Pimpri Chinchwad Education Trust's

PIMPRI CHINCHWAD COLLEGE OF ENGINEERING

SECTOR NO. 26, PRADHIKARAN, NIGDI, PUNE 411044

An Autonomous Institute Approved by AICTE and Affiliated to SPPU, Pune

DEPARTMENT OF INFORMATION TECHNOLOGY

Exit Policy
of
First, Second and Third
B. Tech. Information Technology
(Regulations 2023)

Effective from Academic Year 2024-25

Institute Vision

To be one of the top 100 Engineering Institutes of India in coming five years by offering exemplarily Ethical, Sustainable and Value Added Quality Education through a matching ecosystem for building successful careers.

Institute Mission

1. Serving the needs of the society at large through establishment of a state-of-art Engineering Institute.
2. Imparting right Attitude, Skills, Knowledge for self-sustenance through Quality Education.
3. Creating globally competent and Sensible engineers, researchers and entrepreneurs with an ability to think and act independently in demanding situations.

EOMS Policy

"We at PCCOE are committed to offer exemplarily Ethical, Sustainable and Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders.

We shall strive for technical development of students by creating globally competent and sensible engineers, researchers and entrepreneurs through Quality Education.

We are committed for Institute's social responsibilities and managing Intellectual property.

We shall achieve this by establishing and strengthening state-of-the-art Engineering Institute through continual improvement in effective implementation of Educational Organizations Management Systems (EOMS)."

Course Approval Summary

Board of Studies - Department of Information Technology

Sr. No.	Name of the Course	Course Code	Page number	Signature and stamp of BoS Chairman
1.	Data Science Laboratory	BIT22EX01	2	
2.	Java Programming Laboratory	BIT22EX02	4	
3.	Operating System's Administration Laboratory	BIT22EX03	7	
4.	Network Management Laboratory	BIT22EX04	9	
5.	Mobile Application Development Laboratory	BIT24EX01	11	
6.	Ethical Hacking Laboratory	BIT24EX02	13	
7.	Advanced Java Programming Laboratory	BIT24EX03	15	
8.	DevOps Laboratory	BIT24EX04	17	
9.	Automation Software Testing Laboratory	BIT26EX01	19	
10.	Advanced Python Programming Laboratory	BIT26EX02	21	
11.	Internship	BIT26EX03	24	

Chairman
BoS, Information Technology
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Approved by Academic Council:

Chairman
Academic Council
PCET's, Pimpri Chinchwad College of Engineering
Sector No. 26, Pradhikaran, Nigdi, Pune-44

Chairman, Academic Council
Pimpri Chinchwad College of Engineering

	Pimpri Chinchwad Education Trust's **Pimpri Chinchwad College of Engineering**

Multiple Exit Options

Preamble :

Pimpri Chinchwad College of Engineering (PCCoE) is an autonomous institute affiliated to Savitribai Phule Pune University (SPPU). PCCOE has started implementing National Education Policy 2020 (NEP 2020) from the academic year 2023-24. NEP 2020 emphasizes holistic development, flexible curriculum, integration of technology in teaching and learning processes and multidisciplinary approach. University Grant Commission (UGC) in its guidelines for multiple entry and exit highlights flexible learning leading to the award of certificate, diploma, and degree. To meet the objectives of NEP 2020, PCCoE is offering a flexible curriculum with multiple exit options in line with directives received from Higher and Technical Education Department of Government of Maharashtra.

PCCoE recommends a 4 years multidisciplinary Bachelor's programme as the preferred option since it allows the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on major and minor subjects as per the student's preference.

However, in case of unavoidable circumstances if students need to give up their education they can opt to exit at the end of 2^{nd} or 4^{th} or 6^{th} semester after completing additional 8 credits as prescribed in this document. Students will be allowed to take the exit option after counseling by class teacher, proctor, academic coordinator and head of the department.

Students need to register in Academic Bank of Credit (ABC) for availing this option. The Academic Bank of Credits (ABC), a National-level facility provides flexibility of the curriculum framework and interdisciplinary/multidisciplinary academic mobility of students across the Higher Education Institutes (HEIs) in the country with appropriate

"Credit Transfer" mechanism. It would facilitate credit accumulation through the facility created by the ABC scheme in the "Academic Bank Account" opened for students across the country to transfer and consolidate the credits earned by them by undergoing courses in any of the eligible HEIs (PCCoE). The ABC allows for credit redemption through the process of commuting the accrued credits in the Academic Bank Account maintained in the ABC for the purpose of fulfilling the credits requirements for the award of certificate/diploma/degree by the authorized HEIs (PCCoE). Upon collecting a certificate, diploma or degree, all the credits earned till then, in respect of that certificate, diploma or degree, shall stand debited and deleted from the account concerned.

Multiple Exits:

Students will have the flexibility to enter a programme in odd semesters and exit a programme after the successful completion of even semesters as per their future career needs. The student has to earn the minimum credits as mentioned in table 1 and should not have any backlogs. The student has to submit a request for exiting the programme to the Academic Council Chairman through the BoS Chairman within 2 weeks of declaration of results. The additional 8 credits need to be earned during the Summer Vacation (within 2 months of approval of Exit Request).

