



**Government of Karnataka
Department of Technical Education**

Diploma Curriculum Computer Science and Engineering

C 25 Scheme of Studies (Effect from the AY 2025-26)



**Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION**

Curriculum Structure

III Semester Scheme of Studies - Diploma in Computer Science and Engineering

Sl. No.	Teaching Department	Course Code	Course Name	Hours per week			Total Contact Hours/week	Credits	CIE Marks		Theory SEE Marks		Practice SEE Marks		Total Marks
				L	T	P			Max	Min	Max	Min	Max	Min	
Integrated Courses															
1	CS	25CS31I	Database Concepts and Technologies	4	0	4	8	6	50	20	50	20	-	-	100
2	CS	25CS32I	Computer Networks	4	0	4	8	6	50	20	50	20	-	-	100
3	CS	25CS33I	Data Structures with Python	3	0	4	7	5	50	20	-	-	50	20	100
4	CS	25CS34I	System and Network Administration	3	0	4	7	5	50	20	-	-	50	20	100
Audit Course															
5	KA	25KA31T	Kannada –I (ಸಾಹಿತ್ಯ ಸಿಂಚನ-1/ಬಳಕೆ ಕನ್ನಡ-1)	2	0	0	2	2	50	20	-	-	-	-	50
Total				16	0	16	32	24	250	-	100	-	100	-	450

SEMESTER 3



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Computer Science and Engineering	Semester	3
Course Name	Database Concepts and Technologies	Type of Course	Integrated
Course Code	25CS31I	Contact Hours	8 per week
Teaching Scheme	4:0:4	Credits	6
CIE Marks	50	SEE Marks	50 (Theory)

1. Rationale:

This course is designed to equip students with a comprehensive understanding of modern database systems by integrating essential theoretical concepts with practical skills. The course focuses on enabling students to conceptualize, design, and implement both relational and NoSQL databases, with an emphasis on performing basic CRUD (Create, Read, Update, Delete) operations.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Analyse real-world database requirements and design a structured ER diagram that accurately represents entities and relationships.
CO-02	Translate the ER diagram into a relational schema and verify its compliance with integrity constraints and normalize the design up to the third normal form (3NF)
CO-03	Create database objects and perform data manipulation operations using suitable tool.
CO-04	Query the database to retrieve the required information using suitable SQL statements.
CO- 05	Design and implement a NoSQL database, and perform fundamental CRUD operations.

3. Course Content

Week	CO	PO	Lecture(4HRS) (Knowledge Criteria)	Practice(4HRS) (Performance Criteria)
1	1	1,7	Introduction to Database Systems - Overview of databases and their significance - Types of database systems (RDBMS, NoSQL, Distributed, and Cloud Databases.) - Advantages of database systems over file systems - Overview of Database Management Systems	- Setting up database environments (MySQL/PostgreSQL and MongoDB Atlas) - Explore the interface (MySQL Workbench/ PostgreSQL PgAdmin and local or cloud MongoDB)

			(definition, key features and examples)	
2	1	1,7	Database Models and Architecture - Database models: ER, Relational, and NoSQL - Three-tier architecture and DBMS components - Data Independence: Logical and Physical	- Consider a database scenario and identify the levels of abstraction (external, conceptual, and internal). - Analyze a case study where a database underwent schema evolution (e.g., adding/removing tables or columns). Identify how logical independence was maintained. - Study a database migration example where physical storage was optimized (e.g., moving to SSDs or cloud-based storage) without affecting application functionality. - Set up database connections (MySQL/PostgreSQL/MongoDB) in Python using appropriate modules.
3	1	1,2,3,4,7	ER Modeling - Introduction to Database Design - Importance of ER Modeling in Database Systems - Key ER Modeling Concepts: - Entities, Attributes, and Relationships - Primary Keys and Foreign Keys - Cardinality and Participation	- Identify the ER elements for the given requirements. - Use online tools (Lucidchart, draw.io or similar tools) to create basic entity diagrams. - Design an ER diagram for a library or e-commerce system. - Develop an ER model for an online library system like Kindle or Audible, focusing on user subscriptions and book rentals - Design a comprehensive ER diagram for a healthcare management system, including cardinalities and participation constraints for entities like "Doctor," "Patient," "Appointment," and "Medicine." - Use database modeling tools like MySQL Workbench/ PostgreSQL PgAdmin to create ER diagrams and validate them against requirements.

4	2	1,2,3,4,7	Relational Model and Integrity Constraints - Introduction to Relational Model - Integrity Constraints - Steps for Converting ER Diagrams into Relational Schema	a. Convert ER model to Relational model b. Translate any given ER diagram into Relational schema c. Use MySQL Workbench or PgAdmin to create database objects and apply integrity constraints through the GUI, without writing SQL statements
5	3	1,2,3,4,7	Structured Query Language (SQL) – Basics - Introduction to SQL; - Categories of SQL Commands with definition and syntax - Data types in SQL - Update anomalies	Create database, tables and enforce data integrity constraints using DDL commands. Perform basic CRUD operations through programming language such as PYTHON.
6	2	1,2,3,4,7	Functional Dependency(FD) - Definition and examples. - Types of functional dependencies - Role of FD in normalization. Normalization - Purpose and benefits of normalization. - Normal forms: 1NF, 2NF, 3NF	- Identify Functional Dependencies in a Table - Consider relations and apply normalization rules to bring them to 1NF, 2NF, and 3NF. - Consider an unstructured e-commerce database and apply normalization techniques to eliminate redundancy while maintaining data integrity.
7	4	1,2,3,4,7	Querying Databases - SQL Clauses: Where, Distinct, Order By, Limit; - SQL Operators: Logical Operators, Comparison Operators - Aggregate functions	- Write SQL queries to filter, sort, and limit data using clauses. - Use operators to refine queries and match complex conditions. - Apply aggregate functions to summarize data and perform calculations.
8	4	1,2,3,4,5,7	Advanced Database Querying - Joins: INNER, OUTER, CROSS - GROUP BY and HAVING clauses - Subqueries: Single-row subqueries; Multi-row subqueries; Scalar	- Perform different types of joins to combine data from multiple tables. - Group data and filter the results using GROUP BY and HAVING clauses. - Write and optimize subqueries for filtering and data retrieval.

			subqueries; Correlated subqueries; - Views - Query optimization	Create and use views to simplify complex queries and manage data.
9	3	1,2,3,4,7	Transactions and Concurrency Introduction to Transactions Concurrency Control: - Need for Concurrency Control; - Concurrency Issues; - Concurrency Control Techniques; TCL commands DCL commands	- Create, manage, and roll back transactions - Understand and apply locking mechanisms to control concurrent access to data. - Execute DCL commands to provide privileges to different users
10	5	1,2,3,4,7	Introduction to NoSQL Databases - Overview; Key Features; Types; Advantages and Disadvantages; - CAP theorem - Comparison between RDBMS and NoSQL - Overview of MongoDB	MongoDB Shell Basic commands : show dbs, use <dbname>, show collections
11	5	1,2,3,4,7	MongoDB Data Model and CRUD Operations MongoDB Data Model: Collections and Documents; Data types CRUD Operations - Create: <i>insertOne()</i>, <i>insertMany()</i> - Read: <i>find()</i>, <i>findOne()</i> - Update: <i>updateOne()</i>, <i>updateMany()</i> - Delete: <i>deleteOne()</i>, <i>deleteMany()</i>	- Create MongoDB for E-Commerce Website. - Perform CRUD operations
12	5	1,2,3,4,7	Aggregation in MongoDB - Aggregation Pipeline - Stages in the Aggregation Pipeline - Expression Operators	Write the aggregation pipeline
13	1,2,3,4,5	1,2,3,4,7	Mini Project	Students will design, implement, and optimize a database system for a real-world application of their choice, integrating SQL and NoSQL databases where applicable.

4. References:

Sl No	Description
1	"Database System Concepts" – Abraham Silberschatz, Henry F. Korth, S. Sudarshan
2	"Fundamentals of Database Systems" – Ramez Elmasri and Shamkant B. Navathe
3	"SQL for Data Analysis" – Cathy Tanimura
4	"Learning SQL" – Alan Beaulieu
5	"NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" – Pramod J. Sadalage and Martin Fowler
6	"MongoDB: The Definitive Guide" – Kristina Chodorow
7	MySQL Official Docs: https://dev.mysql.com/doc/
8	W3Schools SQL Tutorial: https://www.w3schools.com/sql/
9	PostgreSQL Documentation: https://www.postgresql.org/docs/
10	MongoDB Documentation: https://www.mongodb.com/docs/
11	"Databases and SQL for Data Science" – Coursera
12	"Introduction to NoSQL Databases" – Udacity

5. Suggestive Online courses

Sl no	Topic Name	Reference Courses	Self Assessment Link	Source
1	Introduction to Database Systems	TOC - Database Management System Part - 1 Infosys Springboard	AssessmentDB1 - Viewer Page Infosys Springboard	Infosys Wingspan
2	Database Models and Architecture	TOC - Database Management System Part - 2 Infosys Springboard	AssessmentDB2 - Viewer Page Infosys Springboard	Infosys Wingspan
3	ER Modeling	TOC - Database Management System (DBMS) and SQL : Complete Pack Infosys Springboard		Udemy
4	Relational Model and Integrity Constraints			Udemy
5	Structured Query Language (SQL) – Basics	TOC - Database Management System Part - 1 Infosys Springboard	AssessmentDB1 - Viewer Page Infosys Springboard	Infosys Wingspan
6	Functional Dependency(FD) and Normalization	TOC - Database Management System (DBMS) and SQL : Complete Pack Infosys Springboard		Udemy
7	Querying Databases	TOC - Database Management System Part - 1 Infosys Springboard	AssessmentDB1 - Viewer Page Infosys Springboard	Infosys Wingspan
8	Advanced Database Querying	TOC - Database Management System Part - 1 Infosys Springboard	AssessmentDB1 - Viewer Page Infosys Springboard	Infosys Wingspan
		TOC - Working with Subqueries Infosys Springboard		Skillssoft
		TOC - SQL Views Infosys Springboard		Skillssoft
9	Transactions and Concurrency	TOC - Database Management System (DBMS) and SQL :		Udemy

		Complete Pack Infosys Springboard		
10	Introduction to NoSQL Databases	TOC - Database Management System Part - 2 Infosys Springboard	AssessmentDB2 - Viewer Page Infosys Springboard	Infosys Wingspan
11	MongoDB Data Model and CRUD Operations			Infosys Wingspan
12	Aggregation in MongoDB	TOC - Aggregation Techniques Infosys Springboard		IIHT
13	Database Design and Implementation	TOC - Manage Data for an Online Grocer Using MySQL Workbench Infosys Springboard		Coursera

