statement v. Result Set 7. Executing Queries 	<p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">2</p> <p style="text-align: center;">2</p>

Unit II	Multithreading	10 Hrs.
	1. Introduction to Multithreading.	1
	2. Thread creation	2
	i. Thread Class	1
	ii. Runnable Interface.	
	3. Life cycle of Thread.	2
	4. Thread Priorities and Synchronization	2
	5. Inter Thread Communication	2
	6. Implementation of Thread with Applet	
Unit III	Networking	10 Hrs.
	1. The java.net package	2
	2. Connection Oriented Transmission-Stream Socket Class	2
	3. Creating a Socket to a remote Host on a post	3
	i. Creating TCP Client	
	ii. Creating TCP Server	
	4. Simple Socket Program Example	3
Unit IV	Servlet and JSP	14 Hrs.
	1. Introduction to Servlet	1
	2. Types of Servlet	2
	i. Generic Servlet	
	ii. Http Servlet	
	3. Life cycle of Servlet	2
	4. Session Tracking.	2
	5. Servlet with database.	2
	6. Introduction to JSP.	1
	7. JSP Life Cycle.	2
	8. JSP with Database.	2
Unit V	Spring & Hibernate	18 Hrs.
	Spring:	
	1. Introduction	1
	2. Applications and Benefits of spring	1
	3. Architecture and Environment Setup	2
	4. Hello World Example	1
	5. Core Spring- IoC Containers	2
	6. Spring Bean Definition	1
	7. Scope, Lifecycle	2
	Hibernate:	
	1. Architecture and Environment	2
	2. Configuration, Sessions, Persistent Class	2
	3. Mapping Files, Mapping Types	2
	4. Examples	2

Reference Books:

1. The Complete Reference – JAVA Herbert Schildt
2. Professional Hibernate, by Eric Pugh, Joseph D. Gradecki by Wiley Publishing, Inc., ISBN: 0-7645-7677-1
3. Spring In Action, Craig Walls, Ryan Breidenbach, Manning Publishing Co., ISBN: 1- 932394- 35-4
4. Head First Servlets and JSP: Passing the Sun Certified Web Component Developer Exam -2nd Edition-Bryan Basham, Kathy Sierra, Bert Bates- O'REILLY.

Website Reference Link:

- <https://www.javatpoint.com/>
<https://www.w3schools.com/php/>
<https://www.tutorialspoint.com/php/index.htm>



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T.Y.B.C.A (Science) 21SBCA352-Introduction to Data Science using Python
(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Introduction to Data Science using Python
Course Code	21SBCA352
Semester	V
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To build the fundamentals of data science
2.	To Learn Techniques and Tools for Transformation of Data
3.	Developing design skills of models for big data problems
4.	Empowering students with tools and techniques used in data science.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Understand data science process and obtain Insights About the Roles of a Data Scientist
2.	Obtain, clean/process, and transform data
3.	Analyze and interpret data using an exploratory data analysis
4.	Use Numpy and Pandas library to facilitate various operations on data.
5.	Use appropriate models of analysis, assess the quality of input, derive insight from results, and investigate potential issues.

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Data Science	10
	1. Basics of Data	1
	2. What is Data Science?	1
	3. Data science process	1
	4. Stages in a Data Science project	1
	5. Applications of Data Science in various fields	1
	6. Basics of Data Analytics	1
	7. Types of Analytics – Descriptive, Predictive, Prescriptive	2
	8. Statistical Inference - Populations and samples -Statistical modeling - probability distributions	2
Unit II	Data preprocessing	12
	1. Data Collection Strategies	2
	2. Data Pre-Processing Overview	2
	3. Data cleaning	2
	4. data integration	2
	5. Data Reduction Data Transformation and Data Discretization. Evaluation of classification methods	2
	6. Confusion matrix, Students T-tests and ROC curves	2
Unit III	Exploratory Data Analytics	8
	1. Descriptive Statistics	1
	2. Mean, Standard Deviation, Skewness and Kurtosis	2
	3. Box Plots	1
	4. Pivot Table	1
	5. Heat Map	1
	6. Correlation Statistics	2
Unit IV	Introduction to Numpy and Pandas	14
	1. NumPy and array	1
	2. Vectorization Operation	1
	3. Array Indexing and Slicing	1
	4. Transposing Array and Swapping Axes	2
	5. Saving and Loading Array	1
	6. Universal Functions	2

	7. Mathematical and Statistical Functions in Numpy	1
	8. Series and DataFrame data structures in pandas i. Creation of Data Frames ii. Accessing the columns in a DataFrame iii. Accessing the rows in a DataFrame	2
	9. Panda's Index Objects – i. Reindexing Series and DataFrames ii. Dropping entries from Series and Data Frames - Indexing, iii. Selection and Filtering in Series and Data Frames iv. Arithmetic Operations between Data Frames and Series v. Function Application and Mapping.	3
Unit V	Model Development	8
	1. Simple and Multiple Regression	1
	2. Model Evaluation using Visualization	1
	3. Residual Plot	1
	4. Distribution Plot	1
	5. Polynomial Regression and Pipelines	2
	6. Measures for In-sample Evaluation	1
	7. Prediction and Decision Making.	1
Unit VI	Model Evaluation	8
	1. Generalization Error	1
	2. Out-of-Sample Evaluation Metrics	1
	3. Cross Validation	2
	4. Overfitting –Under Fitting and Model Selection	2
	5. Prediction by using Ridge	2

References Books:

1. Cathy O'Neil and Rachel Schutt, “Doing Data Science, Straight Talk From The Frontline”, O'Reilly, 2014.
2. Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization”, O'Reilly, 2016.
3. Joel Grus, “Data Science from Scratch: First Principles with Python”, O'Reilly Media, 2015.
4. Wes McKinney, “Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython”, O'ReillyMedia, 2012.