Table 1: Exit option after 2nd or 4th or 6th Semester [Ref: NEP GR, Government of Maharashtra Point 2 and Point 7]

Sr. No.	Levels and Semester Completion	Qualification Title	Regular Credit Requirement	Additional Credits to be Earned
1	Level : 4.5 Semester 2	One Year UG Certificate in the relevant Discipline	Minimum 40 credits	8 Credits of VSEC/Internship/ Apprenticeship per the relevant programme

2	Level:5.0 Semester :4	Two Year UG Diploma in the relevant Discipline	Minimum 80 credits	8 Credits of VSEC/Internship/Mini Project as per the relevant programme
3	Level 5.5 Semester:6	Three Year B. Voc/ B.Sc in the relevant Discipline	Minimum 120 credits	8 Credits of VSEC/Internship/Mini Project as per the relevant programme

The table 1 is interpreted as follows.

Students exiting the First Year programme after securing minimum 40 credits will be awarded one year UG Certificate in the relevant Discipline provided they secure 8 credits in work-based vocational courses or internship / Apprenticeship offered during summer vacation in addition to 4 credits from skill-based courses earned during the first and second semester.

Students exiting the Second Year Programme after securing minimum 80 credits will be awarded Two Years UG Diploma in the relevant Discipline provided they secure additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc.) offered during summer vacation after the fourth semester.

Students exiting the 3-year UG program will be awarded Three Years B. Voc./ B.Sc in the relevant Discipline upon securing minimum 120 credits with additional 8 credits in skill-based vocational courses (skill-based courses, internship, mini projects etc.) offered during summer vacation after the sixth semester.

Exit options shall be provided with Certification, Diploma and B. Vocational/ B.Sc degrees to the students at the end of the second, fourth and sixth semester, respectively, in the four-year degree programme. However the duration of completion of UG Engineering Degree Program is 8 years from the date of admission to first year.

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Curriculum Structure
Exit Courses
Information Technology

CURRICULUM STRUCTURE

Exit Courses B.Tech. (Information Technology)

First Year B. Tech Information Technology Exit Courses (Regulations 2023)
(With effect from Academic Year 2024-25)

Semester II

Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
									FA		SA	TW	PR	OR	Total
		L	P	T	Total	L	P	T	FA1	FA2					
BIT22EX01	Data Science Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT22EX02	Java Programming Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT22EX03	Operating System's Administration Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT22EX04	Network Management Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**200**	**-**	**400**

Second Year B.Tech Information Technology Exit Courses (Regulations 2023)
(With effect from Academic Year 2024-25)

Semester IV

Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
									FA		SA	TW	PR	OR	Total
		L	P	T	Total	L	P	T	FA1	FA1					
BIT24EX01	Mobile Application Development Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT24EX02	Ethical Hacking Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT24EX03	Advanced Java Programming Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT24EX04	DevOps Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**200**	**200**	**-**	**400**

Third Year B.Tech Information Technology Exit Courses (Regulations 2023)
(With effect from Academic Year 2024-25)

Semester VI

Course Code	Course Name	Credit Scheme				Teaching Scheme (Hours/Week)			Evaluation Scheme and Marks						
									FA		SA	TW	PR	OR	Total
		L	P	T	Total	L	P	T	FA1	FA1					
BIT26EX01	Automation Software Testing Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT26EX02	Advanced Python Programming Laboratory	-	2	-	2	-	4	-	-	-	-	50	50	-	100
BIT26EX03	Internship	-	4	-	4	-	8	-	-	-	-	150	-	50	200
Total		**-**	**8**	**-**	**8**	**-**	**16**	**-**	**-**	**-**	**-**	**250**	**100**	**50**	**400**

L-Lecture, **P**-Practical, **T**-Tutorial, **FA**–Formative Assessment, **FA1**-Formative Assessment 1, **FA**–Formative Assessment 2, **SA**-Summative Assessment, **TW**-Term Work, **PR**-Practical Exam, **OR**-Oral Exam.

Course Syllabus

Program	B. Tech. I.T.			Semester			II
Course	Data Science Laboratory			Code			BIT22EX01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Linear algebra
2. Programming Skills

is essential

Course Objectives:

1. To learn how to manipulate datasets using Python libraries.
2. To apply data pre-processing techniques and interpret through various graphs.
3. To build a strong statistical and algorithmic foundation to infer insights.

Course Outcomes:

After learning the course, the students will be able to:

1. Demonstrate Data Science tools and Environment.
2. Apply pre-processing techniques and visualize the data using Python libraries.
3. Analyze different types of data modeling algorithms.
4. Summarize the report on the Data Science application.

Guidelines:

1. Laboratory Instructors may design a suitable set of assignments for each topic. All topics should be addressed. For every topic, at least three lab assignments should be framed and approved during the module meeting.
2. For each laboratory assignment, it is essential for students to write the title, aim, topic theory, algorithm, mathematical background, and data set description (as applicable).
3. Laboratory Journal- Program codes with sample output of all performed assignments are to be submitted as softcopy.
4. Term Work –Term work is a continuous assessment that evaluates a student's progress throughout the semester. Laboratory Instructors may design rubrics to assess assignments and mini-projects.

Detailed Syllabus

Sr. No.	List of Topics (Write a program in Python)
1.	**Data Science Tools and Environment, Python programming basics** · Introduction to the laboratory environment (e.g., Jupyter Notebook, Python IDEs) · Introduction to the Data Science · Python Programming for Data Science · Python Data Structures · Introduction to data manipulation libraries (e.g., Pandas, NumPy, MatPlotlib)
2.	**Data Acquisition and Cleaning** · Data importing from various sources (CSV, JSON, SQL databases) · Data cleaning and preprocessing (handling missing values, outliers, etc.)