6. Suggested programs

Week	Description
1	- Setting up database environments (MySQL/PostgreSQL and MongoDB Atlas) - Explore the interface (MySQL Workbench/ PostgreSQL PgAdmin and local or cloud MongoDB)
2	Identifying Levels of Abstraction in a Given Database Scenario Scenario: A retail company uses a database to manage inventory, sales, and customer information. The system allows: - Customers to browse products and place orders through an online shopping platform. - Store managers to track inventory levels and restock products. - The finance team to generate revenue reports and analyze sales trends.
3	Design ER model for the below database requirement. 1. A food delivery platform connects customers with multiple restaurants, allowing them to browse menus, place orders, and have food delivered to their location. The database must manage a wide range of data, including restaurant information, menu items, customer profiles, orders, payment processing, and delivery tracking. The system must also support delivery logistics, managing driver assignments, and tracking order status from preparation to delivery. - Restaurant Management: - Store restaurant details, including name, location, contact information, and operational hours. - Manage menus with categories, items, pricing, and availability status. - Menu Management: - Maintain records of menu items, including ingredients, preparation time, price, and availability. - Support special offers, discounts, and promotions for menu items. - Customer Management: - Store customer profiles with information such as name, contact details, addresses, and order history. - Allow customers to save favorite restaurants, past orders, and payment preferences. - Order Management:

	- Track customer orders from placement through preparation, dispatch, and delivery. - Manage order status updates in real-time, including stages such as "Preparing," "Out for Delivery," and "Delivered." 5. Delivery Management: - Assign delivery drivers to orders based on location, availability, and estimated delivery time. - Track driver locations in real-time for efficient route optimization and status updates. 6. Payment Processing: - Handle various payment methods including credit/debit cards, digital wallets, and cash on delivery. Maintain secure transaction records and support refunds for cancellations or disputes. 2. Design a database for a To-Do List Application that helps users manage their tasks effectively. The database should store and organize information about users, tasks, categories, and their relationships. Requirements: - The system should store user information such as unique username, email, and password. - Users should be able to create tasks with attributes like title, description, priority, status (e.g., Pending, In Progress, Completed), and due date. Users should be able to organize tasks into categories. A task can belong to multiple categories, and a category can include multiple tasks. Each task should be linked to the user who created it.
4	Convert above ER Diagram to Relational Schema.
5	Create Retail_Store_Management Database and Product Table with following requirements: - each product should have a unique identifier - Each product should have a Product Name, which must be unique and cannot be NULL - Each product should have a Price, and the price must be greater than zero - Each product should have a Description, whose value can be null. Modify Structure: After creating the table, Remove the Description field from the table structure (as per requirement). - Add Quantity , and the default value for it should be set to 0. Execute DML Commands on the Created Tables - Insert Data into the Product Table - Update Data in the Product Table - Delete Data from the Product Table - Select Data from the Product Table - Examine update anomalies and understand their impact on data integrity Design a database for an Inventory Management System for a retail store. The system should keep track of the store's products, suppliers, and customer orders. The database must include the following requirements:

	- Each product has a unique ID, name, category, quantity in stock, price per unit, and supplier details. - Each supplier has a unique ID, name, contact information, and the products they supply. - Each customer has a unique ID, name, contact details, and purchase history. Each order must have an order ID, customer details, date of the order, products purchased, quantities, and total cost.																																																																																								
6	Normalize given schema up to 3NF <table><tr><th>OrderID</th><th>CustomerName</th><th>ProductNames</th><th>ProductQuantities</th><th>ProductPrices</th><th>TotalAmount</th><th>ShippingAddress</th></tr><tr><td>1001</td><td>Alice</td><td>Laptop, Mouse</td><td>1, 2</td><td>1000, 50</td><td>1100</td><td>123 Elm St, NY</td></tr><tr><td>1002</td><td>Bob</td><td>Keyboard, Monitor</td><td>1, 1</td><td>80, 300</td><td>380</td><td>456 Maple Ave, CA</td></tr><tr><td>1003</td><td>Charlie</td><td>Laptop, Mouse, Keyboard</td><td>1, 2, 1</td><td>1000, 50, 80</td><td>1130</td><td>789 Birch Rd, TX</td></tr></table> <table><tr><th>MovieID</th><th>MovieTitle</th><th>Cast</th><th>DirectorName</th><th>Genre</th></tr><tr><td>1</td><td>Inception</td><td>Leonardo DiCaprio, Joseph Gordon-Levitt</td><td>Christopher Nolan</td><td>Sci-Fi</td></tr><tr><td>2</td><td>The Dark Knight</td><td>Christian Bale, Heath Ledger</td><td>Christopher Nolan</td><td>Action</td></tr><tr><td>3</td><td>The Prestige</td><td>Christian Bale, Hugh Jackman</td><td>Christopher Nolan</td><td>Drama</td></tr></table> <table><tr><th>BookID</th><th>BookTitle</th><th>Authors</th><th>PublisherName</th><th>AuthorContact</th></tr><tr><td>1</td><td>Python Programming</td><td>John Doe, Jane Smith</td><td>TechBooks</td><td>john@tech.com, jane@tech.com</td></tr><tr><td>2</td><td>Data Science Basics</td><td>Alice Brown, Bob White</td><td>DataPress</td><td>alice@datasci.com, bob@datasci.com</td></tr><tr><td>3</td><td>Web Development</td><td>Alice Brown, John Doe</td><td>WebWorks</td><td>alice@webworks.com, john@webworks.com</td></tr></table> <table><tr><th>OrderID</th><th>CustomerName</th><th>ProductNames</th><th>ProductPrices</th><th>ShippingAddress</th></tr><tr><td>101</td><td>Alice</td><td>Laptop, Mouse</td><td>1000, 50</td><td>123 Elm St, NY</td></tr><tr><td>102</td><td>Bob</td><td>Keyboard, Monitor</td><td>80, 300</td><td>456 Maple Ave, CA</td></tr><tr><td>103</td><td>Charlie</td><td>Laptop, Mouse, Keyboard</td><td>1000, 50, 80</td><td>789 Birch Rd, TX</td></tr></table>	OrderID	CustomerName	ProductNames	ProductQuantities	ProductPrices	TotalAmount	ShippingAddress	1001	Alice	Laptop, Mouse	1, 2	1000, 50	1100	123 Elm St, NY	1002	Bob	Keyboard, Monitor	1, 1	80, 300	380	456 Maple Ave, CA	1003	Charlie	Laptop, Mouse, Keyboard	1, 2, 1	1000, 50, 80	1130	789 Birch Rd, TX	MovieID	MovieTitle	Cast	DirectorName	Genre	1	Inception	Leonardo DiCaprio, Joseph Gordon-Levitt	Christopher Nolan	Sci-Fi	2	The Dark Knight	Christian Bale, Heath Ledger	Christopher Nolan	Action	3	The Prestige	Christian Bale, Hugh Jackman	Christopher Nolan	Drama	BookID	BookTitle	Authors	PublisherName	AuthorContact	1	Python Programming	John Doe, Jane Smith	TechBooks	john@tech.com , jane@tech.com	2	Data Science Basics	Alice Brown, Bob White	DataPress	alice@datasci.com , bob@datasci.com	3	Web Development	Alice Brown, John Doe	WebWorks	alice@webworks.com , john@webworks.com	OrderID	CustomerName	ProductNames	ProductPrices	ShippingAddress	101	Alice	Laptop, Mouse	1000, 50	123 Elm St, NY	102	Bob	Keyboard, Monitor	80, 300	456 Maple Ave, CA	103	Charlie	Laptop, Mouse, Keyboard	1000, 50, 80	789 Birch Rd, TX
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2	Data Science Basics	Alice Brown, Bob White	DataPress	alice@datasci.com , bob@datasci.com																																																																																					
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7	Suggestive Basic SQL Queries on To do list database - Retrieve User Information for specific email id - Count Tasks for all Users - Retrieve the First 5 Tasks - Retrieve Tasks Due Today - Find the Maximum Due Date of Tasks for a Specific User - Count the Number of Pending Tasks for a Specific User - Find the Average Number of Tasks for specific user																																																																																								
8	Suggestive Advanced SQL Queries on To do list database - Retrieve Tasks with No Categories Assigned. - Count Tasks in Each Category. - Retrieve Categories Without Any Tasks - Retrieve Users Who Have Tasks with High Priority																																																																																								

	- Retrieve Tasks and Their Categories using JOIN - Retrieve Categories with More Than 5 Tasks Assigned. - Retrieve Users with Their Total Task Count using subquery
9	Create a transaction for the scenario: - A customer wants to transfer money from their savings account to their checking account. - If any of the steps fail (for example, if there is insufficient balance in the savings account), roll back the transaction to ensure that no changes are made to the database. DCL - Grant SELECT privilege on a table to a user - Grant multiple privileges to a user - Grant all privileges on a table to a user - Grant privileges on all tables in a schema - Revoke SELECT privilege from a user - Revoke multiple privileges from a user - Revoke all privileges from a user - Revoke privileges on all tables in a schema
10	MongoDB Shell Basic commands : show dbs, use <dbname>, show collections
11	Create MongoDB for E-Commerce Website with following collections Products: Stores product details like name, description, price, category, etc. Users: Stores user details like username, email, password, etc Orders: Stores order details like user ID, product IDs, order status, etc. - Adding a Product - Adding a User - Adding an Order - Find All Products in a Category - Find a Specific Product by Name - Retrieve Orders for a Specific User Find User Details by Username - Update Product Stock - Update User Address - Delete a Product - Delete an Order
12	Write the aggregation pipeline - to calculate the total sales for each product within a specified date range. - to calculate the average price of products in each category - to filter products within a certain price range and then calculate the total number of products in each category.