Book Links:

1. <https://www.programmer-books.com/introducing-data-science-pdf/> 10.
2. <https://www.cs.uky.edu/~keen/115/Haltermanpythonbook.pdf>
3. [http://math.ecnu.edu.cn/~lfzhou/seminar/\[Joel_Grus\]_Data_Science_from_Scratch_First_Princ.pdf](http://math.ecnu.edu.cn/~lfzhou/seminar/[Joel_Grus]_Data_Science_from_Scratch_First_Princ.pdf) 11.
4. <https://www.pdfdrive.com/doing-data-science-d58735039.html>

Website Reference Link:

1. <https://www.datacamp.com/community/open-courses/statistical-inference-and-dataanalysis>
2. <https://www.coursera.org/learn/python-plotting?specialization=data-science-python>
3. <https://epgp.inflibnet.ac.in/>
4. <https://numpy.org/doc/stable/user/quickstart.html>
5. https://pandas.pydata.org/docs/getting_started/tutorials.html



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T.Y.B.C.A (Science) 21SBCA353-Computer Networks
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Computer Networks
Course Code	21SBCA353
Semester	V
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Become familiar with layered communication architectures (OSI and TCP/IP)
2.	Familiarize the students with the standard models for the layered approach to communication between machines in a network and
3.	To learn the protocols of the various layers.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Gain the knowledge of the basic computer network technology.
2.	Gain the knowledge of TCP/IP reference model.
3.	Understand and explore the basics of Computer Networks and Various Protocols
4.	Gain the knowledge of the functions of the Data Link layer in the OSI
5.	Gain the knowledge of the functions of Transport layer in the OSI

Unit No.	Title with Contents	No. of Lectures
Unit I	Introduction to Computer Networks	8
	1. Computer Networks- Goals and applications –Business Application , Home Application, Mobile User, Social Issues	2
	2. Topologies – star, bus, mesh, ring etc.	2
	3. Network Types-LAN, MAN, WAN, Wireless Networks, Home Networks, Internetwork	2
	4. Data Communication-Definition, components, data representation, Data Flow	2
Unit II	Network Models	8
	1. OSI Reference Model	1
	2. Functionality of each layer	2
	3. TCP/IP Reference Model	1
	4. Comparison of OSI and TCP/IP model	2
	5. TCP/IP Protocol Suite	2
	6. Addressing - Physical, Logical and Port addresses (No examples)	
Unit II	The Internet Layer Protocols	10
	1. Review of IPv4 Protocol	2
	2. IPv6	2
	3. Transition from IPv4 to IPv6	2
	4. ICMPv4	2
	5. ICMPv6	2
Unit III	Routing Protocols	10
	1. Forwarding	1
	2. Structure of a Router	1
	3. Routing Tables	1
	4. Intra – And Inter-Domain Routing	2
	5. Distance Vector Routing	2
	6. RIP	2
	7. OSPF	2
	8. BGP	1
	9. Multicast Routing	
Unit IV	The Data Link Layer	10
	1. Design issues	1
	2. Error detection and correction	2
	3. Sliding window protocols	1
	4. Multiple access protocols	2
	5. Ethernet	2
	6. Data Link Layer switching	2

Unit V	The Transport Layer	14
	1. Introduction	1
	2. The Transport Layer Service	
	i. Process-to-Process Communication	1
	ii. Addressing : Port Numbers	1
	iii. Encapsulation and Decapsulation	2
	iv. Multiplexing and Demultiplexing	1
	v. Flow Control	2
	vi. Error Control	1
	vii. Congestion Control	1
	3. UDP	1
	4. TCP	2
		2

References:

1. TCP / IP Protocol Suite Fourth Edition – Behrouz A. Forouzan
2. Computer Networks Fourth Edition – Andrew Tanenbaum
3. Computer Networks by Andrew Tanenbaum, Pearson Education.[4th Edition]
4. Networking All In One Dummies Wiley Publication.[5th Edition]

Website Reference Link:

1. https://mrcet.com/downloads/digital_notes/CSE/III%20Year/COMPUTER%20NETWORKS%20NOTES.pdf
2. https://kanchiuniv.ac.in/coursematerials/VINODKUMAR_COMPUTER_NETWORKS.pdf



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T.Y.B.C.A (Science) 21SBCA354 Lab I: Advanced Java
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Lab I : Advanced Java
Course Code	21SBCA354
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To learn the creation of pure Dynamic Web Application using JDBC.
2.	To understand concept of multithreading and networking.
3.	To learn Server-Side Programming using Servlets and Java Server Pages.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Know the concepts of JDBC Programming.
2.	Understand the concepts of Multithreading
3.	Learn the concepts of Network and Socket Programming
4.	Develop the project by using JSP and JDBC.
5.	Understand the concepts of Spring and Hibernate.

Assignment No	Title with Contents	No. of Practical
1	<ol style="list-style-type: none"> 1. JDBC Driver Manager 2. JDBC Connection establishment 3. JDBC Statements 4. Result Sets 	4
2	<ol style="list-style-type: none"> 1. Multithreading: Suspending, Resuming ,Stopping threads 	2
3	<ol style="list-style-type: none"> 1. Socket Programming 2. Java Implementation import java.net.*; 3. Establish a Socket Connection 4. Java Implementation import java.net.*; 5. Creating TCP Client 6. Creating TCP Server 	2
4	<ol style="list-style-type: none"> 1. Servlet JSP 2. Generic Servlet 3. Http Servlet 4. JSP 	4
5	<ol style="list-style-type: none"> 1. Spring Modules 2. Spring Framework 3. Hibernate Architecture 4. Hibernate Framework 	2
		14

Best IDE Tools:

Sr.No	Name of IDE or Tools	Operating System
1	Compiler: javac (Note : JAVA 8 and above version) Apache tomcat webserver: Tomcat 5.5 and above version	Window Operating System



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T.Y.B.C.A (Science) 21SBCA355- Lab II: Data Science using Python
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Lab II : Data Science using Python
Course Code	21SBCA355
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To learn how to use Jupyter notebooks.
2.	To develop proficiency for data analysis using Numpy datatype and Pandas series.
3.	To understand how to use data visualization for data analysis
4.	To introduce statistical tools for working with data sets

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Develop skills in NumPy Arrays, Indexing ,Sorting and mathematical and statistical functions
2.	Demonstrate proficiency in Pandas dataframe and Pandas Series.
3.	Carry out standard data visualization and formal inference procedures and can comment on the results.
4.	Develop the ability to build and assess data-based models

Assignment No	Title with Contents	No. of Practical
1	NumPy - Arrays	1
2	NumPy - Indexing Exercises	2
3	NumPy Sorting and Searching Exercises	1
4	NumPy Mathematical and Statistical Exercises	2
5	Pandas Dataframe Exercises	2
6	Pandas Series Exercises	2
7	Simple Regression – Model development	2
8	Data Visualization using Matplotlib	2
	Total Number of Practical	14

Best IDE Tools:

Sr.No	Name of IDE or Tools	Operating System
1	Jupyter Notebook for Python 3.10 and above	Window Operating System



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T.Y.B.C.A (Science) 21SBCA356 Project Laboratory
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Project Laboratory
Course Code	21SBCA356
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand concepts of Project Management
2.	To know how various tools for development and management of software projects are used to carry out various tasks involved
3.	To learn the importance of project documentation.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Demonstrate a sound technical knowledge of selected project topic.
2.	Apply techniques for project management
3.	Create various documents used during the development of the project and a project report.