3.	**Data Visualization and Exploratory Data Analysis (EDA)** · Data visualization libraries (e.g., Matplotlib, Seaborn) · Exploratory Data Analysis techniques (summary statistics, data distribution analysis, correlation analysis)
4.	**Statistical / Algorithmic Data Modeling** · Probability distributions, etc. · Basics of classification and regression algorithms · Model evaluation techniques (performance metrics)
5.	**Mini-Project Development and Presentation** · Development of Mini-Project and its presentations Diverse examples of case studies in data science for Mini-project Predictive Maintenance in Manufacturing, Churn Prediction in Telecom Industry, Fraud Detection in Financial Transactions, Healthcare Predictive Analytics, etc.

Reference Books:

1. Grus Joel, *Data Science from Scratch*, O'Reilly Media Inc., ISBN: 9781491901427
2. McKinney Wes, *Python for Data Analysis,* O' Reilly media, ISBN : 978-1-449-31979-3. 4. Python

E-resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs32/
2. https://www.coursera.org/specializations/introduction-data-science
3. https://www.linkedin.com/learning/topics/data-science
4. https://www.mygreatlearning.com/academy/learn-for-free/courses/basics-of-data-visualization-for-data-science
5. https://www.simplilearn.com/data-science-free-course-for-beginners-skillup?source=SidebarWidget_SkillUp
6. https://www.scaler.com/topics/course/python-for-data-science/
7. https://www.mygreatlearning.com/data-science/free-courses
8. https://www.mygreatlearning.com/data-visualization/free-courses

Program	B. Tech. I.T.			Semester			II
Course	Java Programming Laboratory			Code			BIT22EX02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Problem Solving skill
2. Programming language

is essential

Course Objectives:

1. . To learn Java programming skills.

Course Outcomes:

After learning the course, the students will be able to:

1. Apply the concept of Java programming to solve real life problems.
2. Make use of object oriented concepts to write Java Programs.
3. Apply the exception handling and file handling for real world applications.
4. Build an object-oriented solution to solve a real-life problem.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1	A. Write a program in Java to implement the formula Area = Height Width B. Write a program in Java to find the result of the following expression. **(Assume a = 10, b = 5)** **i) (a < < 2) + (b > > 2)** **ii) (a) | | (b > 0)** **iii)(a+b*100)/10** **iv) a & b**
2	Write a program in Java to find the average of marks obtained by a study in five papers.
3	Write a Java Program to convert Integer numbers to Binary numbers.
4	Write a Java String Program to Check Anagram. **Input:** str1 = "Silent" str2 ="Listen" **Output:** Strings are Anagram As all the elements in str1 are exact same as to create str2 .
5	Write a Java program to find the second most frequent character in a given string.
6	Write a Java Program for Linear Search.
7	Write a program in Java with class Rectangle with the data fields width, length, area and color. The length, width and area are of double type and color is of string type . The methods are set_ length () , set_width (), set_ color(), and find_ area (). Create two object of Rectangle and compare their area and color. If area and color both are same for the objects then display “Matching Rectangles” otherwise display “Non matching Rectangle”.

8	Develop a Java-based banking system tailored for the PCCOE Cooperative Bank to facilitate account management and transactions. The assignment requires implementing the following functionalities: ▪ Add Account ▪ Remove Account ▪ Deposit Money ▪ Withdraw Money
9	**Inheritance and aggregation:** Implement application for **a library catalog system** showcasing inheritance with a base class "Item" representing library items like books and DVDs, and derived classes for specific item types. Utilize aggregation by allowing each "Library" object to aggregate multiple instances of "Item" objects stored in its collection.
10	**Polymorphism: method overloading:** Implement program for a geometric shapes application that utilizes function overloading for calculating properties such as area and perimeter. Implement overloaded methods for computing area and perimeter for different shapes (e.g., rectangles, circles, triangles) with varying sets of parameters.
11	**Polymorphism: Method overriding:** Develop an application for a social media platform showcasing method overriding. Implement a base class "Post" with methods for posting and commenting, and derived classes representing different post types (e.g., text post, image post) overriding these methods with specific functionality.
12	**Abstract classes:** Develop an application for a university's course registration system using abstract classes. Implement an abstract class "Course" with common attributes such as course code, title, and credits, and abstract methods for enrolling students and displaying course details. Derived classes representing specific course types (e.g., Information Technology, Mechanical Engg) extend the "Course" class and provide concrete implementations for student enrollment based on course-specific requirements.
13	**Interface:** Create an application for a transportation system where different modes of transport (e.g., car, bus, train) demonstrate polymorphism in their pricing strategies. Implement a common "Transport" interface with a polymorphic method for calculating fares, and each transport type overrides this method to apply its specific fare calculation logic.
14	**Multithreading:** Design an application for performing matrix multiplication using multithreading to improve performance. Implement a matrix multiplication algorithm that divides the computation across multiple threads, with each thread responsible for computing a subset of the resulting matrix. Use Exception Handling.
15	**I/O: reading and writing to files, streams**: Develop a Java program for analyzing log files using I/O operations to read and process log data from files. Implement a log file reader that reads log entries from a text file and analyzes them to extract useful information such as error counts, warning messages. Utilize file streams and buffered readers to efficiently read log files line by line and perform analysis tasks.

Text Books:

1. E. Balagurusamy, “Programming with Java – A Primer”, 4thEdition, Tata – McGraw-Hill Publication, 2019
2. Herbert Schildt, "JAVA: The Complete Reference" 10th Edition, The McGraw Hill Education,2017

Reference Books:

1. Samanta, Debasis, “Object-Oriented Programming With C++ AND JAVA”, 6th Edition, PHI Learning, 2006
2. Steve Freeman , Nat Prycer, "Growing Object-Oriented Software, Guided by Tests", 6th Edition, Pearson Education,2010

E-Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Program	B. Tech. I.T.			Semester			II
Course	Operating System's Administration Laboratory			Code			BIT22EX03
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

Basics of Computer Fundamentals.

is essential

Course Objectives:

1. To learn and understand basics of Operating Systems including Boot process.
2. To learn and understand Shells, Scripts and File System.
3. To introduce to administrative features of Operating Systems.