7. CIE Assessment Methodologies

Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2Practice Test	7	180	50	
3	CIE-3TheoryTest	10	90	50	
4.	CIE-4Practice Test	13	180	50	
5	CIE-5 - Portfolio evaluation (10) - Mini Project (20) - Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/ AWS(20)	1-13		50	
Total					50 Marks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 10 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

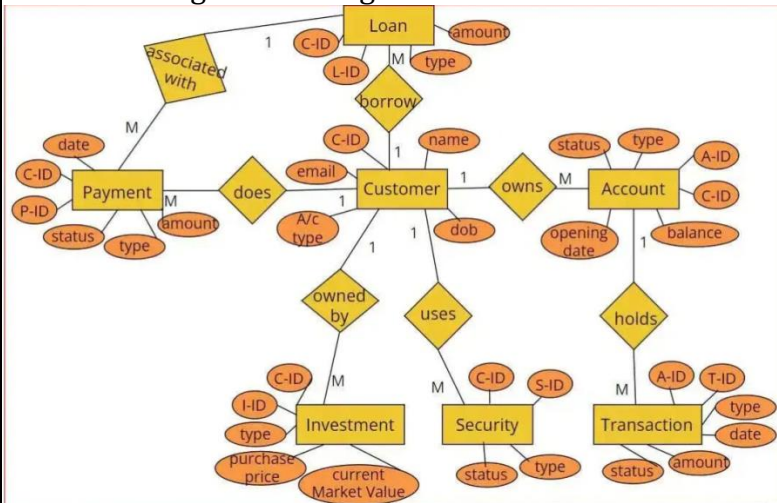
Rubrics for the Mini Project (if included) should be defined by the course coordinator.

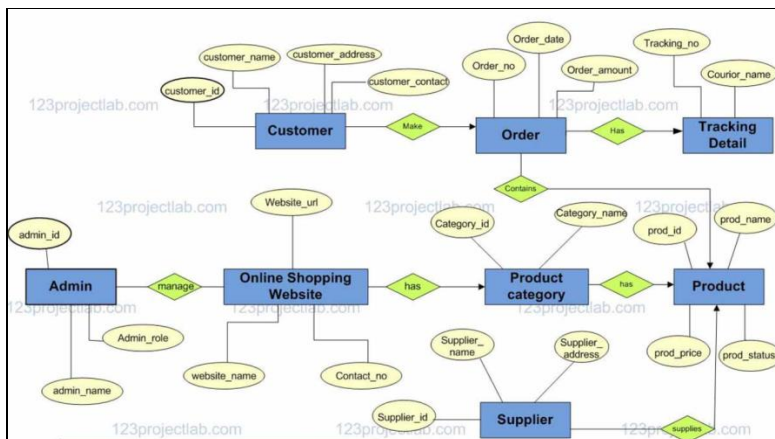
8. SEE - Theory Assessment Methodologies

Sl. No	SEE – Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

9. CIE Theory Test model question paper

Program	Computer Science and Engineering			Semester -3	
Course Name	Database Concepts and Technologies			Test	I/III
Course Code	25CS31I	Duration	90 min	Marks	50
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					
Q.No	Questions		Cognitive Level	Course Outcome	Marks

Section – 1				
1	a. Why is data integrity better maintained in databases than in file systems? Provide examples. – 5 b. Identify and explain the key features of a DBMS. – 10 c. Explain the difference between total and partial participation with examples. – 4 d. Identifying Levels of Abstraction in below given Database Scenario - 6 A university uses a database to manage information about students, courses, and enrollments. The database allows: ▪ Students to view their grades and register for courses via an online portal. ▪ Professors to input grades and access class rosters. ▪ The administration to generate reports on enrollment statistics and course performance.	L2,L3	1	25
2	a. Describe the three-tier architecture of a DBMS and explain the role of each tier. - 5 b. Create an ER diagram for a retail store that includes entities like "Product," "Customer," "Order," and "Supplier." Include attributes and relationships and constraints. – 20	L2,L3	1	
Section – 2				
3	Translate the given ER diagram to relational schema 	L3	2	25
4	Translate the given ER diagram to relational schema	L3	2	



Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.

Sign of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

10. CIE Practice Test model question paper

Program	Computer Science and Engineering		Semester	3
Course Name	Database Concepts and Technologies		Test	II/IV
Course Code	25CS31I	Duration	180 min	Marks

Name of the Course Coordinator:

Questions	CO	Marks
Develop a database system to support a Ticket Raising Application that facilitates efficient management and resolution of user-reported issues. The system should be capable of handling user information, ticket details, categorization, prioritization, assignment, and tracking of ticket resolution. Requirements: - Store user information such as name, email, phone number, and role (e.g., Customer, Support Agent, Admin). - Maintain secure login credentials for users. - Allow customers to raise tickets with details such as: - Issue description - Category (e.g., Technical, Billing, General Inquiry) - Priority level (e.g., Low, Medium, High, Critical) - Assign a unique identifier and timestamp to each ticket. - Track the status of each ticket (e.g., Open, In Progress, Resolved, Closed) and record timestamps for status changes. - Store resolution details, including: - Comments or actions taken by the support agent and resolution timestamp. - Assign tickets to support agents based on expertise, workload, or availability.	1,2,3,4	50

Scheme of assessment

a. Database Design – 15

- Entity-Relationship (ER) Diagram -5
- Correct conversion of ER diagram into a normalized relational schema. - 5
- Use of appropriate data types for attributes and Implementation of integrity constraints-5

b. Database Implementation – 20

- Correct creation of database objects using tools - 5

▪ Application of constraints - 5 ▪ Data Population - 5 ▪ Execution of basic INSERT, UPDATE, DELETE, and SELECT statements - 5	
c. Querying (basic and advanced) - 10	
d. Documentation and Presentation - 5	
Total Marks	50

Sign of the Course Coordinator

Signature of the HOD

11. Equipment/software list with Specification for a batch of 30 students

Sl.No.	Particulars	Specification	Quantity
01	Desktop/Laptop PC with Windows/Linux	Intel i3, 500GB Hard Disk/SSD, 8GB RAM, Monitor, Mouse, Keyboard or higher configuration	30
02	Internet Connection	100 Mbps speed or higher subscription	1
03	LAN connectivity/ High speed Wireless AP	32 Port Switch with LAN cabling/ Wifi Adapters (32 No.)	1
04	Online UPS	5KV with 3 -6 hours backup	1
05	Projector	Multimedia Projector	1
06	White Board	Plane white board / Smart Board/Smart TV	1
07	Audio Speakers	Multimedia, Two-way hybrid speaker system	2



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Computer Science and Engineering	Semester	3
Course Name	Computer Networks	Type of Course	Integrated
Course Code	25CS32I	Contact Hours	8 per week
Teaching Scheme	4: 0:4	Credits	6
CIE Marks	50	SEE Marks	50 (Theory)

1. Rationale:

This course is designed to equip students with the foundational knowledge and practical skills needed to design, implement, and troubleshoot computer networks in various environments. It addresses the selection of appropriate communication technologies and the resolution of issues like signal loss, latency, and noise to ensure optimal network performance. Learners will gain hands-on experience in configuring IP addressing, routing, subnetting, and protocols like TCP/UDP and DNS using network simulators. The course also emphasizes designing secure and scalable networks, from home office setups to enterprise-level solutions, tailored to specific requirements. By mastering these skills, students will be well-prepared for roles in network administration, engineering, and IT consulting.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Evaluate and select appropriate communication technologies based on network requirements while mitigating transmission impairments
CO-02	Design a network for a given specification by using the right network components, devices, topologies, protocols and software.
CO-03	Identify, diagnose, and resolve common network connectivity and performance issues using troubleshooting tools and methodologies.
CO-04	Configure and manage IP addressing, routing, subnetting, and network services (TCP, UDP, DNS) in a WAN environment using simulation tools.
CO-05	Design and implement simple Home Office network for given specification.

3. Course Content

Week	CO	PO	Lecture(4HRS) (Knowledge Criteria)	Practice(4HRS) (Performance Criteria)
1	1,2	1,7	Perspectives on Networking – End user perspectives on Networking and Internet. Communication Systems - Basic elements of communication systems with block diagram, List commonly used terms in electronic communication systems.	1. Demonstrate different network cables and connectors. 2. Demonstrate connecting Computer to home modem/router through Ethernet cable or Wifi 3. Demonstrate automatic and manual IP configuration on both a PC and a mobile device, explaining IP address, subnet

			Data representation, Data flow. Communication Channels: Guided Media (Over view)- Twisted pair, Coaxial Cable, Optical Fibers. Analog and Digital Signals, Periodic and Non-Periodic Signals, Sine Wave, Phase, Wavelength, Digital Signals, Bitrate, Bit-length, Modulation, Demodulation. Unguided Media: Micro Wave, Radio wave, Infrared etc. Electromagnetic waves – what are electromagnetic waves and their properties Electromagnetic spectrum - classification and its applications.	mask, default gateway, and DNS settings.
2	1,2,3	1,2,7	Transmission Impairment – Attenuation, Distortion and Noise, Performance - Bandwidth, Throughput, Latency, Jitter (Basic concepts only). Transmission Modes – Parallel and Serial Transmission. Asynchronous and Synchronous Transmission. Overview of Networking. Categories of networks – Personal Network, LAN, MAN, WAN, Internetworking (Illustrate Network from LAN connected using a HUB to Internetwork). A brief History – ARPANET, MILNET, CSNET, NSFNET, ANSNET. The Internet today – Backbone ISP, Regional ISP, Local ISP. World Wide Web.	1. Explore all ISP in your area/locality and select best internet ISP/plan based on cost and performance. 2. Test the download/upload speed in your computer/mobile phone also check type, bandwidth and ISP. 3. Demonstrate Transmission mode (Video Demonstration) 4. Demonstrate Bandwidth, Throughput, Latency, Jitter (Video Demonstration) 5. Use pathping command to find actual path between source to destination with information about network latency/delay and network loss.
3	1,2,3	1,2,3,7	Protocol and Standards- The communication rules (Method, language, Confirmation) – Protocols. Standards. Protocol layers OSI Model : OSI Layers and Their Functions, OSI Layering Concepts	Network Simulator: Demonstrate Packet tracer or any other network simulator 1. Installation 2. User Interface3 3. Components and cables 4. GUI and CLI Configuration 5. Configure end devices.