Sr. No.	Guidelines
1	Students shall choose any topic for project work in consultation with project guide, Project In-charge and head of the department
2	The students shall work on a Project in a group of not more than three students.
3	Students are expected to work on the chosen project during the entire semester.
4	Students shall undertake application oriented/web-based/database-oriented/research based work.
5	Students shall successfully implement the chosen work. Only a hypothetical / theoretical study shall not be accepted
6	Students shall choose any appropriate programming language/ platform, computational techniques and tools in consultation with the guide, In-charge and the head of the department
7	The faculty members from affiliated college shall act as a project guide for each project group with equal distribution of groups amongst each eligible faculty.
8	The guide shall track and monitor the project progress on a weekly basis by considering the workload of 4 laboratory hours per week.
9	The project work shall be evaluated based on the novelty of the topic, scope of the work, relevance to computer science, adoption of emerging techniques/technologies and its real-world application etc.
10	<p>Students shall prepare a project report with the following contents:</p> <p>a) Title Page</p> <p>b) Certificate</p> <p>c) Index Page detailing description of the following with their sub sections:-</p> <ul style="list-style-type: none"> i. Title: A suitable title giving the idea about what work is proposed. – ii. Introduction: An introduction to the topic giving proper iii. Background of the topic. iv. Requirement Specification: v. Specify Software/hardware/data requirements. vi. System Design details :Methodology/Architecture/UML/DFD/Algorithms/protocols used(whichever is applicable) vii. System Implementation: Code viii. Results: Test Cases/Tables/Figures/Graphs/Screen shots/Reports etc ix. Conclusion and Future Scope: Specify the Final conclusion and future scope x. References: Books, web links, research articles etc.
11	The Project report should be prepared in a spiral bound form with adequate number of copies. Copy shall be submitted to the guide and college for the records.
12	The Project work and report shall be certified by the concerned Project guide and Head of the department.
13	<p>Students shall make a presentation of working project and will be evaluated as per the Project evaluation scheme as detailed below</p> <ul style="list-style-type: none"> 1. Continuous Evaluation, Progress Report: 20 marks 2. End Semester Examination: (30Marks) <ul style="list-style-type: none"> a) Presentation & Project Report :10Marks b) Demonstration of the Project 15 Marks c) Viva- 05 Marks



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T.Y.B.C.A (Science) 21SBCA357A SEC-1 Angular JS

2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Angular JS
Course Code	21SBCA357A
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Introducing Angular JS Framework with expression and directives for web applications
2.	Retrieve data from back-end server, manipulate it and display it with ease.
3.	Modularize your code with the custom services and directives.
4	Create Single Page Applications (SPA).

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Know the concepts of Angular JS
2.	Understand working with directives and expressions
3.	Use the components of Angular JS
4.	Create Dependency Injection & Services
5.	Develop Single Page Application (SPA)

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction Angular JS	5 Hrs.
	<ol style="list-style-type: none"> 1. What is Angular JS? 2. Why Angular JS? 3. Features of Angular JS 4. Model-View-Controller 5. Why MVC matters? 6. MVC-The Angular JS way 7. My First Angular JS app 	<p style="text-align: center;">1</p>
Unit II	Expressions and Working with Directives	8
	<ol style="list-style-type: none"> 1. Number and String Expressions 2. Object Binding and Expressions 3. Working with Arrays 4. Forgiving Behavior 5. Understanding Data binding 6. Conditional Directives 7. Styles Directives 8. Mouse and Keyboard Events Directives 	<p style="text-align: center;">1</p> <p style="text-align: center;">2</p>
Unit III	Controllers	7 Hrs.
	<ol style="list-style-type: none"> 1. Understanding Controllers 2. Programming Controllers & \$scope object 3. Adding Behavior to a Scope Object 4. Passing Parameters to the Methods 5. Having Array as members in Controller Scope. 6. Nested Controllers and Scope Inheritance. 7. Multiple Controllers and their scopes 	<p style="text-align: center;">1</p>
Unit IV	Advance Concept	7 Hrs.
	<ol style="list-style-type: none"> 1. Angular JS Modules 2. Filters 3. Modules 4. Forms 5. Scope 6. Dependency Injection & Services 7. Single Page Application (SPA) 	<p style="text-align: center;">1</p>

Reference Books:

1. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, 1th edition O'Reilly
2. Learn AngularJS in 1 Day: Complete Angular JS Guide with Examples, Krishna Rungta , 1st edition Independently Published
3. Angular 5: From Theory to Practice, Asim Hussain, 1st edition, CodeCraft
4. Angular 2 Cookbook Matt Frisbie, 1st edition, Packt Publishing Limited

Website Reference Link:

1. <https://www.javatpoint.com/>
2. <https://www.w3schools.com/php/>
3. <https://www.tutorialspoint.com/php/index.htm>



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T.Y.B.C.A (Science) 21SBCA357B –SEC1 - C# .Net
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	C# .Net
Course Code	21SBCA357B
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1	To provide the knowledge of Dot Net Frameworks along with C#
2	To able to Knowledge of object-oriented paradigm in the C # programming language,
3	To able to Knowledge of .NET environments

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1	Able to Understand the .NET framework.
2	Able to Develop software in C # (application)
3	knowledge of the structure and model of the programming language C # (note)
4	Use the programming language C # for various programming technologies
5	Demonstrate an understanding of C# syntax through program design