CourseOutcomes:

After learning the course, the students will be able to:

1. Apply basic knowledge of Unix/Linux operating system.
2. Implement basic shell script commands and admin commands.
3. Apply basic knowledge of software installation and system configuration.
4. Construct scripts for operating system tasks.

Guidelines:

Continuous assessment of the laboratory is done based on overall performance and laboratory assignments performance of students. Each laboratory assignment assessment will assign marks based on parameters with appropriate weights. Suggested parameters for overall assessment as well as each laboratory assignment assessment include - Neatness and cleanliness in Experimental write-up, Efficient Code, Innovation, Interpretation of results and conclusions, Punctuality, Overall behaviour, attitude and performance.

Detailed Syllabus

Assignment No.	Suggested List of Assignments Group A Assignments (Mandatory)
1.	Implementation of Create/rename/ delete a file using Unix/Linux commands
2.	Write a function to display the list of devices connected to your system including the physical names and its instance number.
3.	Adding users and access rights
4.	Implement the commands for creation and deletion of directory. Write a program to change current working directory and display the node details for each file in the new directory.
5.	**Process related commands:** List the processes for the current shell, Display information about processes, Display the global priority of a process, and change the priority of a process with default arguments.
6.	Use Operating system Commands to obtain the following results 1. To print the name of operating system 2. To print the login name 3. To print the hostname

	Group B Assignments (At least 6)
1.	Write a C/C++ / Python script to display all logged in users.
2.	Write a C/C++ /Java Program to display the list of devices connected to your system including the physical names and its instance number.
3.	Write a C/C++ Program to Parent creating the child process by use of fork.
4.	Write C/C++ / Python Program to assign nice values to processes and dynamically monitor them.
5.	Write C/C++ /Java program to identify the available memory in the system.
6.	Write C/C++ /Java Scripts required to start, stop and perform daily cleanup tasks.
7.	Write Java script to display all logged in users. Count the number of logged-in users. Write a program to create a foreground and background process for the selected user and display its status.
8.	Java Program to List the processes for the current shell, Display information about processes, Display the global priority of a process, Change the priority of a process with default arguments.
9.	Java Working with startup scripts. (Init script)
10.	Python Program to demonstrate debugging of script.
11.	Write a shell program to convert all lowercase letter in a file to uppercase letter.
12.	Write a daemon process that monitors a directory and reports the changes in directory contents.(e.g. addition of new files, directory access times etc)
	Group C Assignments (At least 1)
1.	Write program to find number of CPU cores and CPU Manufacturer
2.	RAID installation and configuration in Linux derivative.
3.	EXT file system installation and administration of Linux derivative.

Text Books:

1. The Design of the Unix Operating System, Maurice J. Bach, Pearson Education, ISBN: 81-7758-770-6.
2. Evi Nemeth, Garth Snyder, Tren Hein, Ben Whaley, Unix and Linux System Administration Handbook, Fourth Edition, ISBN: 978-81-317-6177-9, 2011

Reference Books:

1. Sumitabha Das. Unix: Concepts and Applications. 4th Edition, McGraw Hill Education, 2017.

E-resources:

1. https://onlinecourses.nptel.ac.in/noc24_cs80/preview
2. https://onlinecourses.nptel.ac.in/noc24_cs108/preview
3. https://onlinecourses.swayam2.ac.in/aic20_sp24/preview

Program	B. Tech. I.T.			Semester			II
Course	Network Management Laboratory			Code			BIT22EX04
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50		50	100

Prior knowledge of:

1. Data Communication

is essential

Course Objectives:

1. To apply various network concepts and commands to configure, troubleshoot and manage network.

Course Outcomes:

After learning the course, the students will be able to:

1. Apply basic knowledge of Unix/Linux operating system.
2. Apply basic knowledge of software installation and system configuration
3. Utilize various network commands and TCP/IP utilities to manage the network.
4. Conduct predefined procedures and steps to manage network faults, configuration and security

Guidelines:

Continuous assessment of the laboratory is done based on overall performance and laboratory assignments performance of students. Each laboratory assignment assessment will assign marks based on parameters with appropriate weights. Suggested parameters for overall assessment as well as each laboratory assignment assessment include - Neatness and cleanliness in Experimental write-up, understanding of the concept, Innovation, Interpretation of results and conclusions, Punctuality, Overall behavior, attitude and performance.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1.	Installation and configuration of wireless Network and Communication Devices e.g. Router and Hub
2.	**Network Hardware, Services and Applications** A. **Dynamic Host Configuration Protocol (DHCP):** Installation, Applying various Filters, Configuration and Management, Install IPv4.0 and configure the scope **B. Active Directory Services:** Installation and Configuration, managing Active Directory security solutions. **C.** Managing desktop configurations using group policy and remote installation. Advanced file systems. **D.** Sharing of devices over the LAN e.g. printers, scanners etc.