			and Benefits, OSI Encapsulation Terminology.	6. Demonstrate Working of all 7 layers by opening a webpage in a simulated network using packet tracer
4	1,2,3	1,2,3,7	TCP/IP Networking Model - Overview of the TCP/IP Networking Model. TCP/IP Application Layer, HTTP Overview, HTTP Protocol Mechanisms. TCP/IP Transport Layer, TCP Error Recovery Basics, Same-Layer and Adjacent-Layer Interactions. TCP/IP Network Layer, Internet Protocol and the Postal Service, Internet Protocol Addressing Basics, IP Routing Basics. TCP/IP Link Layer (Data Link Plus Physical), TCP/IP Model and Terminology, Data Encapsulation Terminology. Names of TCP/IP Messages. Addressing : Physical, Logical, Port	1. Determine the IP Address Configuration of a Computer (Windows) and Test the Network Interface TCP/IP Stack (Ping). 2. Install and configure wireless access point over the LAN. 3. Determine the MAC Address of a Host (PC and Phone). 4. View Wireless and Wired NIC Information and make a table explaining each. 5. Manual and Automatic address assignment (Windows and Android Phone) a) IPv4 address b) Subnet mask c) DNS 6. Demonstrate Addressing in packet tracer
5	1,2,3,5	1,2,3,4	Hardware and Software components of Network - Common network devices - Computers, Access points, Hub, Switch, Router, repeaters, NIC, Modem. LAN Cables – Co-axial, twisted pair, optical fibre, LAN connectors- co-axial cable, and twisted pair cable, optical fibre, Connectors, Firm wares, ISPs. Wired Local Area Networks Protocol and technologies: Ethernet (IEEE 802.3) – Frame Format, Ethernet Evolution, Access Methods: CSMA/CD, CSMA/CA, Fast Ethernet, Gigabit Ethernet. Error Detection in Ethernet. Broadcast and Collision domain.	1. Demonstrate working of common network devices. 2. Install and configure NIC. 3. Twisted Pairs: UTP Cabling Pinouts for 10BASE-T and 100BASE-T, Straight Through Cable Pinout, Crossover Cable Pinout Demonstration. 4. Perform RJ45 crimping for both straight-through and crossover cables, and verify connectivity using a LAN tester. 5. Create and Demonstrate all possible network topologies using simulator. 6. Demonstrate Broadcast and Collision domain (Video demonstration)

			Overview of network topologies - Basic topologies- bus, ring, star, mesh and hybrid.	
6	1,2,3,5	1,3,4	Wireless LAN (IEEE 802.11) – Architecture, Frame Format,BSS, ESS, MAC Sublayer, CSMA/CA, Hidden and Exposed Station Problems, Ethernet access layer devices – Hub, Switch, The MAC address table, Ethernet Broadcast and Broadcast domain, ARP. Hierarchical Network Design – Physical and logical addresses, Benefits of a Hierarchical Design, Access, Distribution, and Core layers (Demonstrate Hierarchical Network Design in packet tracer)	1. Build a physical Ethernet LAN Network and demonstrate file sharing, printer sharing. 2. Install and configure wireless access point over the LAN. 3. Configure and install a ethernet switch/Hub (Use simulator if hardware devices are not available) 4. Create/model a simple Ethernet network using 3 hosts and a switch, Observe traffic behavior on the network and Observer data flow of ARP broadcasts and pings. 5. Demonstrate Collision and Broadcast domain in packet tracer.
7	2,4,5	1,3,4	Introduction to Network Layer Switching - Circuit Switching, Packet Switching. Packet Switching in Network Layer- Connectionless Service, Connection-Oriented Service. Network Layer Services – Logical Addressing, Services Provided at the Source Computer, Services Provided at Each Router, Services Provided at the Destination Computer. Other Network Layer Issues - Error Control, Flow Control, Congestion Control, Routing	1. Build a simple peer-to peer network and verify physical connectivity and Assign various IPv4 addresses to hosts and observe the effects on network communication. 2. Configure IP addresses of a network (real or simulated) and ping across to test and troubleshoot. 3. View Wireless and Wired NIC Information and make a table explaining each.
8	2,4,5	1,3,4	IP Addressing, Address Space, Notation. Classful addressing , Two Levelling addressing, Three-Level Addressing, Classless addressing – Subnetting, Subnet mask, Super netting, CIDR, Variable length subnet mask.	1. Subnetting : Your college is given an ip 192.168.100.0/24, you have 5 different departments, design and implement subnetting using packet tracer. Justify subnetting choices based on departmental needs and allocate appropriate IP ranges.

			Special addresses Network Address Translation (NAT). Delivery and forwarding of IP packets - Direct Delivery, Indirect Delivery. Forwarding. Structure of a Router. IP V4 – Datagram, fragmentation.	2. Connect to web server using simulator, Demonstrate how packets are sent across the Internet using IP addresses and working of HTTP services. 3. Implement Network Address Translation using packet tracer
9	2,4,5	1,3,4	Routing: The Need for Routing - Criteria for Dividing the Local Network. IPv4 Routing - IPv4 Host Routing, Router, Forwarding Decisions and the IP Routing Table, The default gateway, A Summary of Router Forwarding Logic, A Detailed Routing Example. Routing Protocols - IPv4 Routing Protocols – static and dynamic. Other Network Layer Features - Using Names and the Domain Name System, The Address Resolution Protocol, ICMP Echo and the ping Command. IGMP. IPv4 Issues - Need of IPv6, Ipv4 vs IPv6, IPv4 and IPv6 Coexistence. IPv6 features - IPv6 Address Representation. Concept of Virtual LAN's(VLAN's)	1. Implement simple static routing for the practice activity of week 8 (subnetting) 2. Troubleshooting of IP Addressing a) Change a routing table entry b) Wrong address c) incorrect subnet mask. 3. Demonstrate ICMP commands.
10	2,4,5	1,3,4	Transport Layer Services- Process-to-Process Communication, Addressing: Port Numbers, Multiplexing and Demultiplexing, Flow Control, Error Control – Sliding window. Congestion Control. Connectionless and Connection-Oriented Services. Transport Layer protocols- Simple protocol, Stop and Wait, Go back N.	1. Demonstration of Port addressing and well-known port numbers (HTTP, DNS, SMTP) using packet tracer 2. TCP vs. UDP Comparison (Compare the behavior of TCP and UDP protocols) a. Create a network with two PCs connected through a router. b. Configure one PC to run an HTTP (TCP) server and the other a DNS (UDP) server. c. Use the Web Browser and DNS Client tools on the other PC to access these services.

				d. In Simulation Mode, filter for TCP and UDP packets and compare reliability, acknowledgment, and retransmission behavior. 3. Demonstrate Sliding window, Congestion control, Stop and Wait, Go back N (Only demonstration)
11	2,4,5	1,3,4	The Client Server relationship – Client Server interaction. URI, URN, URL User datagram protocol – User datagram, UDP services, UDP Applications. Transmission Control protocol: TCP services, features. Popular TCP/IP Applications, Connection Establishment and Termination. Port Numbers – TCP and UDP. Socket pairs, The netstat command.	1. Create a client – server model in simulator and observe the client interaction between the server and PC using packet tracer. a. Create a network with one server, a switch, and two PCs. a) Configure IP addresses for all devices. b) Enable HTTP and FTP services on the server. c) Use the Web Browser and Command Prompt on the clients to access HTTP and FTP services. d) Open Simulation Mode to capture and analyze HTTP GET and FTP request/response packets. 2. Demonstrate Netstat command
12	2,4,5	1,3,4	Introduction to application layer: Client Server paradigm. HTTP DHCP DNP Telnet and SMTP, POP, IMAP, FTP.	1. Set up and configure a DNS server in Packet Tracer, demonstrating the resolution of domain names to IP addresses using nslookup. 2. Use simulator to demonstrate Telnet and SSH 3. Configure and test DHCP using packet tracer. 4. Configure a HTTP service and demonstrate working of HTTP

13	1,2,3	1,2,3,4,7	Troubleshoot Common Network Problems - The Troubleshooting Process, Network Troubleshooting Overview, Gather Information - Nature of problem, Equipment, Configuration and Topology, Previous Troubleshooting. Structured Troubleshooting Methods - Bottom-Up, Top-Down, Divide-and-Conquer, Follow-the-Path, Substitution, Comparison, Educated Guess. Guidelines for Selecting a Troubleshooting Method Troubleshoot Wireless Issues - Causes of Wireless Issues, Authentication and Association Errors.	1. Demonstrate troubleshooting Commands with a scenario- ipconfig, ping, netstat, tracert, nslookup. 2. Troubleshooting Common Issues Using Packet Tracer Simulation Mode a) set up a basic network with a router, switch, and PCs. b) Introduce issues like: c) Incorrect subnet mask. d) Disabled router interfaces. e) Use Simulation Mode to observe packet flow: f) Identify where packets drop or fail. g) Fix the configuration and test.
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4. References

Sl No	Description
1	Computer Networking: A Top-Down Approach – Kurose and Ross
2	Data Communications and Networking – Behrouz A. Forouzan
3	Computer Networks – Andrew S. Tanenbaum, David J. Wetherall
4	CCNA 200-301 Official Cert Guide – Wendell Odom
5	Network Warrior – Gary A. Donahue
6	TCP/IP Illustrated, Volume 1: The Protocols – W. Richard Stevens
7	Mastering Python Networking – Eric Chou
8	https://www.netacad.com/
9	https://www.coursera.org/learn/computer-networking
10	https://www.udemy.com/course/complete-networking-fundamentals-course/
11	https://www.cisco.com/c/en/us/solutions/enterprise-networks/what-is-networking.html
12	https://www.youtube.com/c/NetworkChuck
13	https://www.packettracernetwork.com/
14	https://www.wireshark.org/docs/wsug_html/
15	https://www.rfc-editor.org/

5. CIE Assessment Methodologies

Sl. No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2Practice Test	7	180	50	
3	CIE-3TheoryTest	10	90	50	
4.	CIE-4Practice Test	13	180	50	
5	CIE-5 - Portfolio evaluation (20) - Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/AWS /any other (30)	1-13		50	Average of all CIE=50 Marks
Total					50 Marks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 20 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

Rubrics for the Mini Project (if included) should be defined by the course coordinator.

6. SEE - Theory Assessment Methodologies

Sl. No	SEE – Theory Assessment	Duration	Exam Paper Max marks	Exam Paper Max Marks scale down to (Conversion)	Min marks to pass
1.	Semester End Examination-Theory	3 Hours	100	50	20

7. CIE Theory Test model question paper

Program	Computer Science and Engineering			Semester -3	
Course Name	Computer Networks			Test	I
Course Code	25CS321	Duration	90 min	Marks	50
Name of the Course Coordinator:					
Note: Answer any one full question from each section. Each full question carries equal marks.					