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction/Overview of .Net & C#.net	06
	1. Introduction to .Net	1
	2. Platform for the .Net	1
	3. Net Framework – BCL & CLR Key design goals	1
	4. CLR, CTS, MSIL & other tools.	1
	5. Advantages/Disadvantages Visual C#.Net Language	1
	6. Features of C#.	1
Unit II	Programming Using Visual C#.Net	10
	1. The start of the application	1
	2. C#.Net Program Design	1
	3. Variables and types	1
	4. OOPS concepts overview	2
	5. Value types and reference types (CTS)	1
	6. Strings and arrays	2
	7. Control Statements in C#.Net	2
	8. Loops in C#.Net	2
Unit III	Introduction To Windows Forms	10
	1. Windows forms library –	1
	2. Layout Enhancements	1
	3. Forms and controls – Hierarchy	1
	4. Creating simple GUI by hand	1
	5. Event handling	2
	6. Basic controls, windows forms – buttons, check boxes, radio buttons, panels, group boxes, list boxes, picture boxes.	4
Unit IV	Windows Forms – II	4
	1. Menus	1
	2. Built-in dialog boxes and printing Extender Controls	1
	3. Tool Strips, Status Strips and progress bars	1
	4. A new MDI forms strategy	1

Reference Books:

1. Beginning Visual C#, Wrox Publication
2. Programmers Heaven C# School First Edition Jonathan Worthington, Faraz Rasheed
3. ADO.NET Examples and Best Practices for C# Programmers, By Peter D, Blackburn, William

Website Reference Link:

1. [C# Tutorial For Beginners \(c-sharpcorner.com\)](http://c-sharpcorner.com)
2. <https://www.tutorialsteacher.com/csharp>
3. www.programmersheaven.com



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TYBCA (Science) 21SBCA358A SEC2-Data Visualizing using Power BI
2023-24 (CBCS – Autonomy 21 Pattern)

Course/Paper Title	Data Visualizing using Power BI
Course Code	21SBCA358A
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	Identify the primary components of the Power BI interface: reports, data, and model views.
2.	Import Excel data and build basic visuals.
3.	Publish a desktop report to the Power BI Service.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Know the concepts of Power BI
2.	Draw the charts of Power BI
3.	Use the components of Power BI
4.	Analysis the data easily

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction To Power BI	07
	1. Introduction to Power BI – Need, Importance 2. Why Power BI 3. Power BI – Advantages 4. Features of Power BI 5. Power BI Installation	2 1 1 2 1
Unit II	Components of Power BI	08
	1. Introduction to components of Power BI 2. Power Query 3. Power Pivot 4. Power View 5. Power BI Service	2 2 2 2 2
Unit III	Working with Data modeling	10
	1. Introduction to ETL 2. Working with Power Query Editor 3. Data Types In Power BI 4. Data Extraction 5. Transforming Data 6. Load Data for Visualization	3 2 2 2 3 2
Unit IV	Introductions to Power BI Charts	05
	1. Introduction to Charts in Power BI 2. How to create different charts in Power BI 3. View data and Export data.	1 2 2

Reference Books:

1. Microsoft Power BI Complete Reference: Bring your data to life with the powerful features of Microsoft Power BI- by Devin Knight ,Brian Knight , Mitchell Pearson.
2. Mastering Power BI: Build Business Intelligence Applications Powered with DAX, Calculations, Insightful Visualizations, Advanced BI Techniques, and Loads of Data Sources Paperback
3. Microsoft Power BI Dashboards Step by Step First Edition by Pearson.

Website Reference Link:

<https://www.javatpoint.com/>
<https://www.tutorialspoint.com/php/index.htm>
<https://learn.microsoft.com/en-us/power-bi/fundamentals/service-get-started>
<https://www.datacamp.com/tutorial/tutorial-power-bi-for-beginners>

Best IDE Tools:

Sr.No.	Name of IDE or Tools	Operating System
1	Microsoft Power BI	Windows-7/8/10



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T.Y.B.C.A (Science) 21SBCA358B SEC-2--Artificial Intelligence
2023-24(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Artificial Intelligence
Course Code	21SBCA358B
Semester	V
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1	To learn various types of algorithms useful in Artificial Intelligence (AI).
2	To convey the ideas in AI research related to emerging technology.
3	To introduce ideas and techniques underlying the design of intelligent computer systems

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Apply the suitable algorithms to solve AI problems
2.	Identify and apply suitable Intelligent agents for various AI applications
3.	Build smart system using different informed search / uninformed search or heuristic approaches
4.	Represent complex problems with expressive language of representation

Unit No.	Title with Contents	No. of Lectures
Unit I	Introduction to Artificial Intelligence	5
	<ol style="list-style-type: none"> 1. Introduction to AI 2. Comparison of AI, Machine Learning, Deep Learning 3. Applications of AI 4. AI Techniques 5. Intelligent Agents, Agents and Environments, Structure of Agents 	<p>1</p> <p>1</p> <p>1</p> <p>2</p>
Unit II	Problems, Problem Spaces and search	5
	<ol style="list-style-type: none"> 1. Defining problem as a State Space Search 2. Production System 3. Problem Characteristics 4. Search & Control Strategies 5. Problems – Water Jug problem, Missionary Cannibal Problem, Block words Problem, Monkey & Banana problem 	<p>1</p> <p>1</p> <p>1</p> <p>2</p>
Unit III	Searching Algorithms	10
	<ol style="list-style-type: none"> 1. Uninformed Search Algorithms/Blind Search Techniques 2. Breadth-first Search 3. Depth-first Search 4. Informed (Heuristic) search Techniques 5. Generate-and-test 6. Simple Hill Climbing 7. Best First Search 8. Constraint Satisfaction 9. Means End Analysis 10. A* and AO* 	<p>1</p>
Unit IV	Knowledge Representation	15
	<ol style="list-style-type: none"> 1. Introduction to prolog <ol style="list-style-type: none"> i. Arithmetic and lists. ii. Backtracking, cut, and negation. Search and cut iii. Difference structures. 2. Definition of Knowledge 3. Types of knowledge (Procedural and Declarative knowledge) 4. Approaches to Knowledge Representation 5. Knowledge representation using Propositional and Predicate logic 6. Conversion to clause form 7. Resolution in Propositional logic 8. Resolution in Predicate logic 	<p>8</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

References:

1. Artificial Intelligence, Tata McGraw Hill, Elaine Rich and Kevin Knight
2. Computational Intelligence, Eberhart, Elsevier, ISBN 9788131217832
3. Artificial Intelligence: A New Synthesis, Nilsson, Elsevier, ISBN 9788181471901
4. Artificial Intelligence: A Modern Approach, Russel & Norvig, Pearson Education
5. Introduction to Machine Learning, Ethem Alpaydin, PHI

Website Reference Link:

1. <https://intellipaat.com/blog/tutorial/artificial-intelligence-tutorial/>
2. <https://hackr.io/tutorials/learn-prolog>

SEMESTER – VI



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T.Y.B.C.A (Science) 21SBCA361- Android Programming
(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Android Programming
Course Code	21SBCA361
Semester	VI
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Android Operating System
2.	To study Android Apps Development Cycle
3.	To learn to create Android Applications.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Demonstrate their understanding of the fundamentals of Android operating systems.
2.	Write simple GUI applications, use built-in widgets and components.
3.	Create components and adapter menu
4.	Design and implement mobile applications involving data storage in SQLite database
5.	Use location-based services while developing application

Unit No.	Title with Contents	No. of Lectures
Unit I	Introduction to Android	06 Hrs
	<ol style="list-style-type: none"> 1. Overview 2. History 3. Features of Android 4. Architecture of Android <ol style="list-style-type: none"> i. Overview of Stack ii. Linux Kernel iii. Native Libraries iv. Android Runtime v. Application Framework vi. Applications 5. SDK Overview <ol style="list-style-type: none"> i. Platforms ii. Tools – (JDK, SDK, Eclipse/Android Studio, ADT, AVD, Android Emulator), Versions 6. Creating your first Android Application 	<p style="text-align: right;">1</p>
Unit II	Activities, Fragments and Intents	10 Hrs
	<ol style="list-style-type: none"> 1. Introduction to Activities 2. Activity Lifecycle 3. Toast 4. Introduction to Intents 5. Linking Activities using Intents 6. Calling built-in applications using Intents 7. Introduction to Fragments 8. Adding Fragments Dynamically 9. Lifecycle of Fragment 	<p style="text-align: right;">1</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p> <p style="text-align: right;">2</p> <p style="text-align: right;">1</p> <p style="text-align: right;">1</p> <p style="text-align: right;">2</p> <p style="text-align: right;">2</p>
Unit III	Android User Interface	06 Hrs
	<ol style="list-style-type: none"> 1. Understanding the components of a screen <ol style="list-style-type: none"> i. Views and View Groups ii. Linear Layout iii. Absolute Layout iv. Table Layout v. Relative Layout vi. Frame Layout vii. Scroll Layout viii. Scroll View ix. Constraint Layout 2. Split Screen / Multi-Screen Activities 	<p style="text-align: right;">5</p> <p style="text-align: right;">1</p>
Unit IV	Designing Your User Interface with Views	13 Hrs

Unit VI	LOCATION BASED SERVICES AND GOOGLE MAP	11
	1. Display Google Maps	
	i. Creating the project	1
	ii. Obtaining the Maps API Key	1
	iii. Displaying the Map	1
	iv. Displaying the Zoom Control	1
	v. Changing Views	1
	vi. Navigating to a specific location	1
	vii. Adding Markers	1
	viii. Getting the location that was touched	1
	ix. Geocoding and Reverse Geocoding	2
	2. Getting Location Data	2
	3. Monitoring a Location	2

Reference Books:

1. Beginning Android4 Application Development, By Wei-Meng Lee WILEY India Edition WROX Publication
2. Professional Android 4 Application Development, By Reto Meier WROX Publication
3. Head First Android Development, By Dawn Griffiths, O'Reilly Publication

Website:

1. The official site for Android developers - <https://developer.android.com>
2. <https://www.tutorialspoint.com/android/index.htm>
3. <https://www.javatpoint.com/android-tutorial>
4. <https://www.geeksforgeeks.org/android-tutorial/>



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T.Y.B.C.A (Science) 21SBCA362 Data Mining
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Data Mining
Course Code	21SBCA362
Semester	VI
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand data warehouse concepts, architecture, business analysis and tools.
2.	To understand data pre-processing and data visualization techniques.
3.	To study algorithms for finding hidden and interesting patterns in data.
4.	To understand and apply various classification and clustering techniques using tools.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Need of data mining and apply suitable pre-processing techniques for data analysis
2.	Apply frequent pattern and association rule mining techniques for data analysis
3.	Apply appropriate classification and prediction techniques for data analysis
4.	Apply appropriate clustering techniques for data analysis
5	Design a Data warehouse system and perform business analysis with OLAP tools

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Data Mining	12 Hrs
	<ol style="list-style-type: none"> 1. What is Data Mining 2. Need of data mining 3. Knowledge Discovery Process 4. Data Mining Tasks- <ol style="list-style-type: none"> i. Classification ii. Regression iii. Time Series Analysis iv. Prediction v. Clustering vi. Association Rules 5. Data Mining Issues 6. Applications of Data Mining 7. Data Objects and attribute types 8. Statistical description of data 9. Data Preprocessing <ol style="list-style-type: none"> i. Data cleaning ii. Data integration and transformation iii. Data reduction iv. Data discretization 10. Data Visualization 11. Data similarity and dissimilarity measures. 	<p style="text-align: right;">1 1 1 2 1 1 2 1</p>
Unit II	Mining Frequent Patterns	12hrs
	<ol style="list-style-type: none"> 1. Frequent patterns 2. Market basket analysis 3. Frequent itemsets, closed itemsets 4. Association rules <ol style="list-style-type: none"> i. Types of association rule (Single dimensional, multidimensional, multilevel, quantitative) 5. Finding frequent itemset (Apriori algorithm) 6. Generating association rules from frequent itemset 7. Limitation and improving Apriori 8. From Association Mining to Correlation Analysis 9. Python Libraries for implementing Apriori 	<p style="text-align: right;">1 2 1 2 2 1 1 2</p>