3.	**Local Area Network**: Identification of various Media and its converters by using them install and configure small Local Area Network (LAN) and identify a case study of troubleshooting Data transmission, TCP/IP Troubleshooting. A. Network Media B. Identification of Switches at Layer 2 and Layer3 and configure the routing from Layer 3 to Layer2.
4.	Explore and Study of TCP/IP utilities and Network Commands on Linux. i. Ping ii. Tracert/Traceroute/Tracepath iii. ipconfig / ifconfig iv. NSlookup v. Hostname vi. Arp vii. Whois viii. Finger ix. Netstat x. Port Scan / nmap xi. Route
5.	**Operating system installation and configuration:** A. **Windows-** Configuration and installation of a. ACP, Upgrading and Migrating to Windows, hardware and applications, b. Telnet services c. Dual Boot operations d. File and Print Services e. Monitoring and Managing Network services
6.	**Windows Server 2008 Administration:** Server deployment, Server Management, Maintaining Servers, Planning Application and Data Provisioning, Planning for Business Continuity and High Availability.
8.	**Linux Operating System Essentials:** Linux environment, Nautilus, Local Services, Manage Logical Volumes, Monitor System Resources, Establish Network Connectivity, Command Line, Secure Linux File Access.

Reference Books:

3. Forouzan, Behrouz A. *TCP/IP protocol suite*. McGraw-Hill Higher Education, 2002.
4. Tanenbaum, Andrew S. *Computer networks*. Pearson Education India, 2003.
5. Hunt, Craig. *TCP/IP network administration*. Vol. 2. " O'Reilly Media, Inc.", 2002.

E-resources:

1. https://nptel.ac.in/courses/106105183
2. https://nptel.ac.in/courses/106105183
3. https://www.linkedin.com/learning/topics/network-administration
4. https://www.mygreatlearning.com/networking-courses/free-courses

Program	B. Tech. I.T.				Semester		IV
Course	Mobile Application Development Laboratory				Code		BIT24EX01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Problem Solving skill
2. Programming language

is essential

Course Objectives:

1. To learn Dart language to build Flutter apps for mobile platforms such as Android and iOS.
2. To build cross platform mobile application development using flutter.

Course Outcomes:

After learning the course, the students will be able to:

1. Apply the concept of flutter and Dart to build mobile applications.
2. Make use of widgets to design user interfaces for a mobile application.
3. Apply the concepts to fetch and authenticate data from external API.
4. Build a mobile application using flutter.

Guidelines:

- All topics listed below must be covered through assignments.
- Continuous assessment of laboratory work should be based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.
- Mini project assessment will be based on parameters such as Understanding of Project Topic, Implementation, Demonstration and Team Work.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1	Study of Flutter and basics of Dart.
2	Set up the Flutter development environment and create your first Flutter app.
3	Implement Hello World Flutter App
4	Implement app with basic Widgets and layouts such as Appbar, Column, Row, Container, Image, Icon, Buttons, Text.
5	Build a counter app that Displays a number in the center of the screen and has two buttons: one to increment the number and one to decrement it.
6	Implement navigation between multiple screens.
7	Implement application to fetch and display data from a REST API.

8	Integrate Firebase into a Flutter app for authentication and database services.
9	Implement animations to enhance the user experience.
10	Apply what you've learned to build a complete, functional Flutter app.

Text Books:

1. Flutter & Dart - The Complete Guide [2022 Edition] by Maximilian Schwarzmüller
2. Flutter for Beginners: An Introductory Guide to Building Cross-Platform Mobile Applications with Flutter and Dart 2 by Alessandro Biessek

Reference Books:

1. Flutter in Action by Eric Windmill
2. Pragmatic Flutter: Building Cross-Platform Mobile Apps for Android, iOS, Web & Desktop by Priyanka Tyagi

E-Resources:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01319478926950400041 7_shared/overview
2. https://flutter.dev/learn

Program	B.Tech. I.T.			Semester			IV
Course	Ethical Hacking Laboratory			Code			BIT24EX02
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

2. Data Communication
3. Computer Networks
4. Database Management

is essential

Course Objectives:

2. To apply various networking tools to provide information and network security.

Course Outcomes:

After learning the course, the students will be able to:

1. Apply basic knowledge of Unix/Linux operating system.
2. Identify different vulnerabilities in the operating system, Network hardware and software, Data bases and internet.
3. Analyze different types of attacks happening in the network.
4. Apply network commands and tools to protect the network and information.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1.	Study different types of attacks, hackers, testing in the network.
2.	Ubuntu virtual machine (or any disto desktop general-purpose like Manjaro, Fedora etc) Install Kali/ Similar Linux virtual machine
3.	**Linux Operating System Essentials:** Linux environment, Nautilus, Local Services, Manage Logical Volumes, Monitor System Resources, Establish Network Connectivity, Command Line, Secure Linux File Access.
4.	**Footprinting and Reconnaissance:** Performing footprinting using Google Hackingwebsite information, information about an archived website, to extract contents of a website, to trace any received email, to fetch DNS information.
5.	**Malware Threats: Worms, viruses, Trojans:** Use Password cracking, Dictionary attack., Encrypt and decrypt passwords, DoS attack, ARP poisoning in windows, Ifconfig, ping, netstat, traceroute, Steganography tools.
6.	**Developing and implementing malwares :** Creating a simple keylogger in python, creating a virus, creating a trojan.
7.	**Hacking web servers, web applications:** Hacking a website by Remote File Inclusion, Disguise as Google Bot to view hidden content of a website, to use Kaspersky for Lifetime without Patch
8.	**sql injection and Session hijacking :** SQL injection for website hacking, session hijacking

9.	**Wireless network hacking, cloud computing security, cryptography :** Using Cryptool to encrypt and decrypt password, implement encryption and decryption using Ceaser Cipher.
10.	**Pen testing :** Penetration Testing using Metasploit and metasploitable,

Reference Books:

6. Simpson, Michael T., Kent Backman, and James Corley. *Hands-on ethical hacking and network defense*. Course Technology Press, 2012.
7. Engebretson, Patrick. *The basics of hacking and penetration testing: ethical hacking and penetration testing made easy*. Elsevier, 2013.
8. Baloch, Rafay. Ethical hacking and penetration testing guide. Auerbach Publications, 2017.
9. Forouzan, Behrouz A. *TCP/IP protocol suite*. McGraw-Hill Higher Education, 2002.

