

**Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications**

Programme Name:Computer Science & Engg **Course Code and Name:** 25CS31I Database Concepts and Technologies **Semester:** 3rd

CO No.	Cognitive Level	Remembering						Understanding						Application						Total Marks	Weightage
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II		
	Type	1M		2M	3M	5M	10 M	1M		2M	3M	5M	10 M	1M		2M	3M	5M	10 M		
		MC Q	FI B					MC Q	FI B					MC Q	FI B						
CO-1	No. of Questions	4	1							1	1		1				1	1	1		
	Marks	4	1	0	0	0	0	0	0	2	3	0	10	0	0	0	3	5	10	38	25
CO-2	No. of Questions	2	1	1		1				1		1					1	1			
	Marks	2	1	2	0	5	0	0	0	2	0	5	0	0	0	0	3	5	0	25	17
CO-3	No. of Questions	4	1							1		1					1		1		
	Marks	4	1	0	0	0	0	0	0	2	0	5	0	0	0	0	3	0	10	25	17
CO-4	No. of Questions	2	1							1	1	1					1		1		
	Marks	2	1	0	0	0	0	0	0	2	3	5	0	0	0	0	3	0	10	26	17
CO-5	No. of Questions	3	1		1					3		1	1				1	1			
	Marks	3	1	0	3	0	0	0	0	6	0	5	10	0	0	0	3	5	0	36	24
Marks		15	5	2	3	5	0	0	0	14	6	20	20	0	0	0	15	15	30		100 %
Total		30						60						60						150	
%		20						40						40						100%	

**Government of Karnataka
Department of Technical Education
Board of Technical Examinations
MODEL QUESTION PAPER**

Course Name: Database Concepts and Technologies
Time: 3Hours

Course Code:20CS31T
Max Marks:100

Instructions

- For Part-A Questions, only the first written answers will be considered for evaluation.
- Answer as per instructions given in each section.

PART – A

I. Select the correct answer from the choices given (15 × 1 = 15)

Q.No	Question	CO	CL
1	Which of the following is an advantage of DBMS over file systems? a) Data redundancy b) Data inconsistency c) Data independence d) Data duplication	CO1	R
2	The conceptual level in DBMS describes: a) Physical storage b) User view c) Complete logical structure d) Hardware details	CO1	R
3	An entity in ER modeling represents: a) Attribute b) Real-world object c) Relationship d) Constraint	CO1	R
4	Which key uniquely identifies a record in a table? a) Foreign Key b) Candidate Key c) Primary Key d) Alternate Key	CO1	R
5	A foreign key is used to: a) Ensure uniqueness b) Establish relationships c) Store null values d) Create indexes	CO2	R
6	Which normal form removes partial dependency? a) 1NF b) 2NF c) 3NF d) BCNF	CO2	R
7	DDL commands are used to: a) Query data b) Define database objects c) Control transactions d) Grant privileges	CO3	R
8	Which SQL command is used to add records? a) UPDATE b) DELETE c) INSERT d) ALTER	CO3	R
9	Which clause is used to filter rows? a) GROUP BY b) ORDER BY c) WHERE d) HAVING	CO3	R
10	Which function returns the total number of records? a) SUM() b) AVG() c) COUNT() d) MAX()	CO3	R
11	MongoDB stores data as: a) Tables b) Documents c) Rows d) Views	CO4	R
12	The MongoDB command to create a database is: a) CREATE DATABASE b) NEW DB c) use dbname d) CREATE DB	CO4	R
13	CAP theorem stands for: a) Consistency, Availability, Partition Tolerance b) Control, Access, Protection c) Cache, Access, Processing	CO5	R

Q.No	Question	CO	CL
	d) Create, Apply, Partition		
14	Which MongoDB method inserts multiple documents? a) insertOne() b) insertMany() c) addMany() d) createMany()	CO5	R
15	Which command removes records from a table? a) INSERT b) DELETE c) SELECT d) CREATE	CO3	R

II. Fill in the blanks by choosing the appropriate answer from the bracket

(3NF, Aggregate Function, Relationship, updateOne(), Referential Integrity) (5 × 1 = 5)

Q.No	Question	CO	C L
16	An association between entities in an ER model is called a _____.	CO1	R
17	The constraint that maintains consistency between related tables is _____.	CO2	R
18	The normalization level that removes transitive dependency is _____.	CO3	R
19	COUNT(), SUM() and AVG() are examples of _____.	CO4	R
20	In MongoDB, a single document can be modified using _____.	CO5	R

PART – B

III. Answer ANY FIVE of the following. Each question carries TWO marks. (5 × 2 = 10)

Q.No	Question	CO	CL
21	Define Data Independence.	CO1	R
22	Differentiate between Entity and Attribute.	CO1	U
23	State any two integrity constraints in DBMS.	CO2	U
24	What is Functional Dependency?	CO2	U
25	List any two DML commands.	CO3	U
26	What is the purpose of the WHERE clause?	CO4	U
27	Define a document in MongoDB.	CO5	U
28	List any two advantages of NoSQL databases.	CO5	U

PART – C

IV. Answer ANY FIVE of the following. Each question carries THREE marks. (5 × 3 = 15)

Q.No	Question	CO	CL
29	Explain the three levels of database abstraction with a neat diagram.	CO1	U
30	Illustrate cardinality constraints with examples.	CO1	A
31	Convert the given ER model into a relational schema. (ER diagram to be provided)	CO2	A
32	Normalize the relation STUDENT(StudentID, Name, CourseID, CourseName, FacultyName) up to 3NF.	CO2	A

Q.No	Question	CO	CL
33	Write SQL statements to create a Product table with appropriate constraints.	CO3	A
34	Write SQL queries to retrieve records using WHERE and ORDER BY clauses.	CO4	A
35	Explain CRUD operations in MongoDB with suitable examples.	CO5	A
36	Write MongoDB commands to insert and retrieve documents from a collection.	CO5	A

PART – D (SECTION – I)

V. Answer ANY FIVE of the following. Each question carries FIVE marks. (5 × 5 = 25)

Q.No	Question	CO	CL
37	Analyze the advantages of database systems over file processing systems.	CO1	A
38	Design an ER diagram for a Library Management System showing entities, attributes, and relationships.	CO1	A
39	Explain the steps involved in converting an ER diagram into a relational schema.	CO2	U
40	Consider a relation EMPLOYEE(EmpID, EmpName, DeptID, DeptName, Manager). Identify functional dependencies and normalize up to 3NF.	CO2	A
41	Create a Product table and demonstrate INSERT, UPDATE, DELETE and SELECT operations using SQL commands.	CO3	A
42	Explain transaction management and TCL commands with examples.	CO3	U
43	Write SQL queries using aggregate functions, GROUP BY and HAVING clauses for a Student database.	CO4	A
44	Compare RDBMS and NoSQL databases with suitable examples.	CO5	U

PART – D (SECTION – II)

VI. Answer ANY THREE of the following. Each question carries TEN marks. (3 × 10 = 30)

Q.No	Question	CO	CL
45	Analyze the requirements of a Food Delivery Platform and design a complete ER diagram showing entities, relationships, cardinalities and participation constraints.	CO1	A
46	Translate the ER diagram provided into a relational schema and verify the integrity constraints. Normalize the schema up to 3NF.	CO2	A
47	Develop SQL queries for a To-Do List Database to perform joins, subqueries, aggregate operations, views, and transaction control commands.	CO4	A
48	Design and implement an Inventory Management Database. Create tables with constraints, populate data, and demonstrate CRUD operations using SQL statements.	CO3	A
49	Design a MongoDB database for an E-Commerce Website. Create collections, perform CRUD operations, and write aggregation pipelines to calculate total sales and average product price by category.	CO5	A

Database Concepts and Technologies(25CS31I)

Model Question Bank

CO-01	Analyze real-world database requirements and design a structured ER diagram that Accurately represents entities and relationships.
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Multiple Choice Questions (Remembering Level) 1MARK

1. DBMS stands for:
a) Data Backup Management System b) Database Management System
c) Database Monitoring Service d) Data Business Management System
2. Which of the following is a database?
a) Collection of related data b) Collection of hardware
c) Collection of networks d) Collection of programs
3. Which database model stores data in tables?
a) ER Model b) Relational Model c) Network Model d) Hierarchical Model
4. SQL is mainly used in:
a) RDBMS b) NoSQL c) Cloud Storage d) Operating Systems
5. Which of the following is a NoSQL database?
a) MySQL b) Oracle c) MongoDB d) SQL Server
6. Data stored across multiple locations is called:
a) Relational Database b) Centralized Database
c) Distributed Database d) Object Database
7. Which database is hosted on the internet?
a) Distributed Database b) Cloud Database
c) Relational Database d) Hierarchical Database
8. ER stands for:
a) Entity Relation b) Entity Relationship
c) Entry Relationship d) Extended Relation
9. An entity is represented by:
a) Oval b) Rectangle c) Diamond d) Circle
10. An attribute is represented by:
a) Rectangle b) Diamond c) Oval d) Triangle
11. A relationship is represented by:
a) Diamond b) Rectangle c) Oval d) Circle
12. Which key uniquely identifies a record?
a) Foreign Key b) Candidate Key c) Primary Key d) Composite Key

13. A foreign key is used to:
a) Delete records b) Connect tables
c) Sort data d) Store data
14. Which architecture consists of presentation, application, and database layers?
a) Two-tier b) Three-tier c) Four-tier d) One-tier
15. Data independence helps:
a) Increase redundancy b) Reduce security
c) Separate data from applications d) Increase duplication
16. Logical data independence deals with:
a) Storage changes b) Hardware changes c) Schema changes d) Network changes
17. Physical data independence deals with:
a) Table relationships b) Changes in storage
c) Query language d) User views
18. Cardinality specifies:
a) Number of attributes b) Number of entities participating in a relationship
c) Number of tables d) Number of keys
19. Total participation means:
a) Some entities participate b) No entity participates
c) All entities participate d) Only one entity participates
20. Which of the following is an advantage of DBMS?
a) Data redundancy b) Data inconsistency
c) Data security d) Data duplication

Fill in the Blanks (Remembering Level) 1 Mark

1. DBMS stands for _____.
2. A database is a collection of _____ data.
3. SQL stands for _____.
4. MySQL is an example of _____.
5. MongoDB is a _____ database.
6. Data stored in tables belongs to the _____ model.
7. Cloud databases are accessed through the _____.
8. ER stands for _____.
9. An entity is represented by a _____.
10. An attribute is represented by an _____.
11. A relationship is represented by a _____.
12. A _____ uniquely identifies a record.
13. A _____ links two tables.
14. Data independence is classified as logical and _____.
15. The middle layer in three-tier architecture is the _____ layer.
16. Cardinality defines the number of _____ in a relationship.
17. Participation can be total or _____.
18. Distributed databases store data in _____ locations.

19. Reducing data duplication reduces _____.
20. The ER model was introduced by _____.

Two-Mark Questions (Remembering Level)

1. Define DBMS and mention its significance.
2. List any four types of database systems.
3. State two advantages of database systems over file systems.
4. Define Primary Key and Foreign Key.
5. What is Cardinality in an ER model?
6. What is a database? State any two advantages of using a database.
7. Define Database Management System (DBMS).
8. Name the three major database models.
9. What is a three-tier database architecture?
10. Define logical data independence.
11. Define physical data independence.
12. What is a Relationship in an ER diagram?
13. What is a Primary Key?
14. What is a Foreign Key?
15. Define Cardinality in ER modeling.

Two-Mark Questions (Understanding Level)

1. Explain the significance of databases in modern organizations.
2. Differentiate between a database and a DBMS.
3. Explain the role of SQL in database systems.
4. Describe the purpose of an RDBMS.
5. Explain why NoSQL databases are used.
6. Describe the need for distributed databases.
7. Explain the importance of cloud databases.
8. Discuss how a DBMS reduces data redundancy.
9. Explain the purpose of data independence.
10. Describe the three layers of three-tier architecture.
11. Explain the concept of an entity with an example.
12. Describe attributes and their role in ER modeling.
13. Explain the importance of primary keys.
14. Describe the purpose of foreign keys in relational databases.
15. Explain cardinality with a suitable example.

Three-Mark Questions (Understanding Level)

1. Explain the advantages of databases over traditional file systems.
2. Compare RDBMS and NoSQL databases.
3. Explain the working of a distributed database system.
4. Describe the components of a DBMS and their functions.
5. Explain logical and physical data independence with examples.
6. Discuss the importance of ER modeling in database design.
7. Explain entities, attributes, and relationships using a simple example.
8. Differentiate between primary keys and foreign keys.

9. Explain cardinality and participation constraints in ER diagrams.
10. Describe the flow of data in a three-tier database architecture.

Five-Mark Questions (Application Level)

1. A college currently stores student information in separate files. Design a database-based solution and explain how DBMS features improve data management.
2. A bank wants to store customer and account information. Identify entities, attributes, primary keys, and relationships, and sketch an ER model.
3. Design a three-tier architecture for a library management system and explain the role of each tier.
4. Create an ER model for a Student–Course enrollment system showing entities, attributes, relationships, and cardinality.
5. Given two tables, Student and Department, identify appropriate primary and foreign keys and explain their relationship.

Ten-Mark Questions (Application Level)

1. A university wants to develop a complete student information system. Design the database structure, identify entities, attributes, primary keys, foreign keys, and relationships, and draw an ER diagram with cardinality constraints.
2. A hospital currently uses a file-based system. Analyze the problems faced and propose a DBMS-based solution. Explain how the proposed system improves efficiency, security, consistency, and data sharing.
3. A multinational e-commerce company wants a highly available database solution. Compare RDBMS, NoSQL, Distributed, and Cloud databases and recommend the most suitable architecture with justification.
4. Design a database architecture for an online banking system using a three-tier model. Explain the functions of each layer and discuss logical and physical data independence in the design.
5. Develop an ER model for a Library Management System involving Books, Members, Librarians, and Borrowing Transactions. Identify entities, attributes, primary keys, foreign keys, relationships, cardinality, and participation constraints, and explain how the model supports database implementation.

CO-02	Translate the ER diagram into a relational schema and verify its compliance with integrity Constraints and normalize the design upto the third normal form (3NF)
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Multiple Choice Questions (Remembering Level)

1. The Relational Model was proposed by:

a) Peter Chen
b) E. F. Codd
c) James Gosling
d) Dennis Ritchie
2. In the Relational Model, data is stored in:

a) Files
b) Trees
c) Tables
d) Graphs
3. A row in a relation is called:

a) Attribute
b) Tuple
c) Domain
d) Schema

4. A column in a relation is called:
a) Attribute b) Tuple c) Record d) Entity
5. Which constraint ensures that primary key values cannot be NULL?
a) Domain Constraint b) Referential Integrity c) Entity Integrity d) Key Constraint
6. Referential Integrity is maintained through:
a) Candidate Key b) Alternate Key c) Foreign Key d) Super Key
7. The process of converting an ER diagram into tables is called:
a) Decomposition b) Relational Mapping c) Normalization d) Aggregation
8. A Functional Dependency is represented as:
a) $A \leftrightarrow B$ b) $A \rightarrow B$ c) $A = B$ d) $A + B$
9. In the FD $A \rightarrow B$, A is called:
a) Dependent Attribute b) Determinant c) Candidate Key d) Foreign Key
10. Which type of dependency occurs when a non-key attribute depends on part of a composite key?
a) Full Functional Dependency b) Partial Dependency
c) Transitive Dependency d) Multivalued Dependency
11. Functional Dependency is mainly used in:
a) Query Processing b) Normalization c) Data Mining d) Backup
12. The primary objective of normalization is:
a) Increase redundancy b) Reduce redundancy
c) Increase storage d) Increase complexity
13. First Normal Form (1NF) eliminates:
a) Partial Dependency b) Repeating Groups
c) Transitive Dependency d) Foreign Keys
14. Second Normal Form (2NF) removes:
a) Repeating Groups b) Transitive Dependency
c) Partial Dependency d) Candidate Keys
15. Third Normal Form (3NF) removes:
a) Partial Dependency b) Repeating Groups
c) Composite Keys d) Transitive Dependency
16. A relation in 2NF must first satisfy:
a) 3NF b) BCNF c) 1NF d) 4NF
17. Which key uniquely identifies each tuple in a relation?
a) Foreign Key b) Primary Key
c) Alternate Key d) Composite Key
18. The structure of a relation is called:
a) Instance b) Schema c) Domain d) Tuple
19. Normalization improves:
a) Data Consistency b) Data Duplication
c) Data Redundancy d) Data Complexity
20. Which normal form removes transitive dependencies?
a) 1NF b) 2NF c) 3NF d) 4NF

Fill in the Blanks (Remembering Level)

1. The Relational Model was proposed by _____.
2. Data in the Relational Model is stored in _____.
3. A row in a table is called a _____.
4. A column in a table is called an _____.
5. A _____ uniquely identifies a record in a relation.
6. A foreign key enforces _____ integrity.
7. Entity integrity ensures that primary key values are never _____.
8. Functional Dependency is represented using the symbol _____.
9. In $A \rightarrow B$, A is called the _____.
10. Functional dependencies are used in _____.
11. The process of reducing redundancy is called _____.
12. The first normal form is abbreviated as _____.
13. 1NF eliminates _____ groups.
14. 2NF removes _____ dependency.
15. 3NF removes _____ dependency.
16. A relation must be in _____ before it can be in 2NF.
17. The structure of a relation is called a _____.
18. The current contents of a relation are called a _____.
19. ER diagrams are converted into _____ schemas.
20. Normalization improves data _____.

Two-Mark Questions (Remembering Level)

1. Define the Relational Model and list its main characteristics.
2. What is a relation in a relational database?
3. What is entity integrity?
4. What is a Functional Dependency?
5. What is normalization?
6. Define Functional Dependency and explain its types with examples.

Two-Mark Questions (Understanding Level)

1. Explain the Relational Model.
2. Explain the concept of a tuple and an attribute.
3. Explain referential integrity.
4. Explain determinant and dependent attributes in FD.
5. Differentiate between full functional dependency and partial dependency.
6. Explain the purpose of 1NF.
7. Explain the objective of 3NF.
8. Why are integrity constraints important in a database?
9. Explain the role of functional dependency in database design.
10. What are the benefits of normalization?