Q.No	Questions	Cognitive Level	Course Outcome	Marks
Section - 1				
1	a) Illustrate Communication system with block diagram. 5 Marks	L2	1	25
	b) Discuss optical fibers, Why are optical fibers preferred for long-distance communication? 10 Marks	L3	1	
	c) Why is serial transmission preferred for long-distance communication? 10 Marks	L3	1	
2	a) How does data represented in computer? 5 Marks	L3	1	
	b) Why is line-of-sight important for microwave communication? 5 Marks	L3	1	
	c) What is bitrate and bit length? How they are connected to network speed? 5 Marks	L3	1	
	d) Illustrate different categories of networks. 10 Marks	L2	1	
Section - 2				
3	a) Illustrate the seven layers of the OSI model. 10 Marks	L2	2	25
	b) What is encapsulation in the context of the OSI model? Why is encapsulation essential for data transmission in a network? 10 Marks	L2	2	
	c) Illustrate main functions of Network layer in OSI model. 5 marks	L2	2	
4	a) Illustrate working of TCP/IP with diagram 10 Marks	L3	2	
	b) Differentiate between Physical, Logical, Port addressing 10 Marks	L3	2	
	c) Discuss the purpose of routing in the network layer 5 mark	L3	2	
Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.				

Signature of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

8. CIE Practice Test model question paper

Program	Computer Science and Engineering			Semester	3
Course Name	Computer Networks			Test	IV
Course Code	25CS32I	Duration	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks

Your college is given an IP 192.168.100.0/24, you have 5 different departments and each department needs separate subnetwork, design and implement the network using packet tracer. Or Design a network with minimum 2 routers and 4 switches, configure network and demonstrate static routing using packet tracer.	2,5	50
Scheme of assessment a) Design IP Address scheme (Written)-15 b) Network design (Creating topology, configuring devices, IP assignment etc)-20 c) Verify connectivity / Routing-10 d) Demonstrate working / Troubleshoot if any error-05		
Total Marks		50

Signature of the Course Coordinator

Signature of the HOD

9. Equipment/software list with Specification for a batch of 30 students

Sl.No.	Particulars	Specification	Quantity
01	Desktop/Laptop PC with Windows/Linux	Intel i3, 500GB Hard Disk/SSD, 8GB RAM, Monitor, Mouse, Keyboard or higher configuration	30
02	Internet Connection	100 Mbps speed or higher subscription	1
03	LAN connectivity/ High speed Wireless AP	32 Port Switch with LAN cabling/ Wifi Adapters (32 No.)	1
04	Online UPS	5KV with 3 -6 hours backup	1
05	Projector	Multimedia Projector	1
06	White Board	Plane white board / Smart Board/Smart TV	1
07	Audio Speakers	Multimedia, Two-way hybrid speaker system	2
08	Crimping Tool Kit		2



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Computer Science and Engineering	Semester	3
Course Name	Data structures with Python	Type of Course	Integrated
Course Code	25CS33I	Contact Hours	7 Hours per week
Teaching Scheme	3:0:4	Credits	5
CIE Marks	50	SEE Marks	50 (Practice)

1. Rationale:

The course is designed to provide learners with a comprehensive understanding of how data is organized, stored, and manipulated in computational systems. By covering both linear and nonlinear data structures, as well as Python's built-in data structures, the course equips students with the knowledge and practical skills necessary to design efficient algorithms and solve computational problems effectively.

2. Course Outcomes : At the end of the Course, the student will be able to:

CO-01	Analyze and compare different data structures to determine their efficiency and suitability for various computational problems.
CO-02	Design and implement solutions for computational problems by selecting appropriate built-in data structures.
CO-03	Develop a solution by integrating appropriate data structures and error-handling techniques.
CO-04	Explain and apply Abstract Data Types (ADT) such as Stacks, Queues, Lists, and Trees in problem-solving scenarios.
CO-05	Design and implement Abstract Data Types (ADT) using User-Defined Data Structures (UDT) for real-world problem-solving.

3. Course Content

Week	CO	PO	Theory	Practice
1	1	1,7	Introduction to Data Structures Classification: Built in data structures User defined data structures Linear and non linear Operations on data structures: Traversal, Insertion, Deletion, Searching, Sorting, and Merging.	Recap of python concepts [practice programs using functions] Explore and document real time applications of Built-in data structures and user defined data structures.
2	1,2	1,2, 3,4	Sets: Characteristics and uniqueness of elements.	Practice programs to understand the concept of Sets and its operations.

			- Set operations: Union, intersection, difference, symmetric difference. Tuples: - Characteristics and immutability. - Basic operations: Creating, Accessing elements and slicing - Packing and unpacking tuples.	Tuple and its operations
3	1,2	1,2,3,4	Lists: - Characteristics and use cases. - Common operations: Creating, Indexing, slicing, appending, removing, sorting. - List comprehensions. Dictionaries: - Key-value pairs: Characteristics and use cases. - Adding, updating, deleting entries. - Iterating through dictionaries. - Dictionary methods (e.g., <code>keys()</code>, <code>values()</code>, <code>items()</code>)	Practice programs to understand the concept of - Lists and its operations. - Dictionaries and its operations
4	1,2	1,2,3,4	Strings: - Creating and assigning strings - Indexing String manipulation and built-in methods: - Concatenation - Repetition - Slicing Files: File attributes; operations	Practice programs to understand the concept of - Strings and its methods. - Files and its operations
5	1	1,2,3,4	Error and Exception Handling: Types of errors; Exception handling	Practice programs to understand the concept of Exception handling
6	3	2,4	Introduction to Recursion - How recursion works (stack memory and execution flow). - Difference between recursion and iteration. Structure of a Recursive Function - Base case. - Recursive case. - Identifying recursive patterns in problems. Use cases of recursion: Factorial calculation.	Practice programs to understand the concept of recursion
7	1,2,3	1,2,4	Getting started with ADT and UDT: Abstract data type(ADT):	Practice programs to understand the concept of ADT and UDT.

			Common ADTs: Stacks, Queues, Lists, Trees, Graphs, Hash Tables. User-Defined Data Type(UDT): class Using UDTs to Implement ADTs	
8	1,3	1,2, 3,4	Stack data structure LIFO (Last In, First Out) principle Real life examples Stack Operations	Practice programs to understand the concept of Stack data structure and its operations
9	1,3	1,2, 3,4	Queue Data Structure FIFO (First In, First Out) principle Real life examples Queue operations	Practice programs to understand the concept of Queue data structure and its operations
10	1,3, 4	1,2, 3,4	Linked Lists ▪ Definition and basic structure (Node, Head, Tail) ▪ Linked list vs. arrays ▪ Types : Singly Linked List, Doubly Linked List, Circular Linked List Singly Linked List ▪ Structure and representation ▪ Basic operations: a. Insertion (at beginning, end, and middle) b. Deletion (from beginning, end, and middle) c. Traversal d. Searching	Practice programs to understand the concept of singly linked list its operations
11	1,3, 4	1,2, 3,4	Doubly Linked List ▪ Structure and representation (with previous and next pointers) ▪ Basic operations: a. Insertion (at beginning, end, and middle) b. Deletion (from beginning, end, and middle) c. Traversal (both forward and backward)	Practice programs to understand the concept of doubly linked list and its operations
12	1,3, 5	1,2, 3,4	Introduction to Trees ▪ Definition and Terminology ▪ Properties of Trees ▪ Binary tree representation in memory Basic Operations: ▪ Insertion, Deletion, Searching ▪ Traversal: In-order, Pre-order, Post-order	Practice programs to understand the concept of tree data structure and its operations

13	1,3, 5	1,2, 3,4	Tree Traversal(recursive and iterative): ▪ In-order ▪ Pre-order ▪ Post-order	Practice programs to understand the concept of tree traversals
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4. References:

Sl No	Description
1	"Python for Everybody" by Dr. Charles Severance
2	"Automate the Boring Stuff with Python" by Al Sweigart
3	"Python Data Structures and Algorithms" by Benjamin Baka
4	https://docs.python.org/3/tutorial/datastructures.html
5	https://www.geeksforgeeks.org
6	https://www.w3schools.com
7	https://www.tutorialspoint.com
8	https://www.khanacademy.org
9	https://www.datacamp.com
10	https://www.programiz.com

5. Suggestive Online courses

Sl no	Topic Name	Reference Courses	Self Assessment Link	Source
1	Introduction to Data Structures Operations on data structures:	TOC - Data Structures and Algorithms using Python - Part 1 Infosys Springboard		Coursera
2	Sets Tuples	TOC - Data Structures and Algorithms using Python - Part 1 Infosys Springboard		Infosys Wingspan
3	Lists Dictionaries	TOC - Data Structures and Algorithms using Python - Part 1 Infosys Springboard		Infosys Wingspan
4	Strings	TOC - Data Structures and Algorithms using Python - Part 1 Infosys Springboard		Infosys Wingspan
5	Error and Exception Handling		Basics of Python - Self Assessment - Viewer Page Infosys Springboard	Infosys Wingspan
6	Introduction to Recursion	TOC - Programming Fundamentals using Python - Science Graduates - Foundation Program Infosys Springboard	Assessment - Programming Fundamentals using Python - Science Graduates - Viewer Page Infosys Springboard	Infosys Wingspan
7	Operators and their Precedence Expressions			
8	Flow control Practice programs to understand the Conditional statements			
9	Iterative statement			

10	Nested loops			
11	Functions			
12	Modules and Packages			

6. Suggestive programs

Week	Program description
2	A university needs a system to manage student course enrollments while ensuring data integrity and efficiency. Requirements: Use tuples to store immutable student details such as: - Student ID - Name - Date of Birth - Enrollment Year ▪ Use sets to manage course enrollments: ▪ Each student has a set of enrolled courses to prevent duplicate enrollments. ▪ Perform operations like adding, removing, and finding common courses among students. ▪ Identify students enrolled in multiple courses using set intersection. ▪ Find students who have dropped a course using set difference.
3	A company needs a system to efficiently manage employee payroll, including storing employee details, calculating salaries, and retrieving information as needed. Develop an Employee Payroll Management System that: Uses a list of dictionaries to store multiple employee records. Each dictionary contains: - Employee ID - Name - Designation - Basic Salary - Allowances and Deductions ▪ Calculates net salary based on salary structure and deductions. ▪ Provides functionalities to add, update, delete, and search employee records. ▪ Allows retrieval of employee salary details using Employee ID or Name. ▪ Ensures efficient data access using dictionary-based lookups
4	In large-scale applications, maintaining a log of system events such as user activities, errors, and warnings is crucial for debugging and auditing purposes. The challenge is to efficiently store and retrieve these logs in a structured format. Develop a log management system that: ▪ Captures system events (e.g., login attempts, errors, warnings) as structured log messages using string manipulation. ▪ Stores these log messages persistently in a file for future reference. ▪ Provides a mechanism to read and display logs when needed. ▪ Handles missing or corrupted log files gracefully. In an educational institution, generating and storing student report cards digitally is essential for record-keeping and easy retrieval. The challenge is to process student data, calculate grades, and store the information efficiently in a file.