Unit III	Classification and Prediction	13 Hrs.
	<p>1. Introduction to Classification and Prediction</p> <p>2. Issues Regarding Classification and Prediction</p> <p>3. Preparing the Data for Classification and Prediction</p> <p>4. Comparing Classification and Prediction Methods</p> <p>5. Decision Tree Induction</p> <p>6. Attribute Selection Measures</p> <p>7. Tree Pruning</p> <p>8. Scalability and Decision Tree Induction</p> <p>9. Training Bayesian Belief Networks</p> <p>10. Rule-Based Classification</p> <ul style="list-style-type: none"> i. Using IF-THEN Rules for Classification ii. Rule Extraction from a Decision Tree iii. Rule Induction Using a Sequential Covering Algorithm <p>11. Prediction</p> <ul style="list-style-type: none"> i. Linear Regression ii. Nonlinear Regression <p>12. Accuracy and Error Measures</p> <ul style="list-style-type: none"> i. Classifier Accuracy Measures ii. Predictor Error Measures <p>13. Python Libraries for implementing Decision Tree and Regression</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>2</p>
Unit IV	Cluster Analysis	13 Hrs
	<p>1. Cluster Analysis</p> <ul style="list-style-type: none"> i. What Is Cluster Analysis? ii. Types of Data in Cluster Analysis iii. Interval-Scaled Variables iv. Binary Variables v. Categorical, Ordinal, and Ratio-Scaled Variables vi. Variables of Mixed Types vii. Vector Objects <p>2. A Categorization of Major Clustering Methods</p> <p>3. Partitioning Methods</p> <ul style="list-style-type: none"> i. Classical Partitioning Methods: : k-Means and k-Medoids <p>4. Outlier Analysis</p> <ul style="list-style-type: none"> i. Statistical Distribution-Based Outlier Detection ii. Distance-Based Outlier Detection <p>5. Python libraries for K-means, K-medoids and outlier Detection</p>	<p>6</p> <p>1</p> <p>2</p> <p>2</p> <p>2</p>

Unit V	Data Warehousing	10 Hrs
	1. Introduction to Data Warehouse	1
	2. Data Warehouse Architecture and its components	1
	3. Data Modeling with OLAP	
	i. Introduction	1
	ii. Difference between OLTP and OLAP	1
	iii. Data Mart	1
	iv. Fact Table, Dimension Table, OLAP cube	1
	v. Different OLAP Operations	1
	4. Schema Design	
	i. Introduction	
	ii. Star and snow-Flake Schema	1
	iii. Fact Constellations: Schemas for Multidimensional Database	1

References:

1. Jiawei Han, MichelineKamber, Jian Pei (2012), Data Mining: Concepts and Techniques, 3rd edition, Elsevier, United States of America.
2. Margaret H Dunham (2006), Data Mining Introductory and Advanced Topics, 2ndedition, Pearson Education, New Delhi, India
3. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.
4. Ian H. Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and TechniquesI, Elsevier, Second Edition.
5. K.P. Soman, ShyamDiwakar and V. Ajay, —Insight into Data Mining Theory and Practicell, Eastern Economy Edition, Prentice Hall of India, 2006.
6. Alex Berson and Stephen J. Smith, —Data Warehousing, Data Mining & OLAPl, Tata McGraw – Hill Edition, 35th Reprint 2016.

Ebook and Notes-

1. <http://myweb.sabanciuniv.edu/rdehkharghani/files/2016/02/The-Morgan-Kaufmann-Series-in-Data-Management-Systems-Jiawei-Han-Micheline-Kamber-Jian-Pei-Data-Mining.-Concepts-and-Techniques-3rd-Edition-Morgan-Kaufmann-2011.pdf>
2. <https://hanj.cs.illinois.edu/bk3/>
3. <https://www-users.cse.umn.edu/~kumar001/dmbook/index.php>

Website Reference Link:

1. <https://intellipaath.com/blog/tutorial/data-warehouse-tutorial/>
2. <https://www.mygreatlearning.com/blog/data-mining-tutorial/>
3. <https://data-flair.training/blogs/data-mining-tutorial/>



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T.Y.B.C.A (Science) 21SBCA363 Principles of Operating Systems
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	DSE III Principles of Operating Systems
Course Code	21SBCA363
Semester	VI
No. of Credits	04

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To study algorithms for CPU-scheduling, process creation and termination.
2.	To understand the notion of a Multithreading and Inter-process communication.
3.	To learn critical-section problems and classical process-synchronization problems.
4.	To know the concept of deadlock, different methods for preventing or avoiding deadlocks and techniques for memory management.
5.	To learn and understand file system, directory structure, file allocation methods and disk scheduling algorithms.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Describe algorithms for process, memory and disk scheduling
2.	Apply technique for inter-process communication and Multithreading.
3.	Implement concept of critical-section
4.	Compare and contrast deadlock avoidance and prevention.
5.	Use functions for file system management

Unit V	File System	10
	1. File Concept i. File Attribute ii. File Operations iii. File Types iv. File Structure	1
	2. Access Methods i. Sequential Access Method ii. Direct Access Method iii. Other Access Methods	2
	3. Directory overview i. Single level directory ii. Two level directory iii. Tree structure directory iv. Acyclic graph directory v. General graph directory	1
	4. File System Structure and Implementation i. Partitions and Mounting ii. Virtual File Systems	2
	5. Allocation Methods i. Contiguous allocation ii. Linked allocation iii. Indexed allocation	2
	6. Free Space Management i. Bit vector ii. Linked list iii. Grouping iv. Counting v. Space maps	2
Unit VI	Disk Scheduling	06
	1. Overview	1
	2. Disk Structure	1
	3. Disk Scheduling i. FCFS Scheduling ii. SSTF Scheduling iii. SCAN Scheduling iv. C-SCAN Scheduling v. LOOK Scheduling	2
	4. Disk Management	1

Reference Books:

1. Operating System Concepts, Avi Silberschatz, Peter Galvin, Greg Gagne, 8th Edition, Wiley Asia
2. Operating Systems: Internals and Design Principles, William Stallings, Prentice Hall of India.
3. The Design of the UNIX Operating System By Maurice J. Bach., PHI publication

E-Books:

3. http://www.uobabylon.edu.iq/download/M.S%2020132014/Operating_System_Concepts,_8th_Edition%5BA4%5D.pdf



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T.Y.B.C.A (Science) 21SBCA364 Lab I: Android Programming
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Lab I : Android Programming
Course Code	21SBCA364
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Android Operating System
2.	To study Android Apps Development Cycle
3	To learn to create Android Applications.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Demonstrate their understanding of the fundamentals of Android operating systems.
2.	Write simple GUI applications, use built-in widgets and components.
3.	Create components and adapter menu
4.	Design and implement mobile applications involving data storage in SQLite database
5.	Use location-based services while developing application