Three-Mark Questions (Understanding Level)

1. Explain the characteristics of the Relational Model.
2. Describe the different types of integrity constraints.
3. Explain the steps involved in converting an ER diagram into a relational schema.
4. Differentiate between entity integrity and referential integrity.
5. Explain Functional Dependency with suitable examples.
6. Compare full, partial, and transitive dependencies.
7. Explain the role of Functional Dependencies in normalization.
8. Discuss the need for normalization in relational databases.
9. Differentiate between 1NF, 2NF, and 3NF.
10. Explain how normalization improves database quality.

Five-Mark Questions (Understanding Level)

1. Explain how entity integrity and referential integrity help maintain data consistency in a database.
2. Discuss the role of Functional Dependencies in the normalization process.
3. Explain the steps involved in converting an ER diagram into a relational schema with an example.
4. Differentiate between 1NF, 2NF, and 3NF using suitable examples.
5. Explain how normalization reduces redundancy and update anomalies in a database.

Three-Mark Questions (Application Level)

1. Given the relation STUDENT(StudentID, StudentName, Department), identify a suitable primary key and justify your choice.
2. Consider the relation EMPLOYEE(EmpID, EmpName, DeptID, DeptName). Identify one functional dependency present in the relation.
3. A table contains multiple phone numbers in a single field. Explain how you would modify the table to satisfy 1NF.
4. Given the relation BOOK(BookID, Title, AuthorID, AuthorName), identify a possible transitive dependency.
5. Convert the following ER entities into relational tables:
 - Student(StudentID, StudentName)
 - Course(CourseID, CourseName)

Write the corresponding relational schemas.

Five-Mark Questions (Application Level)

1. Convert an ER diagram containing Student, Course, and Enrollment entities into a relational schema and identify primary and foreign keys.
2. A university database contains Student(StudentID, StudentName, DeptID, DeptName). Analyze the integrity constraints that should be applied and justify their importance.
3. Given the relation EMPLOYEE(EmpID, EmpName, DeptID, DeptName), identify possible functional dependencies and explain their significance.
4. Analyze the relation STUDENT(StudentID, StudentName, CourseID, CourseName) and determine whether it satisfies 1NF. If not, modify it accordingly.

5. Given a relation with a composite primary key, identify partial dependencies and convert the relation into 2NF.
6. Analyze a relation containing transitive dependencies and normalize it to 3NF.
7. Design a relational schema for a library management system from the given entities Books, Members, and Borrowing.
8. A company database suffers from data redundancy and update anomalies. Apply normalization techniques to improve the database structure.
9. Given a set of functional dependencies, identify candidate keys and explain how they assist in normalization.
10. Design a normalized database schema for a hospital management system and justify the normalization steps applied.

Ten-Mark Questions (Application Level)

1. A college database contains information about Students, Courses, Departments, and Faculty. Design an ER diagram, convert it into a relational schema, identify primary and foreign keys, and explain the integrity constraints involved.
2. Given the relation EMPLOYEE(EmpID, EmpName, DeptID, DeptName, ManagerID, ManagerName), identify all functional dependencies and normalize the relation up to 3NF with proper justification.
3. Analyze a university database system and demonstrate the process of converting ER diagrams into relational schemas while maintaining entity and referential integrity constraints.
4. A library management system contains data redundancy and anomalies. Identify the problems and apply normalization techniques from 1NF to 3NF, showing each step clearly.
5. Design a complete relational database for an online shopping system. Identify entities, convert them into relational schemas, establish integrity constraints, determine functional dependencies, and normalize the database up to 3NF.

CO-03	Create database objects and perform data manipulation operations using suitable tool.
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Multiple Choice Questions (Remembering Level)

1. SQL stands for:

a) Structured Query Language
b) Simple Query Language

c) Standard Query Logic
d) System Query Language
2. Which SQL command is used to retrieve data from a table?

a) INSERT
b) UPDATE
c) SELECT
d) DELETE
3. Which category of SQL commands is used to create database objects?

a) DML
b) DDL
c) DCL
d) TCL
4. Which command is used to remove all records from a table?

a) SELECT
b) UPDATE
c) DELETE
d) COMMIT
5. Which SQL data type is used for storing whole numbers?

a) VARCHAR
b) DATE
c) INT
d) CHAR

6. Which command permanently saves a transaction?
a) ROLLBACK b) COMMIT c) GRANT d) REVOKE
7. Which TCL command cancels changes made during a transaction?
a) GRANT b) SAVEPOINT c) ROLLBACK d) SELECT
8. Which DCL command provides privileges to a user?
a) COMMIT b) REVOKE c) GRANT d) UPDATE
9. Concurrency control is mainly required to:
a) Increase redundancy b) Improve data consistency
c) Create tables d) Delete records
10. Which of the following is a concurrency issue?
a) Dirty Read b) Primary Key
c) Data Type d) Attribute

Part B: Fill in the Blanks (Remembering Level)

1. SQL stands for _____.
2. The SQL command used to insert records into a table is _____.
3. _____ is a TCL command used to make changes permanent.
4. The SQL data type used for storing character strings is _____.
5. The DCL command used to remove permissions from a user is _____.

Two-Mark Questions (Understanding Level)

1. Explain the purpose of SQL in database management.
2. Differentiate between DDL and DML commands.
3. Explain the need for transactions in a database.
4. What is concurrency control? Why is it important?
5. Differentiate between GRANT and REVOKE commands.

Five-Mark Questions (Understanding Level)

1. Explain the categories of SQL commands with suitable examples.
2. Describe commonly used SQL data types and their applications.
3. Explain update anomalies and how they affect database consistency.
4. Discuss the need for concurrency control in a multi-user database environment.
5. Explain TCL and DCL commands with examples.

Three-Mark Questions (Application Level)

1. Write an SQL command to create a table named STUDENT with attributes StudentID, Name, and Age.
2. A table EMPLOYEE contains employee records. Write an SQL query to display all records from the table.
3. Write an SQL command to insert a new student record into the STUDENT table.
4. A user accidentally updates incorrect data in a table. Which TCL command can be used to undo the changes? Explain.
5. A database administrator wants to allow a user to access a table. Which DCL command should be used? Write the syntax.

Ten-Mark Questions (Application Level)

1. Create a STUDENT table with appropriate data types and write SQL commands to:
 - Insert two records
 - Display all records
 - Update a student's age
2. A library database contains a BOOK table. Write SQL statements to:
 - Create the table
 - Insert records
 - Retrieve all book details
 - Delete a record
3. Consider a COLLEGE database. Demonstrate the use of DDL, DML, TCL, and DCL commands with suitable SQL statements.
4. Two users attempt to update the same bank account simultaneously. Explain the possible concurrency issues and suggest a suitable concurrency control technique.
5. A company database contains employee information. Write SQL commands to:
 - Create the EMPLOYEE table
 - Insert records
 - Grant SELECT permission to a user
 - Revoke the permission
 - Commit the transaction

CO-04	Query the database to retrieve the required information using suitable SQL statements.
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Multiple Choice Questions (Remembering Level)

- SQL stands for:
a) Structured Query Language b) Standard Query Language
c) Simple Query Language d) System Query Language
- Which SQL command is used to retrieve data from a table?
a) INSERT b) UPDATE c) SELECT d) DELETE
- Which SQL command is used to add new records to a table?
a) SELECT b) INSERT c) UPDATE d) ALTER
- Which category of SQL commands is used to define database objects?
a) DML b) DDL c) DCL d) TCL
- Which SQL data type is used to store integer values?
a) VARCHAR b) CHAR c) INT d) DATE

Fill in the Blanks (Remembering Level)

- SQL stands for _____.
- The command used to remove records from a table is _____.
- _____ is used to save a transaction permanently.
- The SQL data type used to store text values is _____.
- The DCL command used to withdraw permissions is _____.

Two-Mark Questions (Understanding Level)

- Explain the purpose of SQL in database management.
- What are DDL commands? Give any two examples.
- Explain the need for transactions in databases.
- What is concurrency control?
- Differentiate between COMMIT and ROLLBACK.

Three-Mark Questions (Understanding Level)

- Explain the categories of SQL commands with examples.
- Describe any three commonly used SQL data types.
- Explain update anomalies in a database.
- Discuss the need for concurrency control in a multi-user environment.
- Explain the purpose of DCL commands with suitable examples.

Five-Mark Questions (Understanding Level)

- Explain SQL and discuss its importance in database management systems.
- Describe the various categories of SQL commands with suitable examples.
- Explain different SQL data types and their uses.
- Discuss common concurrency issues that occur in database systems.

5. Explain TCL and DCL commands with syntax and examples.

Three-Mark Questions (Application Level)

1. Write an SQL statement to create a table STUDENT with attributes StudentID, Name, and Age.
2. Write an SQL query to display all records from the EMPLOYEE table.
3. Write an SQL command to insert a new record into the STUDENT table.
4. A transaction updates incorrect data. Which TCL command would you use to undo the changes? Write the syntax.
5. Write an SQL command to grant SELECT permission on a table to a user.

Ten-Mark Questions (Application Level)

1. Create a STUDENT table and write SQL commands to insert, update, and retrieve records from the table.
2. Design a BOOK table for a library database. Write SQL statements to create the table, insert records, and display all records.
3. Demonstrate the use of DDL, DML, DCL, and TCL commands using suitable SQL examples.
4. Consider a banking database where two users access the same account simultaneously. Explain the possible concurrency issues and suggest suitable control measures.
5. Create an EMPLOYEE table and write SQL commands to:
 - o Insert employee records
 - o Update employee details
 - o Grant access to a user
 - o Revoke access from the user
 - o Commit the transaction

CO-05

Design and implement a NoSQL database, and perform fundamental CRUD operations.

Multiple Choice Questions (Remembering Level)

1. Which command is used to insert data into a table?
a) INSERT b) SELECT c) DELETE d) ALTER
2. Which SQL data type is used to store numbers?
a) CHAR b) DATE c) INT d) VARCHAR
3. Which TCL command saves the transaction permanently?
a) COMMIT b) ROLLBACK c) SAVEPOINT d) REVOKE
4. Which DCL command is used to provide privileges to users?
a) REVOKE b) GRANT c) COMMIT d) INSERT
5. Which of the following is a concurrency issue?
a) Dirty Read b) Entity c) Attribute d) Schema

Fill in the Blanks (Remembering Level)

1. SQL stands for _____.
2. The SQL command used to add records is _____.
3. _____ is used to permanently save transaction changes.
4. The SQL data type used to store character strings is _____.
5. _____ is a DCL command used to remove permissions.

Three-Mark Questions (Remembering Level)

1. Define SQL and mention its purpose.
2. List the categories of SQL commands.
3. Define transaction and give an example.
4. What are TCL commands? Name any three TCL commands.
5. What are DCL commands? Name any two DCL commands.

Two-Mark Questions (Understanding Level)

1. Explain the role of SQL in database management.
2. Differentiate between DDL and DML commands.
3. Why are transactions important in databases?
4. Explain the need for concurrency control.
5. Differentiate between GRANT and REVOKE commands.

Five-Mark Questions (Understanding Level)

1. Explain the categories of SQL commands with suitable examples.
2. Describe the commonly used SQL data types and their applications.
3. Explain update anomalies and their effects on a database.
4. Discuss the need for concurrency control in a multi-user database environment.
5. Explain TCL and DCL commands with examples.

Ten-Mark Questions (Understanding Level)

1. Explain SQL in detail and discuss the different categories of SQL commands with syntax and examples.
2. Discuss the various SQL data types and explain where each type is used.
3. Explain transactions and the importance of concurrency control in database systems.
4. Discuss common concurrency issues and explain how concurrency control techniques help resolve them.
5. Explain TCL and DCL commands in detail with syntax, examples, and applications.

Three-Mark Questions (Application Level)

1. Write an SQL command to create a STUDENT table with StudentID, Name, and Age.
2. Write an SQL query to display all records from the EMPLOYEE table.
3. Write an SQL statement to insert a student record into the STUDENT table.

4. A user accidentally modifies data. Which TCL command can be used to undo the changes? Write the syntax.
5. Write an SQL statement to grant SELECT permission on the STUDENT table to a user.

Five-Mark Questions (Application Level)

1. Create a STUDENT table and write SQL commands to insert and display records.
2. Write SQL statements to create a BOOK table and insert three records into it.
3. Demonstrate the use of COMMIT and ROLLBACK commands with a simple transaction example.
4. Write SQL commands to grant and revoke permissions for a user on an EMPLOYEE table.
5. Consider a library database. Write suitable SQL commands to create a table, insert records, update a record, and retrieve all records.

DEPARTMENT OF MECHANICAL ENGINEERING
3RD SEMESTER COMPUTER SCIENCE & ENGINEERING

SUB: Computer Networks

SUB CODE: 25CS32I

WEEK	COURSE OUTCOME				
	CO1	CO2	CO3	CO4	CO5
1	0.5	0.5			
2	0.333	0.333	0.333		
3	0.333	0.333	0.333		
4	0.333	0.333	0.333		
5	0.25	0.25	0.25		0.25
6	0.25	0.25	0.25		0.25
7		0.333		0.333	0.333
8		0.333		0.333	0.333
9		0.333		0.333	0.333
10		0.333		0.333	0.333
11		0.333		0.333	0.333
12		0.333		0.333	0.333
13	0.333	0.333	0.333		
	2.332	4.33	1.832	1.998	2.498

WEIGHTAGE FOR EACH CO IN CURRICULUM

CO-1	CO-2	CO-3	CO-4	CO-5	TOTAL
17.50%	32.50%	15.00%	15.00%	20.00%	100%

% MARKS ALLOTTMENT FOR EACH CO

CO-1	CO-2	CO-3	CO-4	CO-5	TOTAL
18.00	33.00	14.00	16.00	19.00	100.00
27	50	21	24	28	150.00

**Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications**

**Programme Name: Computer Science & Engineering
Semester: 03**

Course Code and Name: Computer Networks(25CS321)

	Cognitive Level	Remembering						Understanding						Application						Analysis							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weightage
No.	Type	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	2		1							2		1					1									
	Marks	2		2							6		10					5								27	17.5
CO-2	No. of Questions	5	3	2							3	1						1	1						1		
	Marks	5	3	4							9	5						5	10						10	50	32.5
CO-3	No. of Questions	2								1			1					2									
	Marks	2								2			10					10								21	15
CO-4	No. of Questions	3	1	1							1	1							1								
	Marks	3	1	2							3	5							10							24	15
CO-5	No. of Questions	3	1	1						2	2							2									
	Marks	3	1	2						4	6							10								28	20
Marks		15	5	10	0	0	0	0	0	6	24	10	20	0	0	0	0	30	20	0	0	0	0	0	10		
Total		30						60						50						10						150	100%
%		20						40						33						7						100	

Govt. of Karnataka
Department of Technical Education
Board of Technical Examinations

Model Question Paper

Course: Computer Networks

Course Code –25CS32I

Time: 3 Hours

Max. Marks: 100

Instructions:

For Part –A Questions, only the first written answers will be considered for Evaluation.

PART- A			
I. Select the correct answers from the choices given			15
x 1 = 15			
Q No.	Question	CO	CL
1	Which transmission impairment causes loss of signal strength? a) Noise c) Distortion b) Attenuation d) Jitter	CO1	R
2	Which network covers a small geographical area such as a building or campus? a) LAN c) WAN b) MAN d) PAN	CO1	R
3	What does LAN stand for? a) Large Area Network Access Network b) Local Area Network Limited Area Network c) Long d)	CO2	R
4	Which layer of the OSI model is responsible for routing? a) Data Link Layer Transport Layer b) Network Layer Session Layer c) d)	CO2	R
5	Which protocol provides logical addressing in a	CO2	R

	network? a) TCP c) ARP b) IP d) ICMP		
6	Which device forwards packets between different networks? a) Hub c) Router b) Switch d) Repeater	CO2	R
7	Which cable is commonly used in Ethernet networks? a) Coaxial Cable c) Twisted Pair Cable b) Fiber Optic Cable Power Cable d)	CO2	R
8	Which command displays the IP configuration of a computer? a) ipconfig c) netstat b) ping d) tracert	CO3	R
9	ARP is used to map: a) Domain Name to IP Address to IP Address b) IP Address to MAC Address to Port Number c) Port Number d) MAC Address	CO3	R
10	Which protocol automatically assigns IP addresses to hosts? a) DNS c) FTP b) DHCP d) HTTP	CO4	R
11	Which protocol translates domain names into IP addresses? a) ICMP c) ARP b) DNS d) FTP	CO4	R

12	Which version of IP uses 128-bit addresses? a) IPv4 c) TCP b) IPv6 d) UDP	CO4	R
13	NAT stands for: a) Network Access Technology c) Network Allocation Table b) Network Address Translation d) Network Application Transfer	CO5	R
14	Which topology is most commonly used in home and office networks? a) Bus c) Star b) Ring d) Mesh	CO5	R
15	Which device provides wireless connectivity to users in a WLAN? a) Hub c) Access Point b) Switch d) Repeater	CO5	R

II. Fill in the blanks by choosing appropriate answer from those given in the bracket.

(IP Address, Seven, IP, Router , Star Topology)

5 x 1 = 5

Q.No	Question	CO	CL
16	The OSI model consists of _____ layers.	CO2	R
17	The protocol responsible for logical addressing in a network is _____.	CO2	R
18	A device that forwards packets between different networks is called a _____.	CO2	R
19	DNS converts domain names into _____.	CO4	R
20	The most common topology used in home office networks is _____.	CO5	R

PART- B

III. Answer ANY FIVE of the following. Each question carries two marks.

5 x 2 = 10

Q.No	Question	CO	CL
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21	Define attenuation in data communication.	CO1	R
22	State the function of a switch in a network.	CO2	R
23	State the primary purpose of the Network Layer in the OSI model.	CO2	R
24	Define DNS.	CO4	R
25	Define NAT.	CO5	R
26	Explain the purpose of the ping command in network troubleshooting.	CO3	U
27	Explain the role of DHCP in a Home Office Network.	CO5	U
28	Explain why star topology is preferred in Home Office Networks.	CO5	U