	Develop a Student Report Card System that: ▪ Takes input for student details (name, roll number, subjects, and marks) and processes it using string manipulation. ▪ Calculates total marks, percentage, and grade based on predefined criteria. ▪ Stores the report card in a structured format within a file. ▪ Allows retrieval and display of student records when needed. ▪ Handles errors such as missing or corrupted report files gracefully.
5	An e-commerce platform allows customers to make payments online using credit cards, debit cards, or digital wallets. However, various issues may arise, such as: ▪ Insufficient funds ▪ Invalid card details ▪ Network failure Payment gateway timeout To ensure a smooth user experience, implement exception handling to catch and manage these errors gracefully.
6	Design and implement a recursive function to navigate through a file system, listing all files and directories within a given path. The function should: ▪ Traverse the directory recursively, printing all files and folders. ▪ Identify subdirectories and go deeper into them until no further subdirectories exist. ▪ Handle cases where directories may be empty. A robot needs to find its way out of a maze represented as a 2D grid. The robot can move up, down, left, or right, but it cannot pass through walls. The goal is to determine a path from the start position (S) to the exit (E) using recursion.
7	Design and implement a UDT-based system for a library to manage books, where: ▪ Each book is represented as an object with attributes like title, author, ISBN, available, and issued to. ▪ The system should allow adding books, issuing books, returning books, and checking book availability. Design and implement a UDT-based system for a hospital to manage patient records, where: ▪ Each patient is represented as an object with attributes like name, age, patient_id, disease, and admitted status. ▪ The system should allow admitting new patients, discharging patients, and updating patient information.
8	Design and implement a stack-based system to manage browser history navigation. The system should: ▪ Store visited web pages in a stack as the user browses. ▪ Allow the user to go "Back" to the previous page. ▪ Allow the user to go "Forward" if they had previously gone back. ▪ Display the current page and maintain navigation history. Design and implement a stack-based system to manage undo/redo functionality in a text editor. The system should: ▪ Store text changes in a stack as users type. ▪ Allow users to undo the last change and revert to the previous state. ▪ Allow users to redo an undone action. ▪ Maintain a record of changes to support multiple undo and redo operations.
9	Design and implement a queue-based system to manage print jobs in a printer. The system should:

	▪ Accept print requests from multiple users. ▪ Process print jobs in FIFO order (First job submitted should be printed first). ▪ Allow users to view the pending queue of print jobs. ▪ Remove a job from the queue once printing is completed. Design and implement a queue-based system to manage customer support tickets. The system should: ▪ Allow customers to submit support tickets with a brief description. ▪ Process tickets in FIFO order (First submitted ticket should be resolved first). ▪ Allow customers to view the current queue of pending tickets. ▪ Remove a ticket from the queue once it has been resolved.
10	Problem Statement: Design and implement a Singly Linked List (SLL) to manage a real-time customer support ticketing system. The system should support the following operations: ▪ Submit Ticket – Add a new ticket to the queue with customer details and issue description. ▪ Resolve Ticket – Remove the first ticket from the queue when resolved. ▪ Next Ticket – Display the next ticket without removing it. ▪ Display Queue – Show all pending tickets. Problem Statement: Design and implement a Singly Linked List (SLL) to manage a real-time ride-sharing queue. The system should support the following operations: ▪ Add Rider – Insert a new rider at the end of the queue when they request a ride. ▪ Assign Rider – Remove a rider from the front of the queue when a driver is available. ▪ Next Rider – Display the next rider without removing them. ▪ Display Queue – Print the list of all riders waiting for a ride.
11	Design and implement a Doubly Linked List (DLL) to manage a web browser's navigation history. The system should support the following operations: ▪ Visit Page – Add a new webpage to the history. ▪ Back – Move to the previous webpage in history. ▪ Forward – Move to the next webpage in history. ▪ Display History – Show all visited pages in order. Design and implement a Doubly Linked List (DLL) to manage a music playlist. The system should support the following operations: ▪ Add Song – Add a new song to the playlist. ▪ Play Current Song – Display the currently playing song. ▪ Next Song – Move to the next song in the playlist. ▪ Previous Song – Move to the previous song. ▪ Display Playlist – Show all songs in the playlist in order.
12	Design and implement a tree-based data structure to manage an organization hierarchy. The system should support the following operations: ▪ Add Employee – Add a new employee under a manager. ▪ Display Organization Hierarchy – Show the reporting structure in a tree format. ▪ Find Manager – Find the reporting manager of a given employee. Design and implement a tree-based data structure to manage a file system hierarchy. The system should support the following operations: ▪ Add Folder/File – Add a new file or folder inside a specific directory. ▪ Display File System – Show the complete directory structure in a tree format.

	Search File – Find a file and return its path.
13	Design and implement a tree-based data structure to represent an organization hierarchy. Implement tree traversal methods to display employees in different orders: - Pre-order Traversal (Top-Down View) – Start from the CEO and visit managers/employees before subordinates. - Post-order Traversal (Bottom-Up View) – Start from employees and move up to managers and then the CEO. - Level-order Traversal (Breadth-First Search) – Traverse the hierarchy level by level. Design and implement a tree-based data structure to represent a file system. Implement different tree traversal methods to explore files and directories: - Pre-order Traversal (For File Path Display) – Displays the directory structure from root to leaf. - Post-order Traversal (For Deleting a Directory) – Ensures that subdirectories and files are deleted before the parent directory. - Level-order Traversal (For Folder Size Calculation) – Helps in calculating disk usage by processing folders level by level.

7. CIE Assessment Methodologies

7. CIE Assessment Methodologies					
Sl.No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 TheoryTest	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 - Portfolio evaluation (20) - Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/AWS /any other (30)	1-13		50	
Total					50 Marks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 20 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

Rubrics for the Mini Project (if included) should be defined by the course coordinator.

8. SEE – Practice Assessment Methodologies

Sl NO	SEE – Practice Assessment	Duration (minutes)	Max marks	Min marks to pass
1.	Semester End Examination-Practice	180	50	20

9. CIE Theory Test model question paper

Program		Computer Science and Engineering			Semester -3rd	
Course Name		Data structure with python			Test	I/III
Course Code		25CS331	Duration	90 min	Marks	50
Name of the Course Coordinator:						
Note: Answer any one full question from each section. Each full question carries equal marks.						
Q.No	Questions			Cognitive Level	Course Outcome	Marks
Section – 1						
1	a)What is the difference between a tuple and a list in Python? Give a scenario where you would prefer using a tuple over a list. (5marks) b)Write a Python function that takes a list of integers as input and returns a new list where:(10 marks) - All even numbers are squared. - All odd numbers are multiplied by 3. Example Input: [1, 2, 3, 4, 5, 6] Example Output: [3, 4, 9, 16, 15, 36] c)Write a Python function that takes a list of tuples, where each tuple contains the name and the age of a person. The function should return the name of the oldest person.(10marks) Example Input: [('John', 45), ('Alice', 50), ('Bob', 30)] Example Output: 'Alice'			L2,L3	1	25
2	a)Describe the basic operations that can be performed on a set in Python. Provide examples of how to compute the intersection, union, and difference between two sets.(5marks) b)Write a Python function that takes a list of tuples, where each tuple contains the name and the age of a person. The function should return the name of the oldest person.(10 marks) Example Input: [('John', 45), ('Alice', 50), ('Bob', 30)] Example Output: 'Alice'			L2,L3	1	

	c)Write a Python function that takes two sets and returns a tuple containing:(10 marks) ▪ The intersection of the two sets. ▪ The union of the two sets. ▪ The difference between the first set and the second set. Example Input: set1 = {1, 2, 3, 4, 5} set2 = {4, 5, 6, 7} Example Output: ({4, 5}, {1, 2, 3, 4, 5, 6, 7}, {1, 2, 3})			
Section - 2				
3	Analyze the code and write the output <pre>def sum_nested_elements(nested_structure): total_sum = 0 stack = [nested_structure] # Initialize the stack with the outer structure print(stack) while stack: current = stack.pop() # Take the last element from the stack print(current) for item in current: if isinstance (item, (list, tuple)): # If it's a list or tuple, add to the stack print(item) stack.append(item) print(stack) elif isinstance (item, (int, float)): # If it's a number, add to the total total_sum += item return total_sum</pre> nested_list = [1, 2, (3, 4), [5, (6, 7)], 8] total = sum_nested_elements(nested_list) print(f"Total sum of elements: {total}")	L3	2	25
4	a)Create a Python program to Create a collection named trees – Oak, Pine, Mango, Neem, Maple, Teak, Mango, Neem, Maple, Pine, Mango, Oak, Pine, Mango, Peepal, Banyan, Sal, Compute and display the result with relevant messages for following: 1. Ask the user to input a tree name to count how many times it appears in the collection. 2. Ask the user to input a tree to find its position in the collection. 3. Get the last 5 tree names from the collection	L3	2	25

	4. Find the unique tree names from the collection Suggest the suitable python concept to solve above and justify your selection. b)Swami Vivekananda was a renowned Indian Hindu monk and one of the most influential spiritual leaders of the 19th century. For the above text, create a python program to 1. measure the length of the text. 2. count the number of words in the text. 3. Count the occurrence of these stop words – of, the, at, in, with 4. Capitalize these words and display the text – Narendranath, Vivekananda 5. Find numeric and alphanumeric words from the above text. Suggest the suitable python concept to solve above and justify your selection.			
Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.				