E-resources:

5. https://www.mygreatlearning.com/academy/learn-for-free/courses/introduction-to-ethical-hacking
6. **https://www.classcentral.com/course/swayam-ethical-hacking-14045**
7. **https://www.simplilearn.com/ethical-hacking-course-free-beginners-skillup**
8. **https://www.eccouncil.org/cybersecurity-exchange/ethical-hacking/free-ethical-hacking-courses/**

Program	B. Tech. I.T.			Semester			IV
Course	Advanced Java Programming Laboratory			Code			BIT24EX03
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Problem Solving skill
2. Programming language

is essential

Course Objectives:

1. To apply the concepts of Java Programming .
2. To design and implement models for real life problems by using Java programming.
3. To develop Java programming skills.

Course Outcomes:

After learning the course, the students will be able to:

1. Use Collection Framework in Java
2. Make use of Swing GUI Components to design GUI.
3. Apply JSP and Servlets concepts to build server based application.
4. Make use of JDBC connectivity to provide a program level interface with databases.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1	Write a Java program to create an array list, add some colors (strings) and print out the collection.
2	Write a Java program to compare two sets and retain elements that are the same.
3	Write a Java program to associate the specified value with the specified key in a HashMap, test if a map contains a mapping for the specified key and test same for specified balue
4	Write a Java program to display elements and their positions in a linked list.
5	Write a Java program to get a key-value mapping associated with the greatest key strictly less than the given key. Return null if there is no such key. Use appropriate collection.
6	Design calculator application using SWING in java with proper event handling
7	Create a Java application with a tabbed interface that manages different sections of information or functionalities for an application.
8	Create Swing application launches with an image view panel and controls for loading images and performing basic editing. Users can load images, apply editing operations using visual controls, and observe the changes in real-time.
9	Installation of Apache Tomcat web server and Develop a simple EJB-based application that manages books in a library (Use Session Bean
10	Write a servlet program to create a simple servlet and test it.
11	Design a servlet to display “Welcome IP address of client” to first time visitor. Display “Welcome-back IP address of client” if the user is revisiting the page. (Use Cookies)

12	Develop a JSP application with two pages: **login.jsp and protected.jsp.** • On login.jsp, create a login form that collects username and password (dummy validation for simplicity). • Upon successful login, store the username in the session using session.setAttribute(). Redirect the user to protected.jsp, which checks for a valid username in the session using session.getAttribute(). • If the username exists, display a welcome message. Otherwise, redirect the user back to login.jsp.
13	Create a JSP application with two pages: 1. **register.jsp:** Contains an HTML form for user registration 2. **process_registration.jsp:** Processes the submitted form data using request.getParameter(). 3. Validates the data and either stores it in-memory. Provides success/error messages based on the outcome.
14	Write a program to connect above a JSP page to a database and perform basic CRUD (Create, Read, Update, Delete) operations for given application.

Text Books:

1. Dreamtech press, "Core Java and Advance Java Blackbook", 4thEdition, Dreamtech press 2016
2. Uttam K. Roy, "Advanced Java Programming", OUP India,2015
3. Herbert Schildt, "JAVA: The Complete Reference" 10th Edition, The McGraw Hill Education,2017

Reference Books:

1. B Prasanalakshmi,"Advanced Java Programming" , CBS Publishers

E-Resources:

1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013501568198868992911/overview
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012825400409235456820833_shared/overview
3. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Program	B.Tech. I.T.			Semester	IV		
Course	DevOps Laboratory			Code	BIT24EX04		
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	PR	OR	Total
2	-	4	-	50	50	-	100

Prior knowledge of:

- Software Engineering and Project Management

is essential

CourseObjectives:

1. To Understand the DevOps Principles in a software Development
2. To apply the concept of Continuous Integration Continuous Delivery(CI/CD) and Containerization tools for Software Deployment.

CourseOutcomes:

After learning the course, the students will be able to:

1. Make use of Version Control system.
2. Apply Continuous Integration and continuous Development using Jenkins.
3. Use of the Containerization and Container Orchestration tools.
4. Study and explore basic services of AWS cloud .

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1.	Study and make a use of Version control System like GitHub.
2.	Explore and apply GitCommands.
3.	Study Jenkins Architecture and Plugins with Jenkins Installation and Setup.
4.	Develop simple Free style Job in Jenkins.
5.	Setup Jenkins job with Git and Apache maven.
6.	Setup Jenkins job with batch Script.
7.	Explore Declarative and Scripted pipeline in Jenkins.
8	Develop Continuous Integration and continuous Development (CI/CD) Pipeline using Jenkins.
9.	Study and Explore the Docker architecture and commands .
10.	Integrate Jenkins with Dockerto Build the CI/CD pipeline.
11	Execute various Docker commands to perform various operation on images and container.
12	Study of Kubernetes architecture and its terminologies.
13	Create Pod and namespaces in kubernetes cluster using YAML file.
14	Explore the different services of AWS like EC2 Instance, Storage(S3), Database Services, AWS Lamda, Networking , AWS Elastic Beanstalk, Autoscaling, VPC.