PART- C

IV. Answer ANY FIVE of the following. Each question carries three marks.

5 x 3 = 15

Q.No	Question	CO	CL
29	Explain the basic elements of a communication system with a neat diagram.	CO1	U
30	Differentiate between guided and unguided transmission media with examples.	CO1	U
31	Explain the functions of the OSI layers.	CO2	U
32	Compare OSI and TCP/IP models.	CO2	U
33	Explain the role of a router in a network.	CO2	U
34	Explain the need for IP addressing.	CO4	U
35	Explain the role of DHCP and DNS services in a Home Office Network.	CO5	U
36	Explain the advantages of star topology in Home Office Networks.	CO5	U

PART- D (Section -I)

V. Answer ANY FIVE of the following. Each question carries Five marks.

5 x 5 = 25

Q.No	Question	CO	CL
37	Explain the TCP/IP model with a neat diagram and describe the functions of each layer.	CO2	U
38	Explain subnetting and subnet masks with a suitable example.	CO4	U
39	Analyze the impact of attenuation, distortion and noise on data transmission and suggest suitable remedies.	CO1	A
40	Apply the OSI model to explain how data travels from a	CO2	A

	sender to a receiver in a network.		
41	A host cannot communicate with another host on the same LAN. Apply suitable troubleshooting techniques to identify and resolve the problem.	CO3	A
42	A user reports that a website cannot be accessed. Demonstrate how ping, tracert and nslookup commands can be used to diagnose the issue.	CO3	A
43	Design a simple Home Office Network for five users with Internet access and justify the choice of devices used.	CO5	A
44	Design an IP addressing and DHCP scheme for a small Home Office Network and explain its implementation.	CO5	A
PART- D (Section -II) VI. Answer ANY THREE of the following. Each question carries Five marks. 10 x 3 = 30			
Q.No	Question	CO	CL
45	Explain the different transmission media used in computer networks (Guided and Unguided Media) and compare their characteristics, advantages, and applications.	CO1	U
46	Design a LAN for a small office with 20 computers and Internet access. Select suitable network devices, topology, IP addressing scheme, and protocols. Justify your design choices.	CO2	A
47	Explain the network troubleshooting process and discuss the purpose of the diagnostic commands <i>ping</i> , <i>tracert</i> , <i>ipconfig</i> , <i>netstat</i> , and <i>nslookup</i> in identifying network connectivity problems.	CO3	U
48	A company has been assigned the network address 192.168.1.0/24. Divide the network into four equal subnets and list the subnet addresses.	CO4	A
49	Analyze the differences between the OSI model and TCP/IP model and identify which model is commonly used in modern networks.	CO2	An

Government of Karnataka
Department of Technical Education
Board of Technical Examination
MODEL QUESTION BANK

Programme Name: Computer Science & Engineering

Semester: 03

Course Name: Computer Networks

Course Code: 25CS32I

CO-1	Evaluate and select appropriate communication technologies based on network requirements while mitigating transmission impairments	Week: 1-6,13
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A. Multiple Choice Questions (MCQs) (Remembering Level)

- Which transmission medium provides the highest bandwidth?
 - Twisted Pair Cable
 - Coaxial Cable
 - Optical Fiber**
 - Radio Wave
- Attenuation of signal strength during transmission is called:
 - Noise
 - Attenuation**
 - Jitter
 - Delay
- Which network covers a building or campus?
 - LAN**
 - MAN
 - WAN
 - PAN
- Which layer of the OSI model is responsible for logical addressing?
 - Data Link Layer
 - Network Layer**
 - Transport Layer
 - Session Layer
- Which device forwards packets between different networks?
 - Hub
 - Switch
 - Router**
 - Repeater
- Ethernet follows which IEEE standard?
 - IEEE 802.11
 - IEEE 802.3**
 - IEEE 802.15
 - IEEE 802.16
- IEEE 802.11 is associated with:
 - Ethernet
 - Wireless LAN**
 - Bluetooth
 - Optical Fiber
- Which topology uses a central connecting device?
 - Bus

- b) Ring
 - c) Star**
 - d) Mesh
8. Which command is commonly used to test network connectivity?
- a) ipconfig
 - b) ping**
 - c) netstat
 - d) arp
9. Which transmission medium is immune to electromagnetic interference?
- a) Twisted Pair
 - b) Coaxial Cable
 - c) Optical Fiber**
 - d) Microwave

B. Fill in the Blanks (Remembering Level)

1. Optical fiber uses _____ for data transmission. **(Light)**
2. A set of communication rules is called a _____. **(Protocol)**
3. _____ is the loss of signal strength during transmission. **(Attenuation)**
4. LAN stands for _____. **(Local Area Network)**
5. The OSI model consists of _____ layers. **(Seven)**
6. The physical address of a device is called a _____ address. **(MAC)**
7. Ethernet follows IEEE standard _____. **(802.3)**
8. IEEE 802.11 defines _____ networks. **(Wireless LAN/Wi-Fi)**
9. A device used to connect different networks is called a _____. **(Router)**
10. The command used to display IP configuration is _____. **(ipconfig)**

C. 2 Marks Questions

Rememberence Level (R)

1. Define attenuation.
2. Define bandwidth.
3. Define throughput.
4. Define latency.
5. Define jitter.
6. Differentiate between guided and unguided transmission media.
7. Define LAN (Local Area Network).
8. Define WAN (Wide Area Network).
9. Define a protocol.
10. State the purpose of the OSI model.
11. Define an IP address.
12. State the function of a switch.
13. State the function of a router.
14. Define Ethernet.
15. Define ARP and state its purpose.
16. Define a modem.
17. Define a Network Interface Card (NIC).
18. Define Wireless LAN (WLAN).

19. Define network topology.
20. Differentiate between LAN and WAN.

Understanding Level (U)

1. Explain the basic components of a communication system.
2. Differentiate between analog and digital signals.
3. Explain the effects of attenuation on data transmission.
4. Explain the significance of bandwidth in network performance.
5. Explain the impact of latency on communication networks.
6. Explain the role of protocols in data communication.
7. Explain the importance of networking standards.
8. Differentiate between LAN and WAN.
9. Explain the purpose and importance of the OSI model.
10. Explain the process of encapsulation in networking.
11. Explain the purpose of a MAC address in a network.
12. Explain the role of Ethernet in local area networks.
13. Explain the features of Wireless LAN (WLAN).
14. Explain the purpose and operation of ARP.

D. 3 Marks Questions

Understanding Level (U)

1. Explain the basic elements of a communication system with a neat diagram.
2. Explain attenuation, distortion and noise.
3. Explain the role of protocols in networking.
4. Describe the functions of any three layers of the OSI model.
5. Explain the TCP/IP model.
6. Explain the features of Wireless LAN (IEEE 802.11)

Application Level (A)

1. Differentiate between guided and unguided transmission media with suitable examples and applications.
2. Differentiate between LAN, MAN and WAN for different networking requirements.
3. Compare Hub, Switch and Router and identify suitable usage scenarios.
4. Compare Star topology and Bus topology for a computer laboratory setup.

E. 5 Marks Questions

Understanding Level (U)

1. Explain the block diagram of a communication system and the function of each component.
2. Explain transmission impairments: attenuation, distortion and noise.
3. Discuss bandwidth, throughput, latency and jitter.
4. Describe the seven layers of the OSI model and their functions.
5. Explain the TCP/IP networking model with a neat diagram.
6. Explain Wireless LAN architecture and IEEE 802.11

Application Level (A)

1. Compare Twisted Pair Cable, Coaxial Cable and Optical Fiber and recommend suitable applications for each.
2. Explain the categories of networks (LAN, MAN and WAN) with examples and suitable use cases.
3. Discuss the functions of Hub, Switch, Router, Repeater and Modem in a network design.
4. Explain different network topologies with their advantages and disadvantages and identify suitable deployment scenarios.
5. Design a suitable network for a given organization by selecting appropriate topology, transmission media and networking devices.

F. 10 Marks Questions

Application Level (A)

1. A college wants to establish a campus network. Select suitable transmission media, network devices and topology. Justify your choices.
2. Compare Twisted Pair Cable, Coaxial Cable and Optical Fiber for a high-speed campus network. Recommend the most suitable medium with justification.
3. A network suffers from attenuation, noise and latency problems. Analyze the causes and suggest suitable remedies.
4. Design a communication system showing sender, receiver, transmission medium and noise. Explain the role of each component.
5. Analyze the functioning of all seven OSI layers when a user accesses a webpage from a browser.
6. Design a star topology network for a computer laboratory with 30 systems. Identify the required devices and explain the advantages.
7. A small office currently uses a Hub and experiences excessive network traffic. Recommend suitable networking devices and justify your recommendation.
8. Design a Wireless LAN for a department with multiple classrooms and laboratories. Select appropriate devices and standards and justify your choices.
9. A network administrator must troubleshoot connectivity problems between two computers. Explain the troubleshooting process using ipconfig, ping, tracert and netstat.
10. Design a hierarchical network (Core, Distribution and Access Layers) for an educational institution and explain its benefits.

CO-2 (More Weightage)	Design a network for a given specification by using the right network components, devices, topologies, protocols and software.	Week: 1-13
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A. Multiple Choice Questions (MCQs) (Remembering Level)

- Which layer of the OSI model is responsible for end-to-end communication?
 - Network Layer
 - Transport Layer**
 - Data Link Layer
 - Physical Layer
- Which protocol is used to transfer web pages?
 - HTTP**
 - FTP
 - SMTP
 - DHCP
- Which device operates at the Network Layer?
 - Hub
 - Switch
 - Router**
 - Repeater
- Which protocol automatically assigns IP addresses?
 - DNS
 - DHCP**
 - FTP
 - HTTP
- Which topology provides a dedicated link between every pair of nodes?
 - Bus
 - Ring
 - Mesh**
 - Star
- Which protocol translates domain names into IP addresses?
 - FTP
 - SMTP
 - DNS**
 - DHCP
- Which transport layer protocol provides reliable communication?
 - TCP**
 - UDP
 - IP
 - ARP
- Which addressing scheme uses subnet masks?
 - MAC Addressing
 - IPv4 Addressing**
 - Port Addressing
 - Physical Addressing
- VLAN stands for:
 - Virtual Local Access Network
 - Virtual Local Area Network**

- c) Visual Local Area Network
 - d) Virtual Logical Area Network
10. Which protocol is used for file transfer?
- a) HTTP
 - b) **FTP**
 - c) SMTP
 - d) DNS
11. Which model consists of four layers?
- a) OSI Model
 - b) **TCP/IP Model**
 - c) IEEE Model
 - d) Ethernet Model
12. Which protocol is responsible for logical addressing?
- a) TCP
 - b) **IP**
 - c) ARP
 - d) ICMP
13. Which routing method requires manual configuration of routes?
- a) **Static Routing**
 - b) Dynamic Routing
 - c) Adaptive Routing
 - d) Flooding
14. Which protocol is used to test network connectivity?
- a) FTP
 - b) HTTP
 - c) **ICMP**
 - d) SMTP
15. Which protocol maps an IP address to a MAC address?
- a) DNS
 - b) **ARP**
 - c) DHCP
 - d) TCP
16. Which technology allows multiple private IP addresses to share a single public IP address?
- a) VLAN
 - b) **NAT**
 - c) DNS
 - d) ICMP
17. Which version of IP uses 128-bit addresses?
- a) IPv4
 - b) **IPv6**
 - c) TCP
 - d) UDP
18. Which network device forwards frames based on MAC addresses?
- a) Router
 - b) **Switch**

- c) Hub
 - d) Modem
19. Which IEEE standard is used for Wireless LAN?
- a) IEEE 802.3
 - b) IEEE 802.11**
 - c) IEEE 802.15
 - d) IEEE 802.16
20. Which layer of the TCP/IP model corresponds to the OSI Transport Layer?
- a) Internet Layer
 - b) Transport Layer**
 - c) Network Access Layer
 - d) Application Layer
21. Which protocol is connectionless?
- a) TCP
 - b) UDP**
 - c) HTTP
 - d) FTP
22. Which subnet mask is commonly associated with a Class C network?
- a) 255.0.0.0
 - b) 255.255.0.0
 - c) 255.255.255.0**
 - d) 255.255.255.255
23. Which switching technique stores the entire frame before forwarding it?
- a) Cut-through Switching
 - b) Store-and-Forward Switching**
 - c) Fragment-Free Switching
 - d) Circuit Switching
24. Which device is used to connect a LAN to the Internet?
- a) Hub
 - b) Switch
 - c) Router**
 - d) NIC
25. Which protocol is used to automatically obtain IP configuration information from a server?
- a) DNS
 - b) DHCP**
 - c) ARP
 - d) FTP

B. Fill in the Blanks (Remembering Level)

1. The OSI model consists of _____ layers. **(Seven)**
2. The TCP/IP model consists of _____ layers. **(Four)**
3. _____ protocol is used to transfer web pages. **(HTTP)**
4. _____ protocol automatically assigns IP addresses. **(DHCP)**
5. A device that forwards packets between networks is called a _____. **(Router)**
6. DNS converts domain names into _____. **(IP Addresses)**

7. TCP provides _____ communication. (**Reliable**)
8. A VLAN is a _____ Local Area Network. (**Virtual**)
9. The default subnet mask of Class C is _____. (**255.255.255.0**)
10. FTP stands for _____. (**File Transfer Protocol**)
11. The OSI model consists of _____ layers. (**Seven**)
12. The TCP/IP model consists of _____ layers. (**Four**)
13. _____ protocol is used to transfer web pages. (**HTTP**)
14. _____ protocol automatically assigns IP addresses. (**DHCP**)
15. A device that forwards packets between networks is called a _____. (**Router**)
16. DNS converts domain names into _____. (**IP Addresses**)
17. TCP provides _____ communication. (**Reliable**)
18. A VLAN is a _____ Local Area Network. (**Virtual**)
19. The default subnet mask of Class C is _____. (**255.255.255.0**)
20. FTP stands for _____. (**File Transfer Protocol**)
21. _____ is responsible for logical addressing in a network. (**IP**)
22. _____ protocol maps IP addresses to MAC addresses. (**ARP**)
23. _____ allows multiple private IP addresses to share a single public IP address.
(**NAT**)
24. IPv6 uses _____ bit addresses. (**128**)
25. _____ routing requires manual configuration of routes. (**Static**)
26. A router uses a _____ table to determine the best path for packet forwarding.
(**Routing**)
27. The process of dividing a network into smaller networks is called _____.
(**Subnetting**)
28. _____ is a connection-oriented transport layer protocol. (**TCP**)
29. _____ is a connectionless transport layer protocol. (**UDP**)
30. Ethernet is defined by the IEEE _____ standard. (**802.3**)

C. 2 Marks Questions

Remembering Level (R)

1. Define a protocol.
2. State the purpose of the OSI model.
3. Define the TCP/IP model.
4. Define an IP address.
5. Define subnetting.
6. Define NAT.
7. Define IPv6.
8. Define a VLAN.
9. Define routing.
10. Define switching.
11. Define TCP.
12. Define UDP.
13. Define DNS.
14. Define DHCP.
15. Define a network topology.
16. Define Ethernet.

17. Define Wireless LAN (WLAN).
18. Define a router.
19. Define a switch.
20. Define a MAC address.
21. Define ARP.
22. State the purpose of ARP.
23. Define IPv4.
24. State the purpose of a subnet mask.
25. Define a routing table.
26. State the purpose of network standards.
27. Define a collision domain.
28. Define a broadcast domain.
29. Define encapsulation.

Understanding Level (U)

1. Explain the purpose of the OSI model.
2. Describe the TCP/IP model and its layers.
3. Explain the process of encapsulation.
4. Compare TCP and UDP.
5. Explain the purpose of IP addressing.
6. Explain the need for subnetting.
7. Describe the role of a router in a network.
8. Describe the function of a switch in a network.
9. Explain the purpose and advantages of VLANs.
10. Explain the role of DNS in network communication.
11. Explain the function of DHCP in IP address allocation.
12. Describe the purpose of HTTP.
13. Describe the purpose of FTP.
14. Explain static routing.
15. Compare static routing and dynamic routing.
16. Compare the OSI model and TCP/IP model.
17. Explain the role of protocols and standards in networking.
18. Describe the functions of the OSI layers.
19. Explain the concept of logical and physical addressing.
20. Compare IPv4 and IPv6.
21. Explain the purpose and operation of NAT.
22. Describe the operation of ARP in a network.
23. Compare a hub, switch, and router.
24. Explain the features of Ethernet technology.
25. Describe the features of WLAN technology.
26. Compare Star, Bus, and Ring topologies.
27. Explain the concept of packet switching.
28. Describe the process of packet forwarding by a router.
29. Explain the importance of network design in an organization.
30. Describe the basic steps involved in network troubleshooting.

D. 3 Marks Questions

Understanding Level (U)

1. Explain the functions of the OSI layers.
2. Compare OSI and TCP/IP models.
3. Differentiate between TCP and UDP.
4. Explain the role of a router in a network.
5. Explain the need for IP addressing.
6. Explain the concept of subnetting.
7. Explain the purpose of VLANs.
8. Describe the working of DNS and DHCP.
9. Explain the purpose of port numbers in TCP/IP communication.
10. Describe the functions of the Transport Layer.

Application Level (A)

1. Differentiate between static and dynamic routing and identify suitable applications for each.
2. Compare Hub, Switch and Router for a given network scenario.
3. Given a network requirement, select an appropriate routing method and justify your choice.
4. Determine the suitable IP addressing scheme for a small office network.
5. Analyze a network requirement and suggest whether TCP or UDP should be used.
6. Recommend suitable VLAN configurations for different departments in an organization.
7. Apply DNS and DHCP services to enable communication in a LAN.
8. Identify the appropriate network device (Hub, Switch or Router) for connecting multiple networks.