Sign of the Course Coordinator

Signature of the HOD

Signature of the IQAC Chairman

10. CIE Practice Test model question paper

Program	Computer Science and Engineering			Semester	
Course Name	Data structure with python			Test	
Course Code	25CS331	Durati on	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Marks
Problem Statement: Text and Numerical Data Separation with Word Classification Write a program that processes a given paragraph and performs the following tasks: 1. Read Input Data: ○ Read a text file containing text data. Each line of the file may contain multiple words. 2. Process Words: ○ Extract all the words from the file, ignoring special characters and punctuation. 3. Separate Text and Numerical Data: ○ Parse the paragraph to separate numerical data (e.g., numbers, digits) and text (e.g., words or characters). 4. Classify Words: ○ From the separated text, classify words into the following categories:				1,2,3	50

▪ Uppercase Words: Words containing only uppercase letters (e.g., "HELLO"). ▪ Lowercase Words: Words containing only lowercase letters (e.g., "world"). ▪ Mixed Case Words: Words containing both uppercase and lowercase letters (e.g., "Python"). 5. Output: ○ The original paragraph. ○ A list of numerical data extracted from the paragraph. ○ Separate lists for Uppercase, Lowercase, and Mixed Case words.		
Scheme of assessment (customize scheme as per requirement of your problem statement) a) Program Design and Conceptual Clarity (Clear identification of the key concepts, Explanation of the logic and methodology used and organization of the program.) - 10 b) Implementation and Execution - 30 c) Best Practices (Code Readability and Error Handling)- 10		
Total Marks		50

Signature of the Course Coordinator

Signature of the HOD

11. SEE- Model Practice Question Paper

Program	Computer Science and Engineering		Semester	3
Course Name	Data Structures using python	Course Code 25CS33I	Duration	180 min
Questions			CO	Marks
1. Design a student grade management system for your college to track and manage student grades. Let the system designed by you include the following requirements. • Add new student records with their name, subject, and grade. • Update a student's grade if there was a mistake. • Search for a student's grade by their name or subject. • Calculate and display the average grade for all students. The system should handle errors, such as trying to update or search for a non-existent student, and offer a simple menu for interaction.			1, 2, 3, 4, 5	50
Scheme of assessment (customize scheme as per requirement of your problem statement) a) Program Design and Conceptual Clarity (Clear identification of the key concepts, Explanation of the logic and methodology used and organization of the program.) - 10 b) Implementation and Execution - 30 c) Best Practices (Code Readability and Error Handling)- 10				
Total Marks				50

1) **Signature of the Examiner 1**

2) **Signature of the Examiner 2**

12. Equipment/software list with Specification for a batch of 30 students

Sl.No.	Particulars	Specification	Quantity
01	Desktop/Laptop PC with Windows/Linux	Intel i3, 500GB Hard Disk/SSD, 8GB RAM, Monitor, Mouse, Keyboard or higher configuration	30
02	Internet Connection	100 Mbps speed or higher subscription	1
03	LAN connectivity/ High speed Wireless AP	32 Port Switch with LAN cabling/ Wifi Adapters (32 No.)	1
04	Online UPS	5KV with 3 -6 hours backup	1
05	Projector	Multimedia Projector	1
06	White Board	Plane white board / Smart Board/Smart TV	1
07	Audio Speakers	Multimedia, Two-way hybrid speaker system	2



Government of Karnataka
DEPARTMENT OF TECHNICAL EDUCATION

Program	Computer Science and Engineering	Semester	3
Course Name	System and Network Administration	Type of Course	Integrated
Course Code	25CS34I	Contact Hours	7 Hours per week Total 91
Teaching Scheme	3:0:4	Credits	5
CIE Marks	50	SEE Marks	50 (Practice)

1. Rationale:

The course System and Network Administration is designed to equip learners with the skills and knowledge required to manage, maintain, and troubleshoot computer systems and networks. This course integrates theoretical knowledge with hands-on practice, preparing learners for vital roles in IT infrastructure management. As technology forms the backbone of modern organizations, proficient administrators are critical to ensuring systems remain secure, reliable, and efficient.

2. Course Outcomes: At the end of the Course, the student will be able to:

CO-01	Analyze hardware specifications and assemble a computer based on given technical requirements.
CO-02	Install an Operating system, configure and modify administration settings, carry out basic troubleshooting and performance monitoring
CO-03	Manage File systems through formatting, partitioning , data backup and recovery techniques.
CO-04	Configure Network, check and update network administration settings, provide basic network security and sharing activities.
CO-05	Design an optimized lab layout and implement e-waste disposal procedures in compliance with regulatory guidelines.

3. Course Content

Week	CO	PO	Theory	Practice
1	1	1	Computer hardware categories and their usage. External components Input devices Output devices Internal components Processing devices Storage devices Network devices	Hardware Identification: 1. Computer Case- Types, Features 2. Identify the front and rear panel controls and ports on a PC cabinet. 3. Exploring the internal components of a computer case 4. Identify different cables and

			Cables and connectors used with computers	CMOS battery, front and back panel connectors, power connectors. 5. Identify Storage devices(Hard disk, SSD), PSU, Cooling systems and their connection to the motherboard. 6. Identify the networking devices connected to the computer.
2	1	1,5	Power supply unit - SMPS What is SMPS? Need for SMPS SMPS parts and connectors. Working principles of SMPS Types of SMPS SMPS voltage color codes Measuring SMPS voltage levels. How to choose right power supply for PC Common issues in SMPS. Troubleshooting common problems in SMPS	1. Unmount the power supply from the PC cabinet. Identify the types of output connectors. 2. Identify output voltages using color coding. 3. Measure voltage levels using a multimeter. 4. Mount the power supply into the PC cabinet, connect different components and test the PC. 5. Troubleshoot Power supply through SMPS fan. 6. Diagnose power supply faults using PSU Tester.
3	1	1,5	Exploring Motherboard What is a motherboard? Types of motherboard(Form factor) Components of Motherboard How does a motherboard work? Main functions of motherboard Popular Motherboard Manufacturers. Desktop motherboard Vs Laptop motherboard Common motherboard issues and maintenance. Mother troubleshooting techniques Usage of CPUID CPU-Z tool.	1. Identify various components of the motherboard.(Draw motherboard layout) 2. Compare motherboards of various types 3. Precautions to be taken before removing the motherboard from the PC cabinet. 4. Using the CPUID CPU-Z tool, find different features of the CPU. 5. Check the Electric flow path and data flow path 6. Using Windows resource monitor to troubleshoot performance issues. 7. Using the CPUID CPU-Z tool, identify the CPU cache features of your working system.
4	1	1,4,5	Chipset Architecture and components Northbridge	1. Hands-on identification of Northbridge and Southbridge chips on motherboards

			Southbridge Booting process (FIRMWARE) POST: BIOS/UEFI Bootloader Execution OS Kernel Loading System Processes Initialization User Authentication	2. Identify the components connected to the north bridge and south bridge. 3. Implement basic power management features using BIOS/UEFI settings. 4. Checking System Information in BIOS/UEFI and Change the Boot Order 5. Analyze the chipset design of a specific device (e.g., smartphone, laptop) and suggest improvements
5	2	1,2,5	Operating System Installation Creating OS Image (Bootable Device) Operating system : Functions and types Understanding file systems and partitions	1. Install and boot Windows 10/11 or any Linux OS 2. Configure essential OS settings including user interface customization and system diagnostics. a. Inverting and rearranging screen b. Testing Microphone 3. Document OS installation procedures a. Windows / Linux
6	2	1,2,4,5	Windows Command line interface Basic Navigation commands File and directory management commands writing simple PowerShell scripts. File security. User Account and Permission Management User Profile Issues: Create a New Profile, Profile Repair	1. Using command prompt or powershell, a. Execute basic navigation commands b. Execute file and directory management commands. 2. Use command line to encrypt and decrypt files and folders 3. Adding, modifying, and deleting user accounts. 4. Create and manage user accounts on a Windows system: a) Using the Control Panel b) Using PowerShell c) Verify the user account creation by logging in with the new credentials and noting any administrative privileges. d) Document the steps taken for the above task

				5. PowerShell scripting: Reading from and writing to the console and files
7	2	1,2,4,5	OS configuration and Administration System Startup Issues and solutions: Safe Mode, Automatic Repair, System Restore, system reset, Image recovery Performance Issues: Task Manager, Resource Monitor, Disk Cleanup, Check for Malware, Update Drivers, Check Disk Health	1. Solve system startup issues using Safe Mode, Automatic Repair, System Restore, system reset, Image recovery 2. Check and/or Solve Performance Issues using Task Manager, Resource Monitor, Event Viewer, Disk Cleanup, Check for Malware, Update Drivers, Check Disk Health 3. Document the concept of Blue Screen of Death (BSOD), identify common causes, analyze a specific error code, explore basic diagnostic tools, and suggest preventive measures
8	3	1,2,4,5	Basics of File Systems - File system types: FAT32, NTFS, exFAT - Structure and functions - File properties System Configuration - Disk partitioning (MBR vs GPT), - Drive formatting, - Disk shrink/extend Data Recovery Techniques - Deleted file recovery - Registry restoration - app recovery - System Restore - Windows Recovery Windows Update Management - Manual vs Auto Updates - Update testing, - Rollback - Update history	1. Create and Format a New Partition 2. MBR vs GPT Identification 3. Resize (Shrink/Extend) a Partition 4. Explore Command Line Disk Tools 5. Delete a file and recover it using Windows File Recovery Tool 6. Registry Backup and Restore 7. System Restore - Create a manual restore point. - Simulate a system issue (e.g., uninstall a program) and roll back using System Restore. 8. Uninstall a program, then use Windows Store or official setup to reinstall it. 9. Windows Update Management - Check and Install Updates Manually - Change Update Settings - View Update History - Rollback an Update
9	3	1,2,4,5	Monitor and manage: Performance monitoring; optimize windows services; tune scheduled tasks. Customizing windows desktop. File and System Corruption:	1. Monitor the processes, System performance using Task manager (Windows)/ Process related Commands in Linux.

			System File Checker (SFC) Deployment Imaging Service and Management Tool (DISM) Check Disk Utility Drivers Management: Device drivers, Network drivers, System drivers	2. Troubleshoot the system delaying for booting (disabling unnecessary Startup applications, Services) 3. Work with task scheduler: Windows/Linux 4. Install printer driver, Network driver disable/ enable, 5. System driver update
10	4	1,2,3,4,5	Network Configuration and Management : IP Addressing , Subnetting, DNS Configuration, Gateway Configuration, VLAN Configuration Network Troubleshooting: Identify the Problem, Establish a Baseline, Check Physical Layer, Verify the Data Link Layer, Test Network Connectivity, Use Traceroute, Diagnose and resolve common IP and DNS-related issues,Examine Firewall and Security Settings Network Security: Firewall, Network profile, Managing wireless network Network Sharing	1. Configure Network Connections, Configure IP Settings, Set DNS Server, Network Adapter Information, Disable or Enable Network Adapter. 2. Ping, Trace Route, Checking Open Ports, Network Statistics, Flush DNS Cache, Reset TCP/IP Stack, 3. Windows Firewall Configuration, Configure Network Profiles, Manage Wireless Networks 4. Share any Files and Folders with other System in the network. 5. Establish and manage remote desktop connections securely.
11	4	1,2,4,5	Network Monitoring and Reporting : Monitor Network Activity, View Network Usage Advanced Network Configuration: Create and Manage Virtual Networks (Hyper-V Manager), Manage Routing (Modem) and Remote Access Virtual Private Network: Definition, Types of VPN, Implementation	1. Monitor network activity using Task manager and resource monitor 2. Install a VM(Hypervisor) document VM Network Utilization Metrics 3. Run basic network commands in guest OS installed on VM 4. Download and install any third party VPN app and connect internet through VPN
12	5	7,8	E-waste management : E-Waste: Definition and types of electronic waste (e.g., computers, smartphones, home appliances). Global statistics on e-waste generation. Environmental and health impacts of improper e-waste management.	1. Visit https://greene.gov.in and https://kspcb.karnataka.gov.in/ to find the latest regulations and policies taken up by the Government of India. 2. Analyze e-waste management processes through on-site visits or virtual case studies.