Assignment No	Title with Contents	No. of Practical
1	IMPLEMENTATION OF ACTIVITY	1
2	IMPLEMENTATION OF INTENT	2
3	IMPLEMENTATION OF LAYOUT	1
4	BASIC UI DESIGN	2
5	ADAPTER AND MENU	2
6	CONTENT PROVIDER	2
7	LOCATION BASED SERVICES AND GOOGLE MAP	2
	Total Number of Practical	12

Best IDE Tools:

Sr.No	Name of IDE or Tools	Operating System
1	Android Studio	LINUX/Window Operating System



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T.Y.B.C.A (Science) 21SBCA365 Data Mining using Python
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Data Mining using Python
Course Code	21SBCA365
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. N.	Objectives
1.	To learn to perform data mining tasks using a data mining using advanced python libraries.
2.	To understand the data sets and data preprocessing.
3.	To demonstrate the working of algorithms for data mining tasks such association rule mining, classification, clustering and regression.
4.	To emphasize hands-on experience working with all real data sets

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Perform suitable data pre-processing and cleaning technique for data analysis
2.	Apply frequent pattern and association rule mining techniques on data.
3.	Discover relationships in the data using regression and correlation measures
4.	Use appropriate classification and clustering techniques for real world datasets

Assignment No	Title with Contents	No. of Practical
1	DATA PREPROCESSING – HANDLING MISSING VALUES	1
2	ASSOCIATION RULE MINING- APRIORI	2
3	CLASSIFICATION – LOGISTIC REGRESSION	1
4	CLASSIFICATION - KNN	2
5	CLASSIFICATION - DECISION TREES	2
6	CLUSTERING – K-MEANS	2
7	OUTLIER DETECTION	2
	Total Number of Practical	12

Best IDE Tools:

Sr.No	Name of IDE or Tools	Operating System
1	Jupiter Notebook for Python	Window Operating System



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T.Y.B.C.A (Science) 21SBCA366 Project Laboratory
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Project Laboratory
Course Code	21SBCA366
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand concepts of Project Management
2.	To know how various tools for development and management of software projects are used to carry out various tasks involved
3.	To learn the importance of project documentation.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Demonstrate a sound technical knowledge of selected project topic.
2.	Apply techniques for project management
3.	Create various documents used during the development of the project and a project report.

Sr. No.	Guidelines
1	Students shall choose any topic for project work in consultation with project guide, Project In-charge and head of the department
2	The students shall work on a Project in a group of not more than three students.
3	Students are expected to work on the chosen project during the entire semester.
4	Students shall undertake application oriented/web-based/database-oriented/research based work.
5	Students shall successfully implement the chosen work. Only a hypothetical / theoretical study shall not be accepted
6	Students shall choose any appropriate programming language/ platform, computational techniques and tools in consultation with the guide, In-charge and the head of the department
7	The faculty members from affiliated college shall act as a project guide for each project group with equal distribution of groups amongst each eligible faculty.
8	The guide shall track and monitor the project progress on a weekly basis by considering the workload of 4 laboratory hours per week.
9	The project work shall be evaluated based on the novelty of the topic, scope of the work, relevance to computer science, adoption of emerging techniques/technologies and its real-world application etc.
10	<p>Students shall prepare a project report with the following contents:</p> <p>d) Title Page</p> <p>e) Certificate</p> <p>f) Index Page detailing description of the following with their sub sections:-</p> <ul style="list-style-type: none"> xi. Title: A suitable title giving the idea about what work is proposed. – xii. Introduction: An introduction to the topic giving proper xiii. Background of the topic. xiv. Requirement Specification: xv. Specify Software/hardware/data requirements. xvi. System Design details :Methodology/Architecture/UML/DFD/Algorithms/protocols used(whichever is applicable) xvii. System Implementation: Code xviii. Results: Test Cases/Tables/Figures/Graphs/Screen shots/Reports etc xix. Conclusion and Future Scope: Specify the Final conclusion and future scope xx. References: Books, web links, research articles etc.
11	The Project report should be prepared in a spiral bound form with adequate number of copies. Copy shall be submitted to the guide and college for the records.
12	The Project work and report shall be certified by the concerned Project guide and Head of the department.
13	<p>Students shall make a presentation of working project and will be evaluated as per the Project evaluation scheme as detailed below</p> <p>3. Continuous Evaluation, Progress Report: 20 marks</p> <p>4. End Semester Examination: (30Marks)</p> <ul style="list-style-type: none"> d) Presentation & Project Report :10Marks e) Demonstration of the Project 15 Marks f) Viva- 05 Marks



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T.Y.B.C.A (Science) 21SBCA367A SEC-1 React Native
2023-24 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	React Native
Course Code	21SBCA367A
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To Reduce the amount of code you write to build rich user interface applications.
2.	Increase the reliability and maintainability of UI by using data binding.
3.	Retrieve data from back-end server, manipulate it and display it with ease.
4	To create Mobile App with best features

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Know the concepts of React Native
2.	Understand working with directives and expressions
3.	Use the components of React Native
4.	Create and use React Native

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction React Native	5 Hrs.
	1. What is React Native?	1
	2. Why React Native?	1
	3. Features of React Native	1
	4. Setup Environment	1
	5. My First React Native app	1
Unit II	Basics of React Native	10 Hrs
	1. React Native-State	1
	2. React Native-Props	1
	3. React Native – Styling	1
	4. React Native – Flexbox	1
	5. React Native – ListView	1
	6. React Native – Text Input	1
	7. React Native – ScrollView	1
	8. React Native – Images	1
	9. React Native – Buttons	2
	10. React Native -Router	
Unit III	Components and APIS	15 Hrs.
	1. React Native – View	1
	2. React Native – Animation	1
	3. React Native – Debugging	1
	4. React Native – WebView	1
	5. React Native – Modal	1
	6. React Native – ActivityIndicator	1
	7. React Native – Picker	1
	8. React Native – Status Bar	1
	9. React Native – Switch	1
	10. React Native – Text	1
	11. React Native – Alert	1
	12. React Native – Geolocation	2
	13. React Native – AsyncStorage	1

Reference Books:

1. React and React Native, by Adam Boduch, published by PACKT
2. React Native Cookbook: Bringing the Web to Native Platforms Jonathan Lebensold, Oreilly

Website Reference Link:

1. <https://www.javatpoint.com/>
2. <https://www.w3schools.com/php/>
3. <https://www.tutorialspoint.com/php/index.htm>

Ebooks:

1. https://books.google.co.in/books?id=jLkrDwAAQBAJ&printsec=frontcover&source=gbs_ge_summar_y_r&cad=0#v=onepage&q&f=false
2. <https://pepa.holla.cz/wp-content/uploads/2016/12/Learning-React-Native.pdf>



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T.Y.B.C.A (Science) 21SBCA367B SEC-1 ASP .Net
(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	ASP .Net
Course Code	21SBCA367B
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To enable the students to learn about basic features of ASP.NET and its controls
2.	To enable the students to create an ASP.NET application using standard .NET Controls
3.	To enable the students to learn about connecting data sources using ADO.NET and managing them.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Use the features of Dot Net Framework along with the features of ASP. NET & C#
2.	Use ASP.NET controls in web applications
3.	Manage states of data
4.	Create database driven ASP.NET web applications and web services
5.	Understand the Model, View and Controller architecture

Unit V	ASP.NET MVC	04
	1. Introduction to MVC Pattern	1
	2. Razor View	3
	3. Controller	
	4. Model	

References:

8. Programming Entity Framework by JuliaLerman
9. Pro ASP.Net MVC 5 (Expert's Voice in ASP.Net) by Adam Freeman
10. Beginning ASP.Net in C#, Wrox Publications/Apress Publications
11. Complete Reference guide ASP.Net

Website Reference Link:

5. Programiz: <https://www.programiz.com>
6. Geeksforgeeks: <https://www.geeksforgeeks.org>
7. Java Point: <https://www.javatpoint.com>
8. Tutorialspoint: <https://www.tutorialspoint.com>



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T.Y.B.C.A (Science) 21SBCA358A- SEC-2: Network Security

2023 (CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Network Security
Course Code	21SBCA368A
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand basics of Cryptography and Network Security.
2.	To learn about various Cryptographic techniques.
3.	To Learn about Symmetric key and Asymmetric key Algorithms
4.	To learn the concept of Digital Signatures.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Identify the security issues in the network and resolve it.
2.	Evaluate security mechanisms using rigorous approaches by key ciphers and Hash functions.
3.	Understand and analyze public-key cryptography, RSA and other public-key cryptosystems
4.	Understand User Authentication

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction To Security	6
	1. The need for Security 2. Security Approaches 3. Principles of Security 4. Types of Attacks	
Unit II	Cryptography: Concepts and Techniques	10
	1. Introduction 2. Plain Text and Cipher 3. Substitution Techniques 4. Transposition Techniques 5. Symmetric and Asymmetric key cryptography	
Unit III	Symmetric Key Algorithms & Asymmetric key Algorithms	10
	1. Algorithms types and modes 2. DES 3. RSA 4. Symmetric and Asymmetric key Cryptography 5. Digital Signatures	
Unit IV	Internet Security Protocols	6
	1. Digital Certificates 2. Basic concepts of Internal security 3. Secure Socket Layer (SSL) 4. Transport Layer Security (TLS) 5. Secure Hyper Text Transfer Protocol (SHTTP) 6. Time Stamping Protocol (TSP)	

References:

1. Cryptography and Network Security Second Edition – Atul Kahate Network Security: The Complete Reference by BRAGG, Tata McGraw Hill Education Private
2. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice Hall PTR., 2002.
3. Stallings, W., Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR., 2003.
4. Stallings, W. Network security Essentials: Applications and standards, Prentice Hall, 2000.

Website Reference Link:

1. https://mrcet.com/downloads/digital_notes/CSE/III%20Year/Information%20Security.pdf
2. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SCS1316.pdf



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T.Y.B.C.A (Science) 21SBCA358B - SEC-2: Cloud Computing

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Cloud Computing
Course Code	21SBCA368B
Semester	VI
No. of Credits	02

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the principles and paradigm of Cloud Computing
2.	To appreciate the role of Virtualization Technologies
3.	Ability to design and deploy Cloud Infrastructure
4.	Understand cloud security issues and solutions

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
	After Completion of this course students will able to-
1.	Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2.	Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple datacenters to build and deploy cloud applications that are resilient, elastic and cost-efficient.
3.	Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
4.	Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3
5.	Analyze various cloud programming models and apply them to solve problems on the cloud

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction to Cloud Computing	08
	1. Overview, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Multitenant Technology.	4
	2. Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology.	2
	3. Infrastructure as a Service, Platform as a Service, Software as a Service, Cloud Deployment Models.	2
Unit II	Abstraction and Virtualization	07
	1. Introduction to Virtualization Technologies, 2. Load Balancing and Virtualization, 3. Understanding Hyper visors, 4. Virtual Machines Provisioning and Manageability Virtual Machine Migration Services,	2
	5. Provisioning in the Cloud Context Virtualization of CPU, Memory , I/O Devices,	2
	6. Virtual Clusters and Resource management	1
Unit III	Programming, Environments and Applications	08
	1. Features of Cloud and Grid Platforms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments,	4
	2. Applications: Moving application to cloud, Microsoft Cloud Services, Google Cloud Applications, Amazon Cloud Services,Cloud Applications.	4

Unit IV	Security In The Cloud	07
	1. Security Overview	2
	2. Cloud Security	
	3. Challenges and Risks	
	4. Software-as-a-Service Security	
	5. Security Governance	2
	6. Risk Management	
	7. Security Monitoring	1
	8. Security Architecture Design	
	9. Data Security, Application Security, Virtual Machine Security	1
	10. Identity Management and Access Control	
	11. Disaster Recovery in Clouds	1

References:

1. Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center :
Brian J.S. Chee and Curtis Franklin
2. Mastering Cloud Computing: Foundations and Applications Programming :
Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi
3. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things :
Kai Hwang, Geoffrey C Fox, Jack G Dongarra

Website Reference Link:

1. Programiz: <https://www.programiz.com>
2. Geeksforgeeks: <https://www.geeksforgeeks.org>
3. Java Point: <https://www.javatpoint.com>
4. Tutorialspoint: <https://www.tutorialspoint.com>