15	Create EC2 Instance using AWS.

Text Books:

1. PierluigiRiti, ―Pro DevOps with Google Cloud Platform‖, Apress, ISBN: 978-1-4842-3896-7.
2. Jez Humble and David Farley, ―Continuous Delivery‖, Pearson Education, Inc, ISBN: 978–0–321–60191–9

Reference Books:

1. Viktor Farcic, ―The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline with Containerized Microservices
2. Sanjeev Sharma and Bernie Coyne, ―DevOps for Dummies, John Wiley & Sons, Inc., 2nd IBM Limited Edition, ISBN: 978-1-119-04705-6

E-resources:

1. https://www.geeksforgeeks.org/devops-tutorial/
2. https://www.javatpoint.com/devops
3. https://www.simplilearn.com/tutorials/devops-tutorial
4. https://www.tutorialspoint.com/devops_tutorials.htm
5. https://www.coursera.org/learn/intro-to-devops
6. https://aws.amazon.com/

Program	B.Tech. I.T.			Semester			VI
Course	Automation Software Testing Laboratory			Code			BIT26EX01
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
2	-	4	-	50	-	50	100

Prior knowledge of:

1. Software development life cycle.
2. Programming languages (Python or Java).

is essential.

Course Objectives:

1. To develop job-relevant skills in the field of software testing.
2. To explore various latest software testing tools.

Course Outcomes:

After learning the course, the students will be able to:

1. Make use of selenium tool to write and execute test cases.
2. Use TestNG to write and execute test cases and generate detailed test reports.
3. Build Page Object Model in Selenium
4. Make use of defect tracking tools to detect, classify defect and generate the report.

Guidelines:

- Continuous assessment of laboratory work should be based on parameters, such as timely completion, performance, innovation, efficient codes, and punctuality.
- Mini project assessment will be based on parameters such as writing of test cases, use of automation testing tools, Execution, Demonstration and Team Work.

Recommended Tools: Selenium, Eclipse, TestNG, JIRA.

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1	Case study on Software Testing. Covers: Overview of software testing, Types of software testing: Manual vs. Automation Benefits and limitations of automation testing and The role of automation in the software development lifecycle (SDLC). Introduction to test automation tools and frameworks, Overview of popular automation tools, Criteria for selecting automation tools, Test automation process and strategy.
2	a. Installation and setup of Selenium WebDriver. b. Introduction to Integrated Development Environments (IDEs) for automation (e.g., Eclipse, Netbeans, IntelliJ IDEA). c. Write and execute test cases using Selenium IDE (Basic Record and Playback tool)
3	Write and execute basic Selenium WebDriver scripts (Use Python or JAVA) a. Use different WebDriver commands. b. Locate web elements using different strategies (ID, Name, XPath, CSS Selector).
4	Write and execute basic Selenium WebDriver scripts (Use Python or JAVA) a. Handling different types of web elements (text boxes, buttons, dropdowns, checkboxes) b. Implementing Action Classes.

5	Write and execute basic Selenium WebDriver scripts (Use Python or JAVA) a. Implement different types of wait commands in selenium.
6	Write and execute basic Selenium WebDriver scripts (Use Python or JAVA) a. Handling alerts, pop-ups, and frames
7	Write and execute basic Selenium WebDriver scripts (Use Python or JAVA) a. Taking screenshots and logging.
8	Use TestNG to write and execute test cases using Parameterization and data-driven testing .
9	Use TestNG to write and organize test suites, execute them efficiently, and generate detailed test reports.
10	Page Object Model (POM):- Implement POM in Selenium
11	Create Defect Tracking Report/Bug Report using Defect Tracking Tool.
12	Comprehensive project involving website application testing.

Text Books:

3. Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing: Principles and Practices"‖, PEARSON
4. Pallavi Sharma, "Selenium with Java – A Beginner's Guide", BPB Online LLP, ISBN-9789391392697

Reference Books:

3. Frank Appel , "Testing with JUnit", Oreilly Publication, ISBN: 9781782166603
4. Rahul Shetty , "Selenium Python Automation Testing from Scratch and Frameworks", January 2021, ISBN: 9781800567733

E-Resources:

1. https://toolsqa.com/selenium-webdriver/.
2. Coursera Course on ―Introduction to Automated Analysis‖ by University of Minnesota available at https://www.coursera.org/learn/automated-analysis

Program	B. Tech. I.T.			Semester	VI		
Course	Advanced Python Programming Laboratory			Code	BIT26EX02		
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	PR	OR	Total
2	-	4	-	50	50	-	100

Prior knowledge of:

1. Problem solving skill
2. Python Programming Language
3. HTML5,CSS & JS

is essential

Course Objectives:

1. To gain ability to develop responsive web applications and its deployment.

Course Outcomes:

After learning the course, the students will be able to:

1. Installation and Configuration of Django & Flask frameworks, in a development and production environment.
2. Construct Front end and back end development using Django/Flask
3. Apply the knowledge of different libraries to establish connections with databases and perform CRUD operations.
4. Implement REST-API endpoints, handle incoming requests, validate data, and generate suitable responses