E. 5 Marks Questions

Understanding Level (U)

1. Explain the OSI model with a neat diagram.
2. Explain the TCP/IP model and its layers.
3. Compare OSI and TCP/IP models.
4. Explain IPv4 addressing and address classes.
5. Discuss static routing and dynamic routing.
6. Explain VLANs and their advantages.
7. Explain DNS and DHCP services in a network.
8. Compare TCP and UDP with suitable examples.
9. Explain HTTP and FTP protocols.
10. Explain the process of packet forwarding in a router.
11. Explain the need and benefits of IPv6.
12. Describe the concept of classless addressing (CIDR).
13. Explain the role of protocols and standards in network communication.
14. Describe the functions of the OSI layers and their significance in data communication.
15. Compare IPv4 and IPv6 addressing schemes.
16. Explain the purpose and operation of NAT.
17. Describe the operation of ARP in a network.

18. Compare Ethernet and WLAN technologies.
19. Compare Star, Bus, and Ring network topologies.
20. Explain the concept of packet switching.
21. Describe the process of packet forwarding in a router.
22. Explain the importance of network design in an organization.

Application Level (A)

1. Explain subnetting with a suitable example.
2. Explain the functions of common network devices used in LANs and WANs and recommend their usage in a given scenario.
3. Design an IP addressing scheme for an organization with multiple departments.
4. Analyze a network requirement and select suitable routing techniques.
5. Configure a logical network using VLANs and explain the advantages obtained.
6. Demonstrate how DNS and DHCP work together when a client accesses a website.
7. Analyze a packet's journey through the TCP/IP layers when accessing a web server.
8. Recommend suitable protocols (HTTP, FTP, DNS, DHCP, TCP, UDP) for different networking applications.
9. Design a simple LAN and explain the role of routers, switches and addressing schemes.
10. Apply CIDR to efficiently allocate IP addresses for a growing organization.
11. Select an appropriate network topology for a small office and justify your choice.
12. Determine the suitable subnet mask and IP address range for a given network requirement.
13. Apply subnetting to divide a network into multiple departments.
14. Recommend suitable Ethernet or WLAN technologies for a given network scenario.
15. Apply NAT to enable Internet access for hosts using private IP addresses.
16. Select appropriate network devices (Switch, Router, Access Point) for a given network design.
17. Determine the appropriate transport layer protocol (TCP/UDP) for a given application and justify your choice.
18. Apply VLAN implementation to improve security and traffic management in an organization.
19. Design a basic IP addressing scheme for a small enterprise network.
20. Identify network communication issues and **suggest** suitable troubleshooting actions.

F. 10 Marks Questions

Application Level (A)

1. Design a network for a college department consisting of 4 laboratories and 2 offices. Select suitable topology, devices, and protocols with justification.
2. A company is allocated the network 192.168.10.0/24 and requires four departments. Design an appropriate subnetting scheme and assign IP ranges.
3. Design a LAN using switches and routers for 50 computers and explain the addressing scheme used.
4. A network administrator must connect two different networks and provide Internet access. Design the network and explain the role of each device.

5. Design a network using VLANs for Administration, Accounts, and CSE departments and explain how VLANs improve performance and security.
6. Design and configure a network using static routing between two LANs and explain the routing process.
7. Design a network that uses DNS, DHCP, and HTTP services. Explain how each service contributes to network operation.
8. A university requires a scalable network for multiple buildings. Design a hierarchical network using appropriate devices, addressing schemes, and protocols, and justify your design choices.
9. Design a WLAN for an organization with multiple floors and justify the choice of wireless technologies and network devices.
10. Design a secure enterprise network using routers, switches, VLANs, NAT, DNS, and DHCP services and justify your design choices.
11. Apply subnetting to divide a network into multiple departments and allocate suitable IP address ranges.
12. Apply NAT to enable Internet access for hosts using private IP addresses and explain its operation.
13. Select and apply suitable routing techniques to connect branch offices of an organization.
14. Design an IP addressing scheme for a small enterprise network with multiple departments and future expansion requirements.
15. Apply DNS and DHCP services to establish communication in a LAN and explain their configuration requirements.

G. 10 Marks Questions

Analysis Level(An)

1. Analyze the OSI model and TCP/IP model with respect to their layers, functions, and practical applications in modern networks.
2. Compare the OSI model and TCP/IP model and justify which model is more suitable for real-world network implementation.
3. Analyze the operation of switching and routing in a network and evaluate their role in efficient packet delivery.
4. Examine the need for subnetting in an organization and justify how subnetting improves network performance and network management.
5. Compare IPv4 and IPv6 addressing schemes and evaluate the benefits of migrating to IPv6.
6. Analyze the implementation of VLANs in a campus network and evaluate their impact on network security and traffic management.
7. Interpret the role of TCP and UDP in data communication and justify the selection of each protocol for different network applications.
8. Analyze a network design involving Ethernet, WLAN, routing, and switching components and justify the choice of technologies used.
9. Examine the interaction of DNS, DHCP, HTTP, and FTP protocols in network communication and interpret their contribution to service delivery.
10. Evaluate the network requirements of a growing organization and justify the selection of appropriate IP addressing, routing, and VLAN strategies.

11. Analyze a network scenario and identify the role of protocols and standards in ensuring successful communication between devices.
12. Analyze the impact of selecting different network topologies (Star, Bus, and Ring) for a college network and justify the most suitable topology.

CO-3	Identify, diagnose, and resolve common network connectivity and performance issues using troubleshooting tools and methodologies.	Week: 2-6,13
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A. Multiple Choice Questions (MCQs) (Remembering Level)

- 1 Which command is used to trace the route taken by packets?
 - a) ping
 - b) tracert**
 - c) netstat
 - d) nslookup
31. Which command is used to view active network connections?
 - a) ping
 - b) ipconfig
 - c) netstat**
 - d) tracert
32. Which command is used to resolve domain names?
 - a) ping
 - b) tracert
 - c) nslookup**
 - d) netstat
33. Excessive signal loss during transmission is called:
 - a) Noise
 - b) Attenuation**
 - c) Jitter
 - d) Collision
34. Which device reduces collision domains in a LAN?
 - a) Hub
 - b) Switch**
 - c) Repeater
 - d) Modem
35. Which performance metric measures the delay in packet delivery?
 - a) Throughput
 - b) Latency**
 - c) Bandwidth
 - d) Bit Rate
36. ARP is used to map:
 - a) Domain Name to IP Address
 - b) IP Address to MAC Address**
 - c) MAC Address to Port Number
 - d) Port Number to IP Address
37. Which troubleshooting approach starts from the Physical Layer and moves upward?
 - a) Bottom-Up**
 - b) Top-Down
 - c) Divide-and-Conquer
 - d) Comparison
38. Which command is used to display the MAC address table on a device?
 - a) ping
 - b) arp**

- c) tracert
 - d) netstat
39. Which metric indicates the amount of data successfully transmitted per unit time?
- a) Latency
 - b) Throughput**
 - c) Jitter
 - d) Delay
40. Which troubleshooting method starts from the Application Layer and moves downward?
- a) Bottom-Up
 - b) Top-Down**
 - c) Divide-and-Conquer
 - d) Trial-and-Error
41. Which protocol is mainly used by the ping command?
- a) TCP
 - b) UDP
 - c) ICMP**
 - d) ARP
42. Which network device creates a separate collision domain for each port?
- a) Hub
 - b) Switch**
 - c) Repeater
 - d) Bridge
43. Packet loss in a network can result in:
- a) Increased bandwidth
 - b) Reduced network performance**
 - c) Better throughput
 - d) Faster routing
44. Which command helps verify DNS name resolution?
- a) ping
 - b) tracert
 - c) nslookup**
 - d) netstat
45. High variation in packet delay is known as:
- a) Throughput
 - b) Latency
 - c) Jitter**
 - d) Attenuation
46. Which device forwards frames based on MAC addresses?
- a) Router
 - b) Switch**
 - c) Repeater
 - d) Modem
47. Which troubleshooting methodology begins by testing a middle layer and then moves up or down?
- a) Top-Down

- b) Bottom-Up
- c) Divide-and-Conquer**
- d) Comparison

48. Which command is used to test connectivity between two hosts?

- a) netstat
- b) ping**
- c) ipconfig
- d) arp

49. Which command displays the IP configuration of a computer?

- a) ipconfig**
- b) ping
- c) tracert
- d) netstat

B. Fill in the Blanks (Remembering Level)

1. The command used to test connectivity is _____. (**ping**)
2. _____ displays the IP configuration of a host. (**ipconfig**)
3. The command used to trace packet paths is _____. (**tracert**)
4. _____ displays active network connections. (**netstat**)
5. DNS troubleshooting is commonly performed using _____. (**nslookup**)
6. _____ is the delay experienced by packets in a network. (**Latency**)
7. Loss of signal strength is called _____. (**Attenuation**)
8. ARP maps an IP address to a _____ address. (**MAC**)
9. A switch creates separate _____ domains. (**Collision**)
10. The troubleshooting method that starts from the Physical Layer is _____. (**Bottom-Up**)
11. _____ is the amount of data transmitted successfully per unit time. (**Throughput**)
12. Variation in packet delay is called _____. (**Jitter**)
13. The _____ command displays the ARP cache entries. (**arp**)
14. Packet loss negatively affects network _____. (**Performance**)
15. The protocol used by ping is _____. (**ICMP**)
16. A Hub creates a single _____ domain. (**Collision**)
17. The troubleshooting method that starts from higher layers is _____. (**Top-Down**)
18. DNS stands for _____. (**Domain Name System**)
19. The process of locating and correcting network faults is called network _____. (**Troubleshooting**)
20. A switch forwards frames using _____ addresses. (**MAC**)

C. 2 Marks Questions

Remembering (R)

1. Define bandwidth.
2. Define throughput.
3. Define latency.
4. Define jitter.
5. Define a collision domain.

6. Define a broadcast domain.
7. Define ARP.
8. State the purpose of ARP.
9. State the purpose of the ping command.
- 10.State the purpose of the tracert command.
- 11.Define network troubleshooting.

Understanding (U)

1. Explain the need for network troubleshooting.
2. Explain the significance of latency in network performance.
3. Explain the significance of throughput in network performance.
4. Explain the effects of attenuation on data transmission.
5. Describe the concept of a collision domain.
6. Describe the concept of a broadcast domain.
7. Explain the operation of ARP.
8. Explain how the ping command is used in troubleshooting.
9. Explain the purpose and use of the ipconfig command.
- 10.Explain how the tracert command helps in network diagnostics.
- 11.Describe the purpose of the netstat command.
- 12.Describe the purpose of the nslookup command.
- 13.Explain the concept of a troubleshooting methodology.
- 14.Describe the Bottom-Up troubleshooting approach.
- 15.Compare Bottom-Up and Top-Down troubleshooting approaches.

D. 3 Marks Questions

Understanding (U)

1. Explain the need for network troubleshooting.
2. Differentiate between bandwidth and throughput.
3. Explain attenuation, distortion and noise.
4. Differentiate between collision domain and broadcast domain.
5. Explain the working of ARP.
6. Describe the purpose of ping and tracert commands.
7. Explain the use of ipconfig and netstat commands.
8. Compare Bottom-Up and Top-Down troubleshooting methods.
9. Explain common causes of wireless network issues.
- 10.Describe the role of nslookup in troubleshooting DNS problems.
- 11.Explain the importance of network performance metrics.
- 12.Describe the Divide-and-Conquer troubleshooting methodology.
- 13.Explain the concept of packet loss.
- 14.Explain the impact of latency on network performance.

Application (A)

1. Identify the appropriate troubleshooting command to verify connectivity between two hosts.

2. Analyze a scenario where a user cannot access a website and suggest suitable troubleshooting tools.
3. Determine whether a network issue is related to DNS or connectivity using appropriate commands.
4. Compare different troubleshooting methodologies and recommend one for a given scenario.
5. Analyze a LAN with excessive collisions and suggest corrective measures.
6. Identify possible causes of poor wireless signal strength in an office environment.
7. Apply ARP concepts to troubleshoot communication between two devices on the same network.
8. Recommend suitable diagnostic commands for analyzing slow network performance..

E. 5 Marks Questions

Understanding(U)

1. Explain the network troubleshooting process.
2. Discuss bandwidth, throughput, latency and jitter with suitable examples.
3. Explain attenuation, distortion and noise and their impact on network performance.
4. Discuss various troubleshooting methodologies such as Bottom-Up, Top-Down and Divide-and-Conquer.
5. Explain the purpose and usage of ping, ipconfig, tracert, netstat and nslookup commands.
6. Explain collision domain and broadcast domain with suitable diagrams.
7. Discuss common wireless network issues and their solutions.
8. Explain the operation of ARP and its role in troubleshooting.
9. Describe the steps involved in diagnosing connectivity problems in a LAN.
10. Explain how network performance metrics are used to identify network problems.
11. Explain packet loss, latency and jitter and their effect on network applications.
12. Discuss the advantages and limitations of different troubleshooting methodologies.

Application (A)

1. Analyze a connectivity issue using ping, tracert and ipconfig commands and explain how the fault can be identified.
2. Apply ARP troubleshooting techniques to resolve communication problems between hosts in the same LAN.
3. Evaluate network performance using bandwidth, throughput, latency and jitter measurements.
4. Analyze a wireless LAN experiencing frequent disconnections and propose suitable solutions.
5. Demonstrate how nslookup can be used to diagnose DNS-related problems.
6. Recommend suitable troubleshooting methodologies for different network fault scenarios.
7. Analyze a network with excessive collisions and suggest design improvements.
8. Apply troubleshooting commands to identify whether a problem exists at the host, network or DNS level.

F. 10 Marks Questions

Application(A)

1. A user cannot access a website although the network cable is connected. Demonstrate a systematic troubleshooting procedure using ipconfig, ping, tracert and nslookup.
2. A network experiences high latency and poor throughput. Analyze the problem and recommend corrective actions.
3. A computer cannot communicate with another computer on the same LAN. Apply suitable troubleshooting techniques to identify and resolve the issue.
4. A wireless network frequently disconnects users. Analyze the possible causes and propose appropriate solutions.
5. A network administrator receives complaints about slow network performance. Evaluate the network using bandwidth, throughput, latency and jitter measurements and suggest improvements.
6. A host can access local resources but cannot access internet resources. Use troubleshooting commands and methodologies to identify the root cause.
7. Analyze a scenario where an incorrect IP address or subnet mask causes communication failure. Explain how the issue can be detected and resolved.
8. A DNS server failure prevents users from accessing websites using domain names. Explain how nslookup and other troubleshooting tools can be used to diagnose the problem.
9. A switch-based network experiences communication issues due to incorrect configurations. Apply troubleshooting methodologies to isolate and resolve the fault.
10. Develop a complete troubleshooting plan for a campus network experiencing connectivity and performance problems.
11. A company reports intermittent network failures during peak hours. Analyze the issue using network performance metrics and recommend solutions.
12. Design a troubleshooting strategy for an enterprise network where users can access local resources but experience slow internet connectivity.
13. A newly installed wireless LAN has poor coverage and low throughput. Diagnose the problem and propose improvements.
14. Analyze a network where packet loss is affecting VoIP and video conferencing services. Recommend suitable corrective measures.
15. A network administrator suspects DNS misconfiguration as the cause of communication failure. Demonstrate a systematic approach to verify and resolve the issue.

CO-4	Configure and manage IP addressing, routing, subnetting, and network services (TCP, UDP,DNS) in a WAN environment using simulation tools.	Week: 7-12
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A. Multiple Choice Questions (MCQs) (Remembering Level)

- Which protocol is responsible for logical addressing?
 - TCP
 - IP**
 - ARP
 - ICMP
- Which routing protocol requires manual route configuration?
 - Static Routing**
 - Dynamic Routing
 - OSPF
 - RIP
- Which protocol translates domain names into IP addresses?
 - DHCP
 - DNS**
 - FTP
 - SMTP
- Which protocol is used to test network connectivity?
 - ARP
 - ICMP**
 - FTP
 - HTTP
- Which protocol provides reliable communication?
 - TCP**
 - UDP
 - IP
 - ARP
- Which protocol is connectionless?
 - TCP
 - UDP**
 - HTTP
 - FTP
- Which device makes forwarding decisions using a routing table?
 - Switch
 - Router**
 - Hub
 - Repeater
- Which technique conserves public IPv4 addresses?
 - VLAN
 - NAT**
 - ARP
 - ICMP
- Which protocol automatically assigns IP addresses to hosts?
 - DNS
 - DHCP**

- c) FTP
 - d) HTTP
10. Which version of IP uses 128-bit addresses?
- a) IPv4
 - b) IPv6**
 - c) TCP
 - d) UDP
11. Which protocol resolves an IP address to a MAC address?
- a) ICMP
 - b) ARP**
 - c) DHCP
 - d) DNS
12. Which IPv4 class provides the largest number of hosts?
- a) Class A**
 - b) Class B
 - c) Class C
 - d) Class D
13. Which routing protocol is dynamic?
- a) Static Routing
 - b) OSPF**
 - c) Manual Routing
 - d) Default Routing
14. Which protocol is used for sending emails?
- a) FTP
 - b) HTTP
 - c) SMTP**
 - d) DHCP
15. Which protocol is commonly used for file transfer?
- a) DNS
 - b) FTP**
 - c) SMTP
 - d) ICMP
16. Which IPv6 address type replaces broadcast communication?
- a) Unicast
 - b) Multicast**
 - c) Anycast
 - d) Loopback
17. Which layer is responsible for routing packets?
- a) Transport Layer
 - b) Network Layer**
 - c) Data Link Layer
 - d) Session Layer
18. Which protocol is used to obtain IP configuration automatically?
- a) DHCP**
 - b) DNS
 - c) HTTP
 - d) FTP

19. Which address uniquely identifies a device in a network?

- a) Port Address
- b) IP Address**
- c) Protocol Address
- d) Service Address

20. Which protocol is used by the ping command?

- a) TCP
- b) UDP
- c) ICMP**
- d) ARP

B. Fill in the Blanks (Remembering Level)

1. _____ provides logical addressing in a network. **(IP)**
2. _____ routing requires manual configuration of routes. **(Static)**
3. DNS converts domain names into _____. **(IP Addresses)**
4. _____ protocol is used by the ping command. **(ICMP)**
5. TCP is a _____ oriented protocol. **(Connection)**
6. UDP is a _____ protocol. **(Connectionless)**
7. NAT stands for _____. **(Network Address Translation)**
8. IPv6 uses _____ bit addresses. **(128)**
9. DHCP is used for automatic _____ assignment. **(IP Address)**
10. A router uses a _____ table to forward packets. **(Routing)**
11. ARP stands for _____. **(Address Resolution Protocol)**
12. CIDR stands for _____. **(Classless Inter-Domain Routing)**
13. The default subnet mask of Class C is _____. **(255.255.255.0)**
14. IPv4 addresses contain _____ bits. **(32)**
15. The protocol used to transfer files is _____. **(FTP)**
16. SMTP is used for sending _____. **(Emails/Mails)**
17. DNS server resolves _____ names into IP addresses. **(Domain)**
18. VLAN stands for _____ Local Area Network. **(Virtual)**
19. TCP uses _____ numbers to identify applications. **(Port)**
20. IPv6 was developed to overcome IPv4 _____. **(Address Exhaustion)**

C. 2 Marks Questions

Remembering (R)

1. Define IP addressing.
2. Define subnetting.
3. Define NAT.
4. Define IPv6.
5. Define routing.
6. Define DNS.
7. Define ICMP.
8. Define TCP.
9. Define UDP.
10. Define DHCP.
11. Define VLAN.