			E-Waste Management Lifecycle: Lifecycle of electronic devices: production, usage, and disposal. Processes in e-waste recycling: collection, sorting, and recovery. Policies and Regulations on E-waste: Global e-waste policies National laws and policies on e-waste	3. Document how to reduce carbon footprint
13	1,2,3, 4,5	1,2,3 ,4,5, 6	Mini Project Activity- Layout Management Lab setup Management: Resource purchase, Installation, Electrical safety measurement	Develop a comprehensive lab setup plan, including hardware procurement, installation, electrical safety measures, and cybersecurity protocols.

4. References:

Week	Description
01	https://discover.hubpages.com/technology/The-Four-Main-Categories-Of-Computer-Hardware-Parts https://www.javatpoint.com/what-are-the-computer-cables
02	https://www.intel.com/content/www/us/en/gaming/resources/power-supply.html https://en.wikipedia.org/wiki/Switched-mode power supply https://www.amd.com/en/resources/support-articles/faqs/GPU-104.html
03	https://www.geeksforgeeks.org/what-is-a-motherboard/ https://www.studocu.com/en-us/document/purdue-university-global/information-technology-concepts/12-exploring-motherboards-processors-and-memory/37160479
04	https://www.baeldung.com/cs/chipset https://www.javatpoint.com/booting-in-operating-system https://learn.microsoft.com/en-us/windows-hardware/drivers/bringup/boot-and-uefi
05	https://www.javatpoint.com/how-to-install-windows-10 https://answers.microsoft.com/en-us/windows/forum/all/steps-to-install-windows-10/a499989c-f31f-49d0-8dbb-3b6425a5f47b https://www.geeksforgeeks.org/how-to-install-ubuntu-desktop/
06	https://learn.microsoft.com/en-us/windows-server/administration/windows-commands/windows-commands https://www.freecodecamp.org/news/command-line-commands-cli-tutorial/ https://www.geeksforgeeks.org/most-useful-cmd-commands-in-windows/ https://devblogs.microsoft.com/scripting/table-of-basic-powershell-commands/
07	https://learn.microsoft.com/en-us/troubleshoot/windows-client/performance/windows-boot-issues-troubleshooting https://learn.microsoft.com/en-us/troubleshoot/windows-client/performance/windows-startup-issues-troubleshooting https://support.microsoft.com/en-us/windows/system-configuration-tools-in-windows-f8a49657-b038-43b8-82d3-28bea0c5666b
08	https://learn.microsoft.com/en-us/windows-server/storage/disk-management/overview-of-disk-management https://support.microsoft.com/en-us/windows/windows-file-recovery-61f5b28a-f5b8-3cc2-0f8e-a63cb4e1d4c4
09	https://support.microsoft.com/en-us/windows/system-configuration-tools-in-windows-f8a49657-b038-43b8-82d3-28bea0c5666b

	https://support.microsoft.com/en-us/windows/update-drivers-manually-in-windows-ec62f46c-ff14-c91d-eead-d7126dc1f7b6
10	https://learn.microsoft.com/en-us/training/paths/configure-networking-windows-clients/ https://support.microsoft.com/en-us/windows/change-tcp-ip-settings-bd0a07af-15f5-cd6a-363f-ca2b6f391ace https://support.microsoft.com/en-us/windows/setting-up-a-wireless-network-in-windows-97914e31-3aa4-406d-cef6-f1629e2c3721 https://learn.microsoft.com/en-us/windows/security/operating-system-security/network-security/windows-firewall/ https://www.windowscentral.com/8-networking-command-tools-every-user-should-know-windows-10
11	https://www.vmware.com/topics/virtual-networking https://www.kaspersky.com/resource-center/definitions/what-is-a-vpn
12	https://greene.gov.in/ https://kspcb.karnataka.gov.in/

5. CIE Assessment Methodologies

5. CIE Assessment Methodologies					
Sl. No	CIE Assessment	Test Week	Duration (minutes)	Max marks	Average of all CIE=50 Marks
1.	CIE-1TheoryTest	4	90	50	
2.	CIE-2 Practice Test	7	180	50	
3	CIE-3 TheoryTest	10	90	50	
4.	CIE-4 Practice Test	13	180	50	
5	CIE-5 ▪ Portfolio evaluation (10) ▪ Mini Project (20) ▪ Online Course/s of minimum 10 Hrs. in Infosys Spring Board/ Swayam/NPTEL/AWS /any other (20)	1-13		50	
Total					50 Marks

Note:

Portfolio evaluation

Each laboratory exercise will be evaluated for a total of 10 marks. The evaluation will include the following components:

- Written description of the experiment in the observation book.
- The results obtained from the experiment.
- Corrections and evaluations of the experiment completed in the previous class, documented in the record book.

The average of all exercises shall be considered for the final assessment at the end of course.

- Rubrics for the Mini Project (if included) should be defined by the course coordinator.

6. SEE – Practice Assessment Methodologies

Sl.No	SEE – Practice Assessment	Duration (minutes)	Max marks	Min marks to pass
1.	Semester End Examination-Practice	180	50	20

7 CIE Theory Test model question paper

Program		Computer Science and Engineering			Semester -III	
Course Name		System and Network Administration			Test	I
Course Code		25CS34I	Duration	90 min	Marks	50
Name of the Course Coordinator:						
Note: Answer any one full question from each section. Each full question carries equal marks.						
Q.No	Questions			Cognitive Level	Course Outcome	Marks
Section - 1						
1	a) Categorize the given devices/components into multiple categories i. Mouse ii. Phone Display iii. RAM iv. RJ45 v. Flash Drive vi. NIC vii. Printer viii. Projector ix. Cache -05			L3	1	25
	b) Ajay a computer science diploma II year student. One of his friends wanted to buy a new desktop, so he asked Ajay's suggestions, feeling he might know more about computers. What are your suggestions to him with respect to hardware? -10			L3	1	
	c) Compare the hardware components of a computer with your mobile phone. -10			L2	1	
2	a) How can you diagnose power supply faults using PSU Tester? 5			L3	1	
	b) Rachana was sitting on a plastic chair before trying to check the system unit cabinet. Though the power supply is not connected she got an electric shock. How can you analyze this problem? What are the safety measures for this? (static electricity) -10			L3	1	
	c)How does SMPS work? -10			L2	1	
Section - 2						
3	a) Anil and Hruthvik are debating whether the north bridge is faster or the south bridge is faster? How can you conclude it? Justify your answer. -05			L3	1	25
	b) One of the computers in your lab was hanged when Vedant ran application 'X'. He doesn't want to restart the computer but has to kill application 'X' . How can you help him? -10			L3	1	

	c) Khushi wants to install an operating system from his pen drive. But it is not loading. Someone told her to change it to BIOS. She does not understand it clearly. Can you help her with this regard - 10	L3	1,2	
4	a) How can you differentiate single boot virtual machine installation? -5	L2	1,2	
	b) Compare windows/Linux OS with android OS -10	L2	1,2	
	c) Rehman installed an older version of the operating system on his computer. Some of his hardwares like Wi-Fi, is not working. How can you resolve this issue? (Chipset not installed) -10	L3	1,2	
Note for the Course coordinator: Each question may have one, two or three subdivisions. Optional questions in each section carry the same weightage of marks, cognitive level and course outcomes.				

Signature of the Course Coordinator Signature of the HOD Signature of the IQAC Chairman

8. CIE Practice Test model question paper

Program	Computer Science and Engineering			Semester	1
Course Name	System and Network Administration			Test	II
Course Code	25CS34I	Durati on	180 min	Marks	50
Name of the Course Coordinator:					
Questions				CO	Mar ks
1. You are instructed to install newer version of Operating system in a computer in your lab. Decide the OS, document hardware requirement for the same, before installing the OS check the BIOS/UEFI settings and do necessary updates in it. Install OS on right PC. Create a new account name CSE_LAB1_01 with a strong password				1,2,3	50
Scheme of assessment					
a) Choosing OS and document Hardware-10 b) BIOS/UEFI settings-10 b) Installation of OS and related operations-15 c) OS related operations-10 d) Portfolio Evaluation-05					
Total Marks					50

Sign of the Course Coordinator

Signature of the HOD

9. SEE-Model Practical Question Paper

Program	Computer Science and Engineering	Semester	III	
Course Nam	System and Network Administration	Marks	50	
Course Code		Duration	180 Min	
Questions		Cognitive Levels	Course Outcomes	Marks
Section -1	You are tasked with setting up and maintaining a computer system for a small office environment. The goal is to ensure that the hardware components are correctly identified, software is installed and configured, issues are resolved efficiently, and the network is operational for seamless communication. Requirements: Hardware: Verify hardware specifications and compatibility with the system requirements. Software Installation: Install an operating system (e.g., Windows/ Linux) on a computer. Install essential drivers and utility software required for system functionality Diagnose ,resolve and document any hardware and software issues faced Network Configuration: Set up a basic wired or wireless network for the office, ensuring connectivity between devices	L3	1,2,3,4,5	45
Section -2	Portfolio Evaluation/Viva	L3		5

1)Signature of the Examiner 1

2) Signature of the Examiner 2

10.Equipment/software list with Specification for a batch of 30 students

Sl.No.	Particulars	Specification	Quantity
01	Computers		10
02	PSU Tester		10
03	Multimeter		10
04	Individual components- SMPS/PSU	400 watts	10
05	Individual components- SMPS/PSU	800 watts	10
06	Motherboard	ATX	10
07	Motherboard	Micro ITX 10	10
08	RAM stick	DDR3	10
09	RAM stick	DDR4	10
10	CMOS battery		10
11	Windows 10/11 OS user license for multi users		-
12	POST diagnostic card		10