Detailed Syllabus

Assignment No.	Suggested List of Assignments
1.	Design a web page of E-Commerce: a. Using HTML/HTML5, CSS, Bootstrap and JS. b. Using HTML5 layout tags develop informative page with sections which include various images, links to other pages for navigation, make use of all possible formatting (for example font, color etc.). c. Develop and demonstrate the usage of inline, internal and external style sheet using CSS.
2.	Write JavaScript to validate the following fields of the Registration page. a. First Name (Name should contain alphabets and the length should not be less than 6 characters). b. Password (Password should not be less than 6 characters length). c. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) d. Mobile Number (Phone number should contain 10 digits only). e. Last Name and Address (should not be Empty).
3.	Set up a Flask development environment: a. Install Flask,

	b. Create a new Flask project, c. Set up a virtual environment.
4.	Hello World - Creating your first Flask application a. Importing modules b. Creating a Flask object c. Run the application in main d. Create a view function e. Assign a URL route
5.	Implement mailing feature in Flask application.
6.	Building RESTful CRUD API with Flask.
7.	Set up a Django development environment: a. Install Django, b. create a new Django project, c. Set up a virtual environment.
8.	Creating a Django application : a. Learn how to create a new app within a Django project, b. Configure the app's settings, c. Add the app to the project's URL configuration.
9.	Building views and templates: Build a set of views and templates for your app, including a homepage, an about page, and a detail page for the blog post model you created.
10.	Handling user authentication and authorization: Add user authentication to your app, allowing users to create accounts, log in, and log out.
11	Creating a Django App with Database Connection to perform CRUD operations.
12.	Building RESTful CRUD API with Django.
13.	Develop a mini Django application and Deployment of the application on AWS
14.	Develop a mini Flask application and Deployment of the application on AWS.

Text Books:

2. Reema Thareja, “Python Programming Using Problem Solving Approach”, Second edition Oxford University Press.

3. John Dean, “Web Programming with HTML5, CSS3 and JavaScript”, Jones & Bartlett Learning, 2019Edition.
4. Django for APIs: Build Web APIs with python and Django (Welcome to Django), publication date: August 10,2020. Publisher:WelcomeToCode.

Reference Books:

3. Maureen Sprankle, Problem Solving and Programming Concepts, 9th edition, Pearson.
4. Paul Barry, Head-First Python, 3rd edition August 2023. Publisher(s): O'Reilly Media, Inc. ISBN: 9781492051299.
5. Glenn Johnson, “Programming in HTML5 with JavaScript and CSS3”, Microsoft Press, 2013 Edition.
6. “Django for beginners: Build websites with Python & Django” William Vincent (2018).
7. HTML and CSS: The Comprehensive Guide Paperback-April 24,2023, Publisher:Rheinwerk, Computing Edition: First Edition, Publication Date: April 24,2023

E-resources:

7. https://www.coursera.org/learn/python-programming-fundamentals
8. https://docs.python.org/3/tutorial/index.html
9. https://www.coursera.org/learn/django-web-framework
10. https://docs.djangoproject.com/en/5.0/
11. https://flask.palletsprojects.com/en/3.0.x/

Program	B. Tech. I.T.				Semester		VI
Course	Internship				Code		BIT26EX03
Credits	Teaching Scheme (Hrs./Week)			Evaluation Scheme and Marks			
	Lecture	Practical	Tutorial	TW	OR	PR	Total
4	-	8	-	150	50	-	200

Course Objectives:

3. To encourage and provide opportunities for students to get professional/personal experience.
4. To learn and apply the technical knowledge from academics /classroom learning in real- life/industrial situations.
5. To get familiar with various tools and technologies used in industries and their applications.
6. To enable students to develop professional skills and expand their professional network by developing employer-valued skills like teamwork and communication.
7. To apply the experience gained from the industrial internship to the academic course completion project.
8. To nurture professional and societal ethics along with team building.
9. To understand the social, economic and administrative considerations that influence the working environment of industrial organizations..

Course Outcomes:

After learning the course, the students will be able to:

5. Develop professional competence with academic knowledge.
6. Build a professional network and expose students to future employees.
7. Identify suitable profile(s) / role(s) based on one's aspirations, area of interest, and strengths.
8. Make your own career goals and personal aspirations

InternshipDuration:

- Internship of minimum 4 weeks(Approximately40-45hrs/week)is mandatory for all students during the summer term after the semester VI.
- Internship will be considered only after submitting valid documents at end of internship.

Pre-InternshipPlanning:

- Orientation of interns: Orientation session will be conducted for students at the beginning of Semester VI
- Allocation of the internal supervisor to the student.

Internship Work Identification:

Contacting various companies for Internship and Internship work identification process should b e initiated in the VI Semester, in coordination with the industry institute interaction cell. This will helpstudentsto start their internship work on time.

The internship may be done through the following verticals through offline/online mode.

- Industrial -Private, Public, LLP or Start-up Company.
- In-house Internship through third party or research problem statement.
- Incubation center: Understart-uporpre-incubation registered with the Incubationcenter, Innovation/Entrepreneurship related activities.
- GovernmentSectorandResearchLabs/GovernmentResearchorganization-DRDO,DIAT,ISRO,TIFR,CDAC etc.
- TechnicalClubs/Professional Societies activities like SummerSchool,
- PlatinumPlacementProject.
- Technical Internship throughInternshala,EduSkill.
- Overseas Internship.

Vision and Mission of Information Technology Department

Department Vision

To become a front-runner in the western region in preparing Information Technology engineers with academic excellence and research skills empowering their roles in technology and society.

Department Mission

1. To equip students with the skills and knowledge through a dynamic learning environment
2. To collaborate with industries to nurture proficient Information Technology Engineers
3. To cultivate a spirit of research, innovation, and entrepreneurship to address community and business challenges.
4. To imbibe work ethics and leadership skills through co-curricular and extracurricular activities.