12. Define a port number.
13. Define ARP.
14. State the purpose of NAT.
15. State one difference between IPv4 and IPv6.

Understanding Level(U)

1. Compare circuit switching and packet switching.
2. Explain the concept of subnetting with a suitable example.
3. Explain the purpose and operation of NAT.
4. Compare static routing and dynamic routing.
5. Explain the role of DNS in network communication.
6. Describe the functions of ARP and ICMP.
7. Compare IPv4 and IPv6.
8. Explain the purpose and advantages of VLANs.
9. Compare TCP and UDP.
10. Explain the concept of port addressing.
11. Explain the purpose of flow control in data communication.
12. Describe the operation of DHCP in IP address allocation.
13. Explain the client-server communication model.
14. Explain the purpose of HTTP in web communication.
15. Compare POP and IMAP protocols.

D. 3 Marks Questions

Understanding(U)

1. Explain the need for IP addressing.
2. Differentiate between classful and classless addressing.
3. Explain the purpose of NAT.
4. Explain the working of DNS.
5. Explain the role of ICMP in a network.
6. Compare IPv4 and IPv6.
7. Differentiate between TCP and UDP.
8. Explain the purpose of DHCP and VLANs.
9. Explain the purpose of ARP.
10. Explain the role of subnet masks in networking.

Application (A)

1. Explain subnetting with an example.
2. Compare static and dynamic routing.
3. Determine an appropriate IP addressing scheme for a small office network.
4. Analyze a scenario where NAT is required and justify its use.
5. Recommend TCP or UDP for different applications and justify your choice.
6. Apply DNS and DHCP concepts in a LAN environment.
7. Design VLANs for different departments in an organization.
8. Identify suitable routing techniques for connecting multiple networks.

E. 5 Marks Questions

Understanding (U)

1. Explain IPv4 addressing and address classes.
2. Explain classless addressing and CIDR.
3. Discuss NAT and its advantages.
4. Explain static routing and dynamic routing.
5. Describe the functions of DNS, ARP and ICMP.
6. Compare IPv4 and IPv6.
7. Explain TCP services and features.
8. Explain UDP services and applications.
9. Discuss flow control, error control and congestion control.
10. Explain DHCP and its operation.
11. Explain VLANs and their advantages.
12. Explain the working of HTTP, FTP and SMTP protocols.

F. 10 Marks Questions

Application (A)

1. A company is assigned the network address 192.168.10.0/24 and has four departments. Design a subnetting scheme, allocate IP ranges and justify your design.
2. Design and configure a network using static routing between two LANs. Explain the routing process and packet forwarding.
3. A college network requires internet access for multiple departments using private IP addresses. Design a solution using NAT and explain its operation.
4. Analyze the packet delivery process when a user accesses a website using a domain name. Explain the roles of DNS, routing and IP addressing.
5. A company plans to migrate from IPv4 to IPv6. Compare the two protocols and recommend a migration strategy.
6. Design a network using VLANs for Administration, Accounts and CSE departments. Explain how VLANs improve security and network performance.
7. Configure a WAN network connecting two branch offices. Select suitable IP addressing and routing techniques and justify your choices.
8. Design a network using DNS, DHCP and HTTP services. Explain how these services interact to provide seamless network communication.
9. Analyze the behavior of TCP and UDP when transmitting data between two hosts. Recommend suitable applications for each protocol.
10. A university is allocated the network 172.16.0.0/16 and requires multiple subnets for departments and laboratories. Design an efficient addressing and routing scheme using CIDR/VLSM and justify your decisions.
11. Design a network for an organization with multiple branches using dynamic routing and explain the advantages over static routing.
12. A company wants to implement IPv6 while maintaining IPv4 connectivity. Propose a suitable transition mechanism and justify your choice.
13. Design a WAN using routers, DNS, DHCP and NAT services and explain the complete communication process.
14. Develop an addressing plan using VLSM for departments with different host requirements.
15. Design and justify a secure VLAN-based network for a college campus.

CO-5	Design and implement simple Home Office network for given specification.	Week: 5-12
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A. Multiple Choice Questions (MCQs) (Remembering Level)

- Which device is commonly used to provide internet access in a home network?
 - Hub
 - Switch
 - c) Router**
 - Repeater
- Which topology is most commonly used in home and office networks?
 - Bus
 - Ring
 - c) Star**
 - Mesh
- Which service automatically assigns IP addresses to devices?
 - DNS
 - b) DHCP**
 - FTP
 - HTTP
- Which protocol is used to access web pages?
 - a) HTTP**
 - FTP
 - SMTP
 - DHCP
- Which protocol translates domain names into IP addresses?
 - FTP
 - HTTP
 - c) DNS**
 - TCP
- Which device forwards packets between different networks?
 - Hub
 - Switch
 - c) Router**
 - Access Point
- Which technology allows multiple private IP addresses to share a public IP address?
 - VLAN
 - b) NAT**
 - DNS
 - ICMP
- IEEE 802.11 standard is used for:
 - Ethernet
 - b) Wireless LAN**
 - Routing
 - VLAN
- Which protocol is used for file transfer?
 - HTTP
 - b) FTP**
 - DNS

- d) DHCP
- 10. Which network device provides wireless connectivity to users?
 - a) Router
 - b) Switch
 - c) Access Point**
 - d) Repeater
- 11. Which device connects multiple computers in a LAN?
 - a) Router
 - b) Switch**
 - c) Modem
 - d) Access Point
- 12. Which protocol is commonly used for sending e-mails?
 - a) FTP
 - b) SMTP**
 - c) HTTP
 - d) DHCP
- 13. Which protocol is reliable and connection-oriented?
 - a) TCP**
 - b) UDP
 - c) IP
 - d) ARP
- 14. Which protocol is connectionless?
 - a) TCP
 - b) UDP**
 - c) FTP
 - d) HTTP
- 15. Which network device converts digital signals into analog signals?
 - a) Router
 - b) Switch
 - c) Modem**
 - d) Hub
- 16. VLAN stands for:
 - a) Virtual Link Area Network
 - b) Virtual Local Area Network**
 - c) Virtual LAN Access Network
 - d) Visual Local Area Network
- 17. Which service resolves host names into IP addresses?
 - a) DHCP
 - b) DNS**
 - c) HTTP
 - d) FTP
- 18. Which topology provides easy fault isolation?
 - a) Bus
 - b) Ring
 - c) Star**
 - d) Mesh

19. Which IP addressing technique divides a network into smaller networks?

- a) Routing
- b) Subnetting**
- c) Switching
- d) Bridging

20. Which device operates at the Network Layer?

- a) Hub
- b) Switch
- c) Router**
- d) Repeater

B. Fill in the Blanks (Remembering Level)

1. A _____ is used to connect a home network to the Internet. **(Router)**
2. The most common topology used in home networks is _____. **(Star)**
3. DHCP automatically assigns _____ addresses. **(IP)**
4. DNS converts domain names into _____. **(IP Addresses)**
5. NAT stands for _____. **(Network Address Translation)**
6. IEEE 802.11 is the standard for _____ networks. **(Wireless LAN/Wi-Fi)**
7. FTP stands for _____. **(File Transfer Protocol)**
8. HTTP is used to access _____ pages. **(Web)**
9. A wireless network uses an _____ Point to provide connectivity. **(Access)**
10. A _____ server stores and resolves domain names. **(DNS)**
11. SMTP is used to send _____. **(Emails/Mails)**
12. A _____ connects multiple devices within a LAN. **(Switch)**
13. TCP stands for _____. **(Transmission Control Protocol)**
14. UDP stands for _____. **(User Datagram Protocol)**
15. VLAN stands for _____ Local Area Network. **(Virtual)**
16. A _____ converts digital signals into analog signals. **(Modem)**
17. The process of dividing a network into smaller networks is called _____. **(Subnetting)**
18. DNS resolves _____ names into IP addresses. **(Domain)**
19. A router forwards packets using a _____ table. **(Routing)**
20. Client-server communication commonly uses _____ and FTP protocols. **(HTTP)**

C. 2 Marks Questions

Remembering Level(R)

1. Define a Home Office Network.
2. Define NAT.
3. Define VLAN.
4. Define DNS.
5. Define DHCP.
6. Define a client-server network.
7. Define HTTP.
8. Define FTP.
9. State the purpose of NAT.

10. Identify the device used to provide wireless connectivity in a network.

Understanding(U)

1. Compare wired and wireless networks.
2. Explain the need for IP address planning.
3. Explain the purpose and operation of NAT.
4. Explain the purpose of VLANs in network design.
5. Compare TCP and UDP services.
6. Describe the client-server communication model.
7. Explain the role of DNS in a Home Office Network.
8. Explain the operation of DHCP in IP address allocation.
9. Describe the purpose of HTTP and FTP services.
10. Illustrate the basic architecture of a Home Office Network.

D. 3 Marks Questions

Understanding(U)

1. Explain the components required for a Home Office Network.
2. Compare wired and wireless networks.
3. Explain the role of a router in a home network.
4. Describe the operation of DHCP in assigning IP addresses.
5. Explain the purpose of DNS in internet communication.
6. Explain the advantages of star topology in home networks.
7. Describe the function of NAT in a home office setup.
8. Explain the role of an Access Point in WLANs.
9. Explain how FTP and HTTP services are used in a network.
10. Describe the need for subnetting in network design.
11. Explain the functions of a modem and a switch.
12. Explain client-server architecture.

Application (A)

1. Select suitable devices for setting up a home office network and justify your choices.
2. Compare wired and wireless connectivity for a given office requirement.
3. Recommend an appropriate topology for a home office network.
4. Design a simple IP addressing scheme for a small office.
5. Apply DHCP and DNS services in a home office environment.
6. Analyze a scenario where NAT is required.
7. Recommend suitable protocols for web browsing, file transfer and email services.
8. Suggest improvements for a home office network experiencing poor connectivity

E. 5 Marks Questions

Understanding (U)

1. Explain the architecture of a Home Office Network with a neat diagram.
2. Discuss the functions of Router, Switch, Access Point and Modem in a home network.
3. Explain the operation of DHCP and DNS services in a network.
4. Discuss wired and wireless network technologies used in home offices.
5. Explain NAT and its advantages in Internet sharing.

6. Describe star topology and justify its suitability for home office networks.
7. Explain subnetting and its importance in network design.
8. Discuss client-server architecture and its applications.
9. Explain HTTP and FTP protocols and their uses.
10. Describe the process of designing a secure and reliable home network.
11. Explain hierarchical network design.
12. Discuss network security measures in home office networks.

Application Level (A)

1. Design an IP addressing scheme for a home office network.
2. Select appropriate networking devices for a given office requirement and justify your choices.
3. Design a wireless LAN for a small office and explain device placement.
4. Analyze the interaction of DHCP, DNS and NAT services in a network.
5. Design a client-server network for file sharing and printing services.
6. Recommend suitable topologies for different office requirements.
7. Apply subnetting techniques to divide a network into departmental segments.
8. Propose security measures for protecting a home office network.

F. 10 Marks Questions

Application (A)

1. Design a Home Office Network for a small business with 10 computers, printers and Internet access. Select suitable devices, topology and addressing scheme with justification.
2. A home office requires both wired and wireless connectivity for employees. Design the network and explain the role of each device used.
3. Design a network using DHCP, DNS and NAT services for a home office. Explain how these services work together.
4. A small company wants separate networks for Administration, Accounts and Technical staff. Design an IP addressing and subnetting scheme for the office network.
5. Design a Wireless LAN for a two-floor office building. Select suitable devices and explain how coverage and connectivity can be ensured.
6. A home office network experiences slow internet access and connectivity issues. Analyze the possible causes and propose suitable solutions.
7. Design a client-server based home office network that supports web browsing, file sharing and printing services. Explain the network architecture.
8. A company wants secure Internet access for multiple users through a single public IP address. Design the network using NAT and justify your design.
9. Design a scalable network for a home office that can expand from 10 to 50 devices in the future. Justify your choice of topology, devices and addressing scheme.
10. Create a complete network design for a small enterprise/home office using routers, switches, access points, DHCP, DNS and Internet connectivity. Explain the operation of the network and justify all design choices.
11. Design a secure home office network incorporating firewall, NAT and wireless security mechanisms.

12. Develop a hierarchical network design for a medium-sized office and justify the choice of devices.
13. Design a network supporting web services, file transfer, email communication and printing services for a small enterprise.
14. Propose a complete network upgrade plan for a growing organization expanding from 20 to 100 users.
15. Design a VLAN-based network for different departments in a home-office environment and explain its benefits.

Note:

This Question Bank is prepared only as a reference material to assist students in understanding the course content, learning outcomes, and expected examination pattern.

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications
Programme Name: Computer Science and Engineering

Semester: 04

Course Code and Name: Linux Administration (25CS411)

	Cognitive Level	Remembering						Understanding						Application						Analysis							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weight age
No.	Type	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	3	2							3	2							1							1		
	Marks	3	2	0	0	0	0	0	0	6	6	0	0	0	0	0	0	5	0	0	0	0	0	0	10	32	21.3333
CO-2	No. of Questions	2	1							2	2							2									
	Marks	2	1	0	0	0	0	0	0	4	6	0	0	0	0	0	0	10	0	0	0	0	0	0	0	23	15.3333
CO-3	No. of Questions	3	2							2	3							3	1					1	1		
	Marks	3	2	0	0	0	0	0	0	4	9	0	0	0	0	0	0	15	10	0	0	0	0	5	10	58	38.6667
CO-4	No. of Questions	5																	1								
	Marks	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	15	10
CO-5	No. of Questions	2								1	1		1											1			
	Marks	2	0	0	0	0	0	0	0	2	3	0	10	0	0	0	0	0	0	0	0	0	0	5	0	22	14.6667
Marks		15	5	0	0	0	0	0	0	16	24	0	10	0	0	0	0	30	20	0	0	0	0	10	20		
Total		20						50						50						30						150	100
%		13.33						33.33						33.33						20						99.99	

Govt. of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper

Course: Linux administration

Course Code– 25CS41I

Time: 3Hours

Max. Marks: 100

Instructions:

For Part –A Questions, only the first written answers will be considered for Evaluation.

PART – A

I. Select the correct answer from the choices given.

(15 × 1 = 15)

Q.No	Question	CO	CL
1	Which command shows the current directory? a) ls b) pwd c) cd d) mkdir	CO1	L1
2	Linux is an example of: a) Operating System b) Browser c) Database d) Compiler	CO1	L1
3	Which command displays system information? a) uname b) mkdir c) rm d) cp	CO1	L1
4	A shell script is a collection of: a) Images b) Commands c) Videos d) Files	CO2	L1
5	Which tool is used to schedule repeated tasks? a) cron b) top c) ps d) chmod	CO2	L1
6	Which command changes file permissions? a) chmod b) pwd c) ls d) date	CO3	L1
7	Which command creates a new user? a) useradd b) userdel c) passwd d) who	CO3	L1
8	SSH is mainly used for: a) Printing b) Secure remote login c) Gaming d) Music	CO3	L1

Q.No	Question	CO	CL
9	Which command shows running processes? a) top b) mkdir c) touch d) cp	CO5	L1
10	Which command is used to stop a process? a) kill b) ls c) cat d) pwd	CO5	L1
11	RAID 1 provides: a) Backup through mirroring b) Printing c) Compression d) Encryption	CO4	L1
12	Which package manager is used in Ubuntu? a) apt b) paint c) word d) chrome	CO4	L1
13	Apache is a: a) Web Server b) Browser c) Compiler d) Text Editor	CO4	L1
14	MySQL is a: a) Database b) Operating System c) Shell d) Firewall	CO4	L1
15	Firewall is used for: a) Network security b) Playing music c) Editing files d) Printing documents	CO4	L1

II. Fill in the blanks by choosing appropriate answers from the bracket. (5 × 1 = 5)

(ls, useradd, cron, operating, SSH)

Q.No	Question	CO	CL
16	Linux is an _____ system	CO1	L1
17	The command used to list files is _____.	CO1	L1
18	The command used to create a new user is _____.	CO3	L1
19	_____ is used to schedule jobs automatically.	CO2	L1
20	_____ is used for secure remote login.	CO3	L1

PART – B

III. Answer ANY FIVE of the following. Each question carries TWO marks. (5 × 2 = 10)

Q.No	Question	CO	CL
21	Explain any two functions of an Operating System.	CO1	L2
22	Differentiate between Kernel and Shell (any two points).	CO1	L2
23	Explain the benefits of virtualization in Linux administration.	CO1	L2
24	What is shell scripting? Mention any two advantages.	CO2	L2
25	Explain the importance of job scheduling in Linux.	CO2	L2
26	Explain the purpose of users and groups in Linux.	CO3	L2
27	What are file permissions in Linux? Explain read, write and execute permissions.	CO3	L2
28	Differentiate between a process and a program.	CO5	L2

PART – C

IV. Answer ANY FIVE of the following. Each question carries THREE marks. (5 × 3 = 15)

Q.No	Question	CO	CL
29	Explain the Linux boot process briefly.	CO1	L2
30	Explain the role of Kernel in an Operating System and mention its main functions.	CO1	L2
31	Explain the purpose of shell scripting with a simple example.	CO2	L2
32	Explain the Linux directory structure and the purpose of /home, /etc, /bin, and /var directories.	CO3	L2
33	Explain file permissions in Linux using symbolic and numeric notation with examples.	CO3	L2
34	Explain the process life cycle and different states of a process in Linux.	CO5	L2
35	Differentiate between one-time scheduling (at) and recurring scheduling (cron) with examples.	CO2	L2
36	Explain the importance of firewalls and SSH in securing Linux systems.	CO3	L2

PART – D (SECTION – I)

V. Answer ANY FIVE of the following. Each question carries FIVE marks. (5 × 5 = 25)

Q.No	Question	CO	CL
37	Explain the steps to install Linux on a Virtual Machine.	CO1	L3
38	Write a simple shell script to display "Welcome to Linux" and explain its output.	CO2	L3
39	Create a new user and assign a password using Linux commands. Explain the steps.	CO3	L3
40	Change the permissions of a file using the chmod command and explain the result.	CO3	L3
41	Create a cron job to run a script every day and explain the procedure.	CO2	L3
42	Illustrate the procedure for managing user privileges in Linux using users, groups, and sudo permissions.	CO3	L3
43	A user is unable to modify a file even though the file exists. Analyze the possible reasons and suggest a solution.	CO3	L4
44	A Linux system is running slowly. Analyze the possible causes and suggest suitable actions to improve performance.	CO5	L4

PART – D (SECTION – II)

VI. Answer ANY THREE of the following. Each question carries TEN marks. (3 × 10 = 30)

Q.No	Question	CO	CL
45	Apply Linux commands to create users, groups, and a shared directory with appropriate permissions.	CO3	L3
46	Explain the architecture of a Linux server environment and illustrate the functions of Apache/Nginx and MySQL/PostgreSQL in delivering web applications.	CO4	L3
47	Analyze the differences between Linux and Windows operating systems based on any five features.	CO1	L4
48	Examine the security features of SSH and firewall and differentiate their roles in protecting a Linux system.	CO3	L4
49	Explain the concepts of parent and child processes and describe how processes are created and terminated in Linux.	CO5	L2

Model Question Bank

Programme Name: Computer Science and Engg.

Semester: 4

Course: Linux administration

Course Code– 25CS41I

I. Multiple Choice Questions (1 Mark Each)

Q.No	Question	Options	CO	CL
1	Which command is used to display the contents of a directory?	a) cat b) ls c) mv d) chmod	CO1	L1
2	Which software is commonly used to create virtual machines?	a) Apache b) MySQL c) VirtualBox d) Cron	CO1	L1
3	Which command displays the Linux kernel version?	a) uname -r b) pwd c) who d) mkdir	CO1	L1
4	Which symbol is used to represent a variable in shell scripting?	a) # b) \$ c) @ d) %	CO2	L1
5	Which command schedules a one-time task in Linux?	a) cron b) at c) ps d) top	CO2	L1
6	Which permission allows a user to view file contents?	a) Write b) Execute c) Read d) Delete	CO3	L1
7	Which command changes file ownership?	a) chmod b) chown c) cp d) mv	CO3	L1
8	Which command displays currently logged-in users?	a) who b) ls c) rm d) pwd	CO3	L1
9	Which command displays memory usage information?	a) free b) touch c) mkdir d) cat	CO5	L1
10	Which command shows disk usage of file systems?	a) df b) ps c) grep d) kill	CO5	L1
11	LVM stands for:	a) Linux Volume Manager b) Logical Volume Manager c) Local Virtual Memory d) Linux Virtual Machine	CO4	L1
12	Which command is used to install packages in Ubuntu?	a) yum b) apt install c) rpm -e d) pkgadd	CO4	L1
13	Nginx is mainly used as:	a) Database Server b) Web Server c) Package Manager d) Firewall	CO4	L1
14	Which protocol is used for secure file transfer?	a) FTP b) HTTP c) SCP d) Telnet	CO3	L1
15	Which tool helps prevent brute-force login attacks?	a) Fail2Ban b) rsync c) cron d) fdisk	CO3	L1

II. Fill in the Blanks (1 Mark Each)**(/etc/passwd, cron, kill, scp, Web, whoami, mkdir, Secure, mirroring, /etc)**

Q.No	Question	CO	CL
1	The command used to display the current logged-in user is _____.	CO1	L1
2	Linux stores user account information in _____ file.	CO3	L1
3	The command used to create a directory is _____.	CO1	L1
4	A recurring scheduled task is managed using _____.	CO2	L1
5	SSH stands for _____ Shell.	CO3	L1
6	The command used to terminate a process is _____.	CO5	L1
7	RAID 1 uses _____ for data protection.	CO4	L1
8	The command used to securely copy files is _____.	CO3	L1
9	Linux configuration files are mainly stored in the _____ directory.	CO3	L1
10	Apache is a _____ server.	CO4	L1

III. Questions Carrying 2 Marks

Q.No	Question	CO	CL
1	State any two advantages of Linux over proprietary operating systems.	CO1	L2
2	What is a hypervisor? Give one example.	CO1	L2
3	Define shell scripting.	CO2	L2
4	List any two uses of cron jobs.	CO2	L2
5	What is the purpose of the /etc directory?	CO3	L2
6	What is the role of sudo?	CO3	L2
7	Differentiate between a user account and a group.	CO3	L2
8	Define a process.	CO5	L2
9	What is a Process Control Block (PCB)?	CO5	L2
10	What is Interprocess Communication (IPC)?	CO2	L2
11	Mention any two IPC mechanisms.	CO2	L2
12	Define virtual memory.	CO5	L2
13	What is RAID 1?	CO4	L2
14	What is a package repository?	CO4	L2
15	State any two advantages of SSH.	CO3	L2

IV. Questions Carrying 3 Marks

Q.No	Question	CO	CL
1	Explain the role of systemd in the Linux boot process.	CO1	L2
2	Explain Monolithic and Microkernel architectures.	CO1	L2
3	Explain the steps involved in writing and executing a shell script.	CO2	L2
4	Describe the purpose of chmod and chown commands.	CO3	L2

Q.No	Question	CO	CL
5	Explain the need for user groups in Linux administration.	CO3	L2
6	Explain different states of a process.	CO5	L2
7	Compare cron and at commands.	CO2	L2
8	Explain pipes and message queues as IPC mechanisms.	CO2	L2
9	Explain contiguous and non-contiguous memory allocation.	CO5	L2
10	Describe the purpose of swap memory.	CO5	L2
11	Explain the benefits of LVM in Linux.	CO4	L2
12	Explain buffering and caching with examples.	CO5	L2
13	Describe the package installation process in Linux.	CO4	L2
14	Explain static and dynamic IP addressing.	CO3	L2
15	Explain the purpose of SSL/TLS in web servers.	CO4	L2

V. Questions Carrying 5 Marks

Q.No	Question	CO	CL
1	Demonstrate the steps to install Linux on a physical machine.	CO1	L3
2	Configure system information commands to identify OS version, kernel version, and hostname.	CO1	L3
3	Develop a shell script to display all logged-in users and save the output to a file.	CO2	L3
4	Demonstrate how to create a directory structure for a project and assign appropriate permissions.	CO3	L3
5	Configure a new user account and assign it to multiple groups.	CO3	L3
6	Demonstrate how to monitor and terminate an unresponsive process.	CO5	L3
7	Create a cron job that performs automatic backup of a directory every day.	CO2	L3
8	Demonstrate the procedure to create and use a named pipe for communication.	CO2	L3
9	Configure swap memory and verify its status.	CO5	L3
10	Demonstrate the steps to create a logical volume using LVM.	CO4	L3
11	Configure a static IP address on a Linux system.	CO3	L3
12	Demonstrate secure file transfer using SCP.	CO3	L3
13	Configure SSH key-based authentication for a user account.	CO3	L3
14	Analyze a situation where multiple users cannot access a shared directory and suggest corrective actions.	CO3	L4
15	Analyze high memory utilization on a Linux server and recommend suitable optimization techniques.	CO5	L4

VI. Questions Carrying 10 Marks

Q.No	Question	CO	CL
1	Explain the concepts of virtual memory, paging, and memory management with suitable diagrams.	CO5	L2
2	Explain various Linux server roles and their applications in an organization.	CO4	L2
3	Configure a Linux server to provide secure remote access using SSH and SCP.	CO3	L3
4	Demonstrate the complete procedure to install and configure a MySQL/PostgreSQL database server.	CO4	L3
5	Develop a backup strategy for a Linux server using tar, rsync, and cron.	CO2	L3
6	Analyze the advantages and limitations of RAID and LVM in managing enterprise storage systems.	CO4	L4
7	Analyze a web server security scenario and recommend firewall, SSH, and Fail2Ban configurations.	CO3	L4
8	Examine resource utilization on a Linux server and propose performance tuning measures for CPU, memory, and storage.	CO5	L4

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications

Programme Name: Computer Science and Engineering																				Semester: IV							
Course Name: Object Oriented Programming with Java																				Course Code: 25CS42I							
CO No.	Cognitive Level	Remembering						Understanding						Application						Analysis						Total Marks	Weight
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II								
	Type	1M		2M	3M	5M	10M	1M		2M	3M	5M	10M	1M		2M	3M	5M	10M	1M		2M	3M	5M	10M		
		MC Q	FIB					MC Q	FIB					MC Q	FIB					MC Q	FIB						
CO-1	No. of Questions	2		1	1			1		2	1		1				1	1									
	Marks	2		2	3			1		4	3		10				3	5							33	22	
CO-2	No. of Questions	2	2	1	1			2		1	1	1					1	1									
	Marks	2	2	2	3			2		2	3	5					5	10							36	24	
CO-3	No. of Questions	2	1		1	1		1	1	1	1	1					1	1									
	Marks	2	1		3	5		1	1	2	3	5					5	10							38	26	
CO-4	No. of Questions	2	1	2				3			1		1				1										
	Marks	2	1	4				3			3		10				5								28	18	
CO-5	No. of Questions																							1	1		
	Marks																							5	10	15	10
Marks																											
Total		34						58						43						15						150	100
%		23						38						29						10						100%	100%

**GOVERNMENT OF KARNATAKA
DEPARTMENT OF TECHNICAL EDUCATION
PROGRAM: COMPUTER SCIENCE AND ENGINEERING
IV Semester Diploma Examination
Model Question Paper**

Course: Object Oriented Programming with Java
Time: 3 Hours

Course Code: 25CS42I
Max. Marks: 100

Instructions:

For Part –A Questions, only the first written answers will be considered for Evaluation.

PART- A

I. Select the correct answers from the choices given

15x1 =15

Q.No	Question	CO	CL
1	Which keyword is used to inherit a class in Java? a)implement b) extends c) inherit d) super	CO2	R
2	Which of the following is not an OOP principle? a)Encapsulation b) Inheritance c) Compilation d) Polymorphism	CO1	R
3	A blueprint for creating objects is called a a)Method b) Package c) Class d) Constructor	CO1	R
4	Why is encapsulation used in OOP? a)To increase code length b) To hide data and protect it from unauthorized access c) To reduce the number of classes d) To improve hardware performance	CO1	U
5	Which keyword is used to create an object in Java? a) class b) new c) this d) object	CO2	R
6	Why is method overloading used in Java? a) To define multiple methods with the same name but different parameters b) To hide data c) To inherit classes d) To handle exceptions	CO2	U
7	What is the benefit of inheritance in Java? a) Code duplication b) Code reusability c) Memory wastage d) Slower execution	CO2	U
8	What does SRP stand for? a) Single Responsibility Principle b) Simple Reuse Principle c) Software Reuse Principle d) Single Resource Principle	CO3	R
9	Which SOLID principle is represented by the letter 'O'? a) Object Principle b) Open/Closed Principle c) Override Principle d) Optimization Principle	CO3	R
10	According to SRP, a class should have: a) Multiple responsibilities b) Only one reason to change c) Multiple constructors d) No methods	CO3	U
11	Which keyword is used to handle exceptions in Java? a) throw b) catch c) throws d) final	CO4	R
12	Which block is always executed whether an exception occurs or not? a) try b) catch c) finally d) throw	CO4	R
13	Why is exception handling used in Java? a) To increase program size b) To terminate programs immediately c) To manage runtime errors and maintain normal program flow d) To create objects	CO4	U
14	What happens if an exception is not caught in a program? a) The program continues normally b) The exception is ignored c) The program may terminate abnormally d) A new object is created	CO4	U
15	When should a custom exception be created? a) For every variable b) To represent application-specific error conditions c) To replace all built-in exceptions d) To improve compilation speed	CO4	U

II. Fill in the blanks by choosing appropriate answer from those given in the bracket

5 × 1 = 5

(Single, this, finally, new, reason)

Q.No	Fill in the Blank	CO	CL
16	The keyword used to create an object in Java is _____.	CO2	R
17	The keyword _____ refers to the current object in Java.	CO2	R
18	SRP stands for _____ Responsibility Principle.	CO3	R
19	The block that is always executed whether an exception occurs or not is _____.	CO4	R
20	According to SRP, a class should have only one _____ to change.	CO3	U

PART- B

III. Answer ANY FIVE of the following. Each question carries two marks. 5 x 2 = 10

Q.No	Question	CO	CL
21	List any four core principles of Object-Oriented Programming.	CO1	R
22	Explain the significance of encapsulation in software development.	CO1	U
23	Differentiate between abstraction and encapsulation.	CO1	U
24	What is a constructor in Java?	CO2	R
25	Explain the purpose of the this keyword with an example.	CO2	U
26	Explain any two benefits of applying the Open/Closed Principle.	CO3	U
27	What is an exception in Java?	CO4	R
28	Name any four exception handling keywords used in Java.	CO4	R

PART- C

IV. Answer ANY FIVE of the following. Each question carries three marks. 5x3 =15

Q.No	Question	CO	CL
29	Define Object-Oriented Programming and list its four core principles.	CO1	R
30	Explain how encapsulation helps in achieving data security in Java applications.	CO1	U
31	Illustrate the use of access modifiers in implementing encapsulation with a suitable example.	CO1	A
32	What is inheritance? Explain the purpose of the extends keyword in Java.	CO2	R
33	Explain the difference between method overloading and method overriding with suitable examples.	CO2	U
34	List the five SOLID principles and mention their full forms	CO3	R
35	Explain how the Open-Closed Principle (OCP) improves software maintainability.	CO3	U
36	Explain the difference between checked and unchecked exceptions with examples.	CO4	U

PART-D(Section-I)

V. Answer ANY FIVE of the following. Each question carries Five marks. 5 x5= 25

Q.No	Question	CO	CL
37	Demonstrate encapsulation in Java by creating a Student class with private data members and appropriate getter and setter methods.	CO1	A
38	Explain the differences between abstract classes and interfaces with suitable examples.	CO2	U
39	Write a Java program to demonstrate runtime polymorphism using method overriding.	CO2	A
40	State the Open-Closed Principle (OCP) and explain its benefits in software development.	CO3	R
41	Explain the Interface Segregation Principle (ISP) with a suitable example.	CO3	U
42	Refactor a simple Java class violating the Single Responsibility Principle (SRP) to comply with SOLID principles.	CO3	A
43	Develop a Java program that handles multiple exceptions using try, catch, and finally blocks.	CO4	A
44	Analyse the steps involved in performing CRUD operations using JDBC and explain the role of Driver, Connection, Statement, and ResultSet in database connectivity.	CO5	AN

PART-D(Section-II)

VI. Answer ANY THREE of the following. Each question carries Ten marks. 10x3 =30

Q.No	Question	CO	CL
45	a. Describe the four core concepts of Object-Oriented Programming with suitable examples b. Explain the basic structure of a Java program and describe the purpose of each component	CO1	U
46	Develop a Java program to demonstrate single inheritance by creating a Person class and a Student class that inherits the properties of Person. Display the details of a student	CO2	A
47	Develop a Java program to demonstrate any two SOLID principles	CO3	A
48	Describe the exception handling mechanism in Java and explain the roles of try, catch, and finally blocks with suitable examples	CO4	U
49	A student management system uses JDBC to perform CRUD operations. Analyze the flow of data between the Java application and the database during record insertion and retrieval	CO5	AN

Model Question Bank

Programme Name:Computer Science and Engineering

Semester: IV

CourseName: Object Oriented Programming with Java

Course Code: 25CS42I

I. Multiple Choice Questions

Q.No	Question	Options	CO	CL
1	Which of the following is a core principle of OOP?	A) Linking B) Encapsulation C) Debugging D) Compiling	CO1	R
2	A blueprint for creating objects is called a _____	A) Method B) Constructor C) Class D) Package	CO1	R
3	Which access modifier provides maximum restriction in Java?	A) public B) protected C) default D) private	CO1	R
4	Which OOP concept is used for data hiding?	A) Inheritance B) Polymorphism C) Encapsulation D) Abstraction	CO1	R
5	Which keyword is used to define a class in Java?	A) object B) class C) define D) new	CO1	R
6	Why is encapsulation important in OOP?	A) Increases memory usage B) Protects data from unauthorized access C) Reduces classes D) Increases execution time	CO1	U
7	Which statement best describes abstraction?	A) Hiding implementation details B) Creating objects C) Deleting classes D) Compiling code	CO1	U
8	Why are access modifiers used in Java?	A) To increase program size B) To control accessibility of members C) To create objects D) To execute programs	CO1	U
9	How does inheritance support software development?	A) By duplicating code B) By promoting code reusability C) By deleting methods D) By increasing complexity	CO1	U

10	Which OOP feature allows an object to take many forms?	A) Encapsulation B) Inheritance C) Polymorphism D) Aggregation	CO1	U
11	Which keyword is used to create an object in Java?	A) object B) new C) create D) class	CO2	R
12	Which keyword is used for inheritance in Java?	A) inherit B) super C) extends D) implement	CO2	R
13	Which keyword refers to the current object?	A) current B) self C) this D) super	CO2	R
14	Which interface is used to create a thread?	A) Serializable B) Runnable C) Cloneable D) Comparable	CO2	R
15	Which collection class allows dynamic array implementation?	A) HashSet B) TreeMap C) ArrayList D) Queue	CO2	R
16	Why is inheritance used in Java?	A) To increase code duplication B) To promote code reusability C) To reduce objects D) To handle exceptions	CO2	U
17	What is the purpose of method overloading?	A) To define multiple methods with the same name but different parameters B) To hide data C) To create packages D) To manage exceptions	CO2	U
18	Why are interfaces used in Java?	A) To achieve abstraction B) To create variables C) To delete methods D) To store data	CO2	U
19	What is the benefit of multithreading?	A) Increases waiting time B) Enables concurrent execution of tasks C) Reduces memory D) Deletes processes	CO2	U
20	Which concept enables runtime polymorphism?	A) Method Overloading B) Constructor Overloading C) Method Overriding D) Encapsulation	CO2	U
21	What does SRP stand for?	A) Single Responsibility Principle B) Simple Reuse Principle C) Software Responsibility	CO3	R

		Principle D) Single Resource Principle		
22	Which SOLID principle is represented by the letter 'O'?	A) Override Principle B) Object Principle C) Open/Closed Principle D) Optimization Principle	CO3	R
23	What does ISP stand for?	A) Interface Segregation Principle B) Internal Software Principle C) Interface Security Principle D) Integrated Service Principle	CO3	R
24	Which SOLID principle is represented by the letter 'L'?	A) Logical Substitution Principle B) Liskov Substitution Principle C) Linear Substitution Principle D) Layered Substitution Principle	CO3	R
25	What does DIP stand for?	A) Data Integration Principle B) Dependency Inversion Principle C) Design Improvement Principle D) Dynamic Interface Principle	CO3	R
26	According to SRP, a class should have _____.	A) Multiple responsibilities B) Only one reason to change C) Multiple constructors D) No methods	CO3	U
27	Which principle allows software entities to be extended without modification?	A) SRP B) OCP C) ISP D) DIP	CO3	U
28	Why is ISP important?	A) Prevents large, unnecessary interfaces B) Increases coupling C) Reduces abstraction D) Removes inheritance	CO3	U
29	Which principle promotes programming to abstractions rather than implementations?	A) SRP B) OCP C) DIP D) ISP	CO3	U
30	What is the main objective of refactoring?	A) Change functionality B) Improve code quality without changing behavior C) Increase errors D) Remove classes	CO3	U
31	Which keyword is used to explicitly throw an exception?	A) throws B) throw C) catch D) finally	CO4	R
32	Which block is always executed whether an exception occurs or not?	A) try B) catch C) throw D) finally	CO4	R
33	Which keyword is used to declare exceptions that a method may throw?	A) throw B) throws	CO4	R

		C) catch D) final		
34	Which exception occurs when an array index exceeds its limit?	A) ArithmeticException B) IOException C) ArrayIndexOutOfBoundsException D) SQLException	CO4	R
35	Which exception is raised when dividing a number by zero?	A) ArithmeticException B) IOException C) NullPointerException D) SQLException	CO4	R
36	Why is exception handling used in Java?	A) To manage runtime errors B) To create classes C) To improve hardware D) To compile code	CO4	U
37	What happens if an exception is not handled?	A) Program continues normally B) Program may terminate abnormally C) Exception is ignored D) New object is created	CO4	U
38	Why is the finally block used?	A) To declare variables B) To ensure cleanup code executes C) To create exceptions D) To define classes	CO4	U
39	When should a custom exception be created?	A) For application-specific error conditions B) For every variable C) To replace all built-in exceptions D) To improve speed	CO4	U
40	What is the difference between checked and unchecked exceptions?	A) Checked exceptions are verified at compile time B) Both are verified at runtime C) Unchecked exceptions are verified at compile time D) No difference	CO4	U

II. Fill in the blank Questions

Q.No	Question	CO	CL
1	OOP stands for _____ Oriented Programming.	CO1	R
2	The process of hiding data is called _____.	CO1	R
3	A blueprint for creating objects is called a _____.	CO1	R
4	The mechanism of acquiring properties from another class is called _____.	CO1	R
5	The ability of an object to take many forms is called _____.	CO1	R
6	Encapsulation helps in protecting _____ from unauthorized access.	CO1	U
7	Inheritance improves code _____.	CO1	U
8	Abstraction hides implementation _____ from users.	CO1	U
9	Access modifiers control the _____ of class members.	CO1	U

10	OOP helps in developing _____ and maintainable software.	CO1	U
11	The keyword used to create an object in Java is _____.	CO2	R
12	The keyword _____ refers to the current object.	CO2	R
13	The keyword used for inheritance in Java is _____.	CO2	R
14	A special method used to initialize objects is called a _____.	CO2	R
15	The interface commonly used for creating threads is _____.	CO2	R
16	Method overloading allows multiple methods with the same _____.	CO2	U
17	Runtime polymorphism is achieved using method _____.	CO2	U
18	Interfaces help in achieving _____ in Java.	CO2	U
19	Multithreading enables _____ execution of tasks.	CO2	U
20	Collections Framework provides reusable data _____.	CO2	U
21	SRP stands for Single _____ Principle.	CO3	R
22	OCP stands for Open/_____ Principle.	CO3	R
23	ISP stands for Interface _____ Principle.	CO3	R
24	LSP stands for Liskov _____ Principle.	CO3	R
25	DIP stands for Dependency _____ Principle.	CO3	R
26	According to SRP, a class should have only one _____ to change.	CO3	U
27	OCP encourages extension without modifying existing _____.	CO3	U
28	ISP prevents clients from depending on _____ methods.	CO3	U
29	DIP promotes programming to _____ rather than implementations.	CO3	U
30	Refactoring improves code quality without changing its _____.	CO3	U
31	The keyword used to explicitly throw an exception is _____.	CO4	R
32	The block that always executes is _____.	CO4	R
33	The keyword used to declare exceptions in a method signature is _____.	CO4	R
34	An exception caused by division by zero is _____ Exception.	CO4	R
35	An exception caused by accessing an invalid array index is _____ IndexOutOfBoundsException.	CO4	R
36	Exception handling helps manage _____ errors.	CO4	U
37	A _____ block is used to handle exceptions.	CO4	U
38	Custom exceptions are used to represent application-specific _____ conditions.	CO4	U

III. Questions carrying 2 Marks

Q.No	Question	CO	CL
1	Define Object-Oriented Programming (OOP).	CO1	R
2	List any four core principles of OOP.	CO1	R
3	What is encapsulation?	CO1	R
4	Define inheritance.	CO1	R
5	What is abstraction in OOP?	CO1	R
6	Explain how encapsulation improves data security.	CO1	U
7	Explain the significance of inheritance in software development.	CO1	U
8	Differentiate between abstraction and encapsulation.	CO1	U
9	Explain the role of access modifiers in OOP.	CO1	U
10	How does polymorphism improve code flexibility?	CO1	U
11	What is a constructor in Java?	CO2	R
12	What is the purpose of the <code>this</code> keyword?	CO2	R
13	Define method overloading.	CO2	R

14	What is an interface in Java?	CO2	R
15	What is multithreading?	CO2	R
16	Explain the purpose of constructors in Java programs.	CO2	U
17	Differentiate between method overloading and method overriding.	CO2	U
18	Explain how interfaces support abstraction.	CO2	U
19	Explain the benefits of using collections in Java.	CO2	U
20	How does multithreading improve application performance?	CO2	U
21	State the Single Responsibility Principle (SRP).	CO3	R
22	What is the Open-Closed Principle (OCP)?	CO3	R
23	Define Interface Segregation Principle (ISP).	CO3	R
24	What is the Liskov Substitution Principle (LSP)?	CO3	R
25	Define Dependency Inversion Principle (DIP).	CO3	R
26	Explain why SRP improves maintainability.	CO3	U
27	Explain the benefit of OCP in software design.	CO3	U
28	Why should interfaces be small according to ISP?	CO3	U
29	Explain the importance of DIP in reducing coupling.	CO3	U
30	What is refactoring and why is it needed?	CO3	U
31	What is an exception in Java?	CO4	R
32	Name any four exception handling keywords in Java.	CO4	R
33	What is a checked exception?	CO4	R
34	What is an unchecked exception?	CO4	R
35	What is the purpose of the <code>finally</code> block?	CO4	R
36	Explain the need for exception handling in Java.	CO4	U
37	Differentiate between checked and unchecked exceptions.	CO4	U
38	Explain the purpose of the <code>throw</code> and <code>throws</code> keywords.	CO4	U
39	Why are custom exceptions used in Java applications?	CO4	U
40	How does exception handling improve program reliability?	CO4	U

IV. Questions carrying 3 Marks

Q.No	Question	CO	CL
1	Define Object-Oriented Programming and list its four core principles.	CO1	R
2	Define encapsulation with an example.	CO1	R
3	What is inheritance? Mention its advantages.	CO1	R
4	Define abstraction and polymorphism.	CO1	R
5	List the access modifiers available in Java and their purpose.	CO1	R
6	Explain how encapsulation supports data security in software development.	CO1	U
7	Explain the significance of inheritance in object-oriented design.	CO1	U
8	Differentiate between abstraction and encapsulation.	CO1	U
9	Explain how polymorphism improves code flexibility and reusability.	CO1	U
10	Explain the role of access modifiers in implementing OOP principles.	CO1	U
11	Illustrate encapsulation by designing a <code>Student</code> class with private members and public methods.	CO1	A
12	Demonstrate the use of inheritance using a suitable class hierarchy.	CO1	A

13	Create an example showing the use of abstraction through an abstract class.	CO1	A
14	Write a Java code snippet demonstrating polymorphism.	CO1	A
15	Implement a simple class using appropriate access modifiers to ensure data hiding.	CO1	A
16	What is a constructor? Explain its purpose.	CO2	R
17	Define method overloading with syntax.	CO2	R
18	What is method overriding?	CO2	R
19	Define interface and abstract class.	CO2	R
20	What is multithreading in Java?	CO2	R
21	Explain the difference between method overloading and method overriding.	CO2	U
22	Explain the purpose of constructors in Java programs.	CO2	U
23	Compare interfaces and abstract classes.	CO2	U
24	Explain how collections simplify data management in Java.	CO2	U
25	Explain the advantages of multithreading in Java applications.	CO2	U
26	Write a Java program to demonstrate constructor overloading.	CO2	A
27	Develop a Java program illustrating method overriding.	CO2	A
28	Create an interface and implement it using a Java class.	CO2	A
29	Write a Java program using ArrayList to store and display employee names.	CO2	A
30	Develop a simple multithreaded program using the Runnable interface.	CO2	A
31	State the Single Responsibility Principle (SRP) with an example.	CO3	R
32	Define Open-Closed Principle (OCP).	CO3	R
33	What is Interface Segregation Principle (ISP)?	CO3	R
34	Define Liskov Substitution Principle (LSP).	CO3	R
35	What is Dependency Inversion Principle (DIP)?	CO3	R
36	Explain how SRP improves software maintainability.	CO3	U
37	Explain the importance of OCP in software development.	CO3	U
38	Explain why ISP promotes better interface design.	CO3	U
39	Explain the significance of DIP in reducing coupling.	CO3	U
40	Explain the role of refactoring in improving code quality.	CO3	U
41	Refactor a class having multiple responsibilities to comply with SRP.	CO3	A
42	Design a solution demonstrating OCP using inheritance.	CO3	A
43	Create a class hierarchy that satisfies LSP.	CO3	A
44	Implement ISP by separating a large interface into smaller interfaces.	CO3	A
45	Demonstrate DIP using interfaces and dependency injection.	CO3	A
46	What is an exception in Java? Give examples.	CO4	R
47	List and define exception handling keywords in Java.	CO4	R
48	What are checked and unchecked exceptions?	CO4	R
49	What is the purpose of the <code>finally</code> block?	CO4	R
50	Define custom exception.	CO4	R
51	Explain the need for exception handling in Java applications.	CO4	U
52	Differentiate between checked and unchecked exceptions.	CO4	U
53	Explain the purpose of <code>throw</code> and <code>throws</code> keywords.	CO4	U
54	Explain how custom exceptions improve error handling.	CO4	U
55	Explain the flow of exception handling using try-catch-finally blocks.	CO4	U
56	Write a Java program to handle <code>ArithmeticException</code> .	CO4	A
57	Develop a Java program using multiple catch blocks.	CO4	A
58	Create a custom exception class and demonstrate its use.	CO4	A
59	Write a Java program that uses <code>throw</code> and <code>throws</code> keywords.	CO4	A

60	Develop a Java program that handles file-related exceptions.	CO4	A
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V. Questions carrying 5 Marks

Q.No	Question	CO	CL
1	Explain the significance of encapsulation in developing secure and maintainable software systems.	CO1	U
2	Explain how inheritance promotes code reusability with a suitable example.	CO1	U
3	Differentiate between abstraction and encapsulation with suitable examples.	CO1	U
4	Explain how polymorphism improves flexibility and extensibility in software development.	CO1	U
5	Explain the role of access modifiers in implementing OOP principles.	CO1	U
6	Develop a Java program demonstrating encapsulation using a <code>Student</code> class.	CO1	A
7	Write a Java program illustrating inheritance using <code>Employee</code> and <code>Manager</code> classes.	CO1	A
8	Implement abstraction using an abstract class and a derived class.	CO1	A
9	Write a Java program demonstrating runtime polymorphism using method overriding.	CO1	A
10	Design a class structure using appropriate access modifiers to achieve data hiding.	CO1	A
11	Explain the difference between method overloading and method overriding with examples.	CO2	U
12	Compare abstract classes and interfaces in Java.	CO2	U
13	Explain the advantages of multithreading in Java applications.	CO2	U
14	Explain the importance of Collections Framework in Java programming.	CO2	U
15	Explain the role of constructors in object creation and initialization.	CO2	U
16	Develop a Java program demonstrating constructor overloading.	CO2	A
17	Write a Java program implementing an interface and its methods.	CO2	A
18	Develop a Java program using <code>ArrayList</code> to store and display employee details.	CO2	A
19	Create a multithreaded Java application using the <code>Runnable</code> interface.	CO2	A
20	Write a Java program demonstrating method overriding and dynamic binding.	CO2	A
21	Explain how the Single Responsibility Principle (SRP) improves maintainability of software systems.	CO3	U
22	Explain the significance of the Open-Closed Principle (OCP) in extensible software design.	CO3	U
23	Explain why Interface Segregation Principle (ISP) leads to better interface design.	CO3	U
24	Explain the role of Dependency Inversion Principle (DIP) in reducing coupling between modules.	CO3	U
25	Explain the importance of refactoring in improving code readability and maintainability.	CO3	U
26	Refactor a class violating SRP to comply with the principle.	CO3	A

27	Implement OCP using inheritance and polymorphism.	CO3	A
28	Design an example demonstrating ISP using multiple interfaces.	CO3	A
29	Develop a Java design implementing DIP using interfaces.	CO3	A
30	Create a class hierarchy that satisfies the Liskov Substitution Principle (LSP).	CO3	A
31	Analyze a given class design and identify violations of SRP and OCP. Suggest suitable refactoring measures.	CO3	AN
32	Analyze a software design using SOLID principles and justify whether it satisfies ISP and DIP.	CO3	AN
33	Explain the need for exception handling in Java applications.	CO4	U
34	Differentiate between checked and unchecked exceptions with examples.	CO4	U
35	Explain the use of <code>throw</code> and <code>throws</code> keywords in Java.	CO4	U
36	Explain how custom exceptions improve application reliability.	CO4	U
37	Explain the execution flow of try-catch-finally blocks.	CO4	U
38	Write a Java program to handle <code>ArithmeticException</code> and <code>ArrayIndexOutOfBoundsException</code> .	CO4	A
39	Develop a Java program demonstrating multiple catch blocks.	CO4	A
40	Create a custom exception and demonstrate its use in a Java application.	CO4	A
41	Write a Java program using <code>throw</code> and <code>throws</code> keywords.	CO4	A
42	Develop a Java program to handle file-related exceptions.	CO4	A
43	Analyze a Java program and identify possible exceptions that may occur during execution. Suggest appropriate handling mechanisms.	CO4	AN
44	Analyze the effectiveness of exception handling in improving software reliability and robustness.	CO4	AN
45	Develop a Java program to establish JDBC connectivity and insert a record into a database.	CO5	A
46	Write a Java program to perform update and delete operations using JDBC.	CO5	A
47	Develop a Java application to perform CRUD operations on a Student database using JDBC.	CO5	A
48	Analyze the architecture of JDBC and explain the role of Driver, Connection, Statement, and ResultSet.	CO5	AN
49	Analyze the execution flow of CRUD operations in a JDBC-based Student Management System.	CO5	AN

VI. Questions carrying 10 Marks

Q.No	Question	CO	CL
1	Develop a Java application for a Library Management System demonstrating classes, objects, encapsulation, inheritance, and polymorphism.	CO1	A
2	Design and implement a Student Information System using OOP principles to manage student records and display details.	CO1	A
3	Develop a Java application using interfaces, abstract classes, and polymorphism to manage different types of employees in an organization.	CO2	A
4	Design and implement a Java application demonstrating Interface	CO3	A

	Segregation Principle (ISP) and Dependency Inversion Principle (DIP).		
5	Develop a Java application that applies SOLID principles to manage customer orders in an e-commerce system.	CO3	A
6	Analyze a given software design and identify violations of SRP, OCP, ISP, and DIP . Suggest appropriate refactoring techniques and justify your recommendations.	CO3	AN
7	Develop a Java program that handles multiple exceptions using try-catch-finally blocks and demonstrates robust error handling.	CO4	A
8	Create a custom exception class and develop a Java application that validates user input using custom exception handling.	CO4	A
9	Analyze a Java application and identify potential runtime exceptions. Propose suitable exception handling mechanisms to improve reliability.	CO4	AN
10	Develop a Java application using JDBC to perform Create, Read, and Update operations on a Student database.	CO5	A
11	Create a Java application that connects to a database and manages product information using JDBC and proper exception handling.	CO5	A
12	Analyze the JDBC architecture and explain the interaction between Driver, Connection, Statement, PreparedStatement, and ResultSet during CRUD operations.	CO5	AN
13	Analyze the design of a JDBC-based Student Management System and explain how database connectivity, transaction handling, and CRUD operations are performed efficiently.	CO5	AN

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications

Programme Name: Computer Science and Engineering																				Semester: 05							
Course Name: Artificial Intelligence Concepts																				Course Code:25CS51IA							
	Cognitive Level	Remembering						Understanding						Application						Analysis							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weight age
No.	Type	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	3	2																								
	Marks	3	2																						5	4	
CO-2	No. of Questions	3	2	1						2																	
	Marks	3	2	2						4															10	6	
CO-3	No. of Questions	3	1							1	2							4	1								
	Marks	3	1							2	6							20	10						45	30	
CO-4	No. of Questions	3								2	2	2	1					1						1	1		
	Marks	3								4	6	10	10					5						5	10	45	30
CO-5	No. of Questions	3			2					2	2							0	2								
	Marks	3			6					4	6							0	20						45	30	
Marks		15	5	2	6	0	0	0	0	14	18	10	10	0	0	0	0	25	30	0	0	0	0	5	10		
Total		28						52						55						15						150	100
%		18.66666667						34.66666667						36.66666667						10						100	

Govt. of Karnataka
Department of Technical Education
Board of Technical Examinations

MODEL QUESTION PAPER

Course: Artificial Intelligence Concepts

CourseCode: 25CS51IA

Time: 3 Hours

Max.Marks: 100

Instructions: For Part –A Questions, only the first written answers will be considered for Evaluation.

SI NO	QUESTIONS	CO	CL
PART- A			
I. Select the correct answers from the choices given (15 x 1= 15 Marks)			
1	Artificial Intelligence refers to a) Computer networking b) Machines performing tasks requiring human intelligence c) Database management d) Operating systems	CO1	R
2	Which of the following is an AI-powered virtual assistant? a) MS Word b) Google Assistant c) Notepad d) Paint	CO1	R
3	Machine Learning is a subset of a) Deep Learning b) Data Science c) Artificial Intelligence d) Cloud Computing	CO1	R
4	The first stage of the AI Project Cycle is a) Deployment b) Model Training c) Problem Identification d) Evaluation	CO2	R
5	Data collected from sensors and IoT devices is an example of a) Structured data b) Unstructured data c) Semi-structured data d) Metadata	CO2	R
6	Data cleaning is performed during a) Deployment b) Preprocessing c) Evaluation d) Prediction	CO2	R
7	Which learning technique is commonly used in predictive systems? a) Supervised Learning b) Encryption c) Routing d) Compression	CO3	R
8	Face recognition is an application of a) NLP b) Robotics c) Computer Vision d) Edge Computing	CO3	R

PART-B			
III. Answer ANY FIVE of the following. Each question carries two marks.			5 x 2 = 10
21	List any two stages of the AI Project Cycle.	CO2	R
22	Explain the importance of data collection in AI.	CO2	U
23	Differentiate structured and unstructured data.	CO2	U
24	State any two applications of Computer Vision.	CO3	U
25	Define Recommendation System.	CO4	U
26	What is Edge AI? Mention one advantage.	CO4	U
27	What is AI bias?	CO5	U
28	Define Responsible AI.	CO5	U
PART- C			
IV. Answer ANY FIVE of the following. Each question carries three marks.			5x3 =15
29	List any three ethical issues in Computer Vision.	CO5	R
30	Write any three risks associated with Generative AI.	CO5	R
31	Explain the components of a Predictive System.	CO3	U
32	Describe the working of an NLP system.	CO3	U
33	Explain the importance of recommendation systems in e-commerce.	CO4	U
34	Describe the working principle of Reinforcement Learning.	CO4	U
35	Explain ethical challenges in Robotics and Automation.	CO5	U
36	Discuss fairness and transparency in AI systems.	CO5	U
PART-D (Section-I)			
V. Answer ANY FIVE of the following. Each question carries FIVE marks.			5 x5= 25
37	Explain supervised and unsupervised learning with examples.	CO3	A
38	Discuss applications of Computer Vision in healthcare and security.	CO3	A
39	Explain various applications of NLP in daily life.	CO3	A
40	Explain architecture and working of a Recommendation System.	CO3	A
41	Discuss applications of IoT and Edge Computing in smart cities.	CO4	U
42	Explain the role of AI in Robotics and Industrial Automation.	CO4	U
43	Analyse impact of recommendation systems on user behaviour.	CO4	AN
44	Explain AI integration in a real-world business application.	CO4	A
PART-D(Section-II)			
VI. Answer ANY THREE of the following. Each question carries TEN marks. 10x3 =30			
45	Explain Reinforcement Learning with examples and applications.	CO3	A
46	Discuss IoT and Edge Computing architecture and applications.	CO4	U
47	Analyse impact of AI-based robotics on industries and employment.	CO4	AN
48	Explain deepfakes, risks and preventive measures.	CO5	A
49	Explain Responsible AI deployment in recruitment systems.	CO5	A

Government of Karnataka
Department of Collegiate and Technical Education
Board of Technical Examination

Model Question Bank

Programme Name: **Computer Science and Engineering**

Semester: **5**

Course Name: **Artificial Intelligence Concepts**

Course Code: **25CS51IA**

I. Multiple Choice Questions (1 Marks Each)

SI NO	MCQ QUESTION WITH OPTIONS	CO	CL
1	AI stands for a) Automated Intelligence b) Artificial Intelligence c) Advanced Interface d) Artificial Integration	CO1	R
2	Which of the following is an application of AI? a) Paint b) Notepad c) Google Assistant d) Calculator	CO1	R
3	Machine Learning is a subset of a) Networking b) Cloud Computing c) Database Systems d) Artificial Intelligence	CO1	R
4	The main goal of AI is to a) Increase storage b) Mimic human intelligence c) Design hardware only d) Create networks	CO1	U
5	Which branch of AI focuses on learning from data? a) Robotics b) Machine Learning c) Networking d) Cyber Security	CO1	U
6	AI is widely used in a) Healthcare b) Agriculture c) Education d) All of these	CO1	U

SI NO	MCQ QUESTION WITH OPTIONS	CO	CL
7	The first stage of AI Project Cycle is a) Evaluation b) Problem Identification c) Deployment d) Testing	CO2	R
8	Data annotation means a) Compressing data b) Encrypting data c) Labelling data d) Deleting data	CO2	U
9	Data cleaning is part of a) Deployment b) Prediction c) Evaluation d) Preprocessing	CO2	U
10	Which is an example of structured data? a) Database Table b) Video File c) Image File d) Audio File	CO2	U
11	Missing values are handled during a) Data Collection b) Data Preprocessing c) Deployment d) Evaluation	CO2	U
12	Data collected from sensors is used for a) Model Training b) Hardware Repair c) Formatting d) Networking	CO2	A
13	Predictive systems primarily use a) Random Data b) Historical Data c) Encrypted Data d) Corrupted Data	CO3	U
14	Face recognition is an application of a) NLP b) Robotics c) Computer Vision d) Networking	CO3	R
15	OCR is used for a) Image Compression b) Text Extraction from Images c) Data Encryption d) Recommendation	CO3	U
16	NLP deals with a) Human Language b) Hardware Design c) Networking d) Databases	CO3	R
17	Netflix uses	CO3	A

SI NO	MCQ QUESTION WITH OPTIONS	CO	CL
	a) Firewalls b) Recommendation Systems c) DBMS d) Compilers		
18	Reinforcement Learning learns through a) Compilation b) Formatting c) Interaction with Environment d) Encryption	CO3	A
19	Collaborative filtering is used in a) Recommendation Systems b) Scheduling c) Compression d) Encryption	CO4	U
20	Edge AI processes data a) In Browser b) Only in Cloud c) Near the Data Source d) In Printer	CO4	U
21	IoT stands for a) Integration of Technology b) Internet of Things c) Internet of Tools d) Input of Things	CO4	R
22	Smart sensors are commonly used in a) Operating Systems b) Compilers c) IoT Systems d) Databases	CO4	U
23	Industrial robots help in a) Browsing b) Automation c) Typing d) Printing	CO4	U
24	Robotics combines a) Hardware and Software b) Only Software c) Only Hardware d) Only Networks	CO4	U
25	Generative AI can a) Repair Hardware b) Route Packets c) Create Content d) Compress Files	CO5	A
26	Deepfakes are a) AI-generated Media b) Operating Systems c) Databases d) Networks	CO5	R
27	Responsible AI promotes a) Spam b) Piracy c) Fairness d) Bias	CO5	U

SI NO	MCQ QUESTION WITH OPTIONS	CO	CL
28	Bias in AI may cause a) Better Accuracy Always b) Unfair Decisions c) More Storage d) Faster Hardware	CO5	U
29	Transparency is a principle of a) Networking b) AI Ethics c) Database Systems d) Programming	CO5	U
30	Privacy is important in a) Printers b) Scanners c) Monitors d) AI Systems	CO5	U

II. Fill in the blank Questions (1 Marks Each)

SI NO	FILL IN THE BLANK QUESTION	CO	CL
1	_____ is the branch of computer science that enables machines to mimic human intelligence.	CO1	R
2	Machine Learning is a subset of _____.	CO1	R
3	Google Assistant is an example of an _____ application.	CO1	R
4	The primary goal of AI is to simulate _____ intelligence.	CO1	U
5	_____ learning enables systems to learn from data without explicit programming.	CO1	U
6	AI is widely used in healthcare, agriculture, and _____.	CO1	U
7	The first stage of the AI Project Cycle is _____ Identification.	CO2	R
8	The process of assigning labels to data is called data _____.	CO2	U
9	Data cleaning is a part of data _____.	CO2	U
10	A database table is an example of _____ data.	CO2	U
11	Missing values are handled during data _____.	CO2	U
12	Sensor data is commonly used for model _____.	CO2	A
13	Predictive systems use _____ data to forecast future outcomes.	CO3	U
14	Face recognition is an application of _____ Vision.	CO3	R
15	OCR stands for Optical Character _____.	CO3	U
16	NLP deals with processing human _____.	CO3	R
17	Netflix uses a _____ System to suggest movies and shows.	CO3	A
18	Reinforcement Learning learns through interaction with the _____.	CO3	A
19	Collaborative filtering is a technique used in _____ Systems.	CO4	U
20	Edge AI processes data near the data _____.	CO4	U
21	IoT stands for Internet of _____.	CO4	R

SI NO	FILL IN THE BLANK QUESTION	CO	CL
22	Smart sensors are commonly used in _____ systems.	CO4	U
23	Industrial robots help in _____.	CO4	U
24	Robotics combines hardware and _____.	CO4	U
25	Generative AI can create new _____ such as text, images, and videos.	CO5	A
26	Deepfakes are AI-generated _____.	CO5	R
27	Responsible AI promotes _____ and accountability.	CO5	U
28	AI bias may lead to _____ decisions.	CO5	U
29	Transparency is a key principle of AI _____.	CO5	U
30	Protecting user _____ is important in AI systems.	CO5	U

III. Questions carrying 2 Marks

SI NO	QUESTIONS	CO	CL
1	Define Artificial Intelligence.	CO1	R
2	List any two applications of Artificial Intelligence.	CO1	R
3	Differentiate between Artificial Intelligence and Machine Learning.	CO1	U
4	State any two advantages of AI.	CO1	U
5	What is Machine Learning?	CO1	R
6	Mention any two real-world applications of AI.	CO1	U
7	List the stages of the AI Project Cycle.	CO2	R
8	What is data annotation?	CO2	U
9	Define structured data with an example.	CO2	U
10	What is data preprocessing?	CO2	U
11	Why is data cleaning important in AI projects?	CO2	U
12	Mention any two sources of data collection for AI applications.	CO2	A
13	Define Predictive System.	CO3	R
14	What is Computer Vision?	CO3	R
15	Expand OCR and mention its use.	CO3	U
16	Define Natural Language Processing (NLP).	CO3	R
17	What is a Recommendation System?	CO3	U
18	Define Reinforcement Learning.	CO3	U
19	What is Collaborative Filtering?	CO4	U
20	Define Edge AI.	CO4	R
21	What is IoT?	CO4	R
22	State any two applications of IoT.	CO4	U
23	Define Robotics.	CO4	R
24	What is Industrial Automation?	CO4	U

SI NO	QUESTIONS	CO	CL
25	What is Generative AI?	CO5	R
26	Define Deepfake Technology.	CO5	U
27	What is Responsible AI?	CO5	U
28	Define AI Bias.	CO5	U
29	What is Transparency in AI?	CO5	U
30	Why is Privacy important in AI systems?	CO5	U

IV. Questions carrying 3 Marks

SI NO	QUESTIONS	CO	CL
1	Explain the concept of Artificial Intelligence and its importance in modern technology.	CO1	U
2	Describe the evolution of Artificial Intelligence.	CO1	U
3	Differentiate between AI, Machine Learning, and Deep Learning.	CO1	U
4	Explain any three applications of AI in daily life.	CO1	U
5	Discuss the benefits of AI in healthcare and education.	CO1	A
6	Explain the role of AI in solving real-world problems.	CO1	A
7	Explain the stages of the AI Project Cycle.	CO2	U
8	Describe the process of data collection in AI projects.	CO2	U
9	Explain the importance of data annotation with examples.	CO2	U
10	Differentiate between structured and unstructured data.	CO2	U
11	Explain the steps involved in data preprocessing.	CO2	A
12	Discuss the significance of quality data in AI systems.	CO2	A
13	Explain the working of a Predictive System with an example.	CO3	U
14	Describe the applications of Predictive Analytics in business.	CO3	A
15	Explain how Computer Vision is used in facial recognition systems.	CO3	U
16	Describe the working of Optical Character Recognition (OCR).	CO3	U
17	Explain the components of a Natural Language Processing system.	CO3	U
18	Discuss the applications of NLP in chatbots and virtual assistants.	CO3	A
19	Explain the working principle of Recommendation Systems.	CO4	U
20	Describe Content-Based Filtering and Collaborative Filtering.	CO4	U
21	Explain the concept of Reinforcement Learning with an example.	CO4	A
22	Discuss the role of Edge AI in real-time decision-making.	CO4	U
23	Explain the integration of AI and IoT in smart applications.	CO4	A
24	Describe the applications of Robotics in industrial automation.	CO4	U
25	Explain the ethical issues associated with Generative AI and Deepfake technology.	CO5	A

V. Questions carrying 5 Marks

SI No	Question	CO	CL
1	Illustrate the working of an Artificial Intelligence system with a suitable real-world example.	CO1	A
2	Compare and contrast Artificial Intelligence, Machine Learning, and Deep Learning with suitable examples.	CO1	AN
3	Demonstrate how AI is transforming healthcare, education, and agriculture sectors.	CO1	A
4	Analyze the advantages and limitations of Artificial Intelligence in modern society.	CO1	AN
5	Apply AI concepts to propose a solution for a smart traffic management system.	CO1	A
6	Illustrate the AI Project Cycle with a neat diagram and explain each stage.	CO2	A
7	Apply the AI Project Cycle to develop a student performance prediction system.	CO2	A
8	Analyze the importance of data collection, annotation, and preprocessing in AI projects.	CO2	AN
9	Examine the impact of poor-quality data on the performance of AI models.	CO2	AN
10	Demonstrate the process of preparing a dataset for AI model training.	CO2	A
11	Apply predictive analytics to forecast sales in a retail business scenario.	CO3	A
12	Illustrate the architecture and working of a Predictive System with an example.	CO3	A
13	Analyze the role of Computer Vision in healthcare and security applications.	CO3	AN
14	Demonstrate how OCR technology converts image-based text into machine-readable text.	CO3	A
15	Apply Natural Language Processing techniques in developing an intelligent chatbot.	CO3	A
16	Analyze the significance of sentiment analysis in social media applications.	CO3	AN
17	Illustrate the working of a Recommendation System using a suitable example.	CO4	A
18	Compare and contrast Content-Based Filtering and Collaborative Filtering techniques.	CO4	AN
19	Apply Reinforcement Learning concepts to train an autonomous game-playing agent.	CO4	A
20	Analyze the role of rewards and penalties in Reinforcement Learning.	CO4	AN
21	Demonstrate how IoT and Edge AI work together in a smart city application.	CO4	A
22	Analyze the impact of Robotics and Automation on industrial productivity.	CO4	AN
23	Examine the ethical challenges associated with Generative AI technologies.	CO5	AN
24	Analyze the risks, misuse, and societal impact of Deepfake technology.	CO5	AN
25	Apply Responsible AI principles to design a fair and transparent AI-based recruitment system.	CO5	A

IV. Questions carrying 10 Marks

SI NO	QUESTIONS	CO	CL
1	Analyze the evolution, scope, and applications of Artificial Intelligence in modern society with suitable examples.	CO1	AN

SI NO	QUESTIONS	CO	CL
2	Compare and contrast Artificial Intelligence, Machine Learning, and Deep Learning with neat illustrations and real-world applications.	CO1	AN
3	Evaluate the advantages, limitations, and future prospects of Artificial Intelligence in various domains.	CO1	AN
4	Design an AI-based solution for a smart healthcare monitoring system and explain its working.	CO1	A
5	Analyze each stage of the AI Project Cycle and illustrate its application in a real-world problem.	CO2	AN
6	Develop a complete AI project plan for predicting student academic performance using the AI Project Cycle.	CO2	A
7	Examine the role of data collection, annotation, preprocessing, and feature selection in building effective AI models.	CO2	AN
8	Assess the impact of data quality issues on AI model performance and propose suitable remedies.	CO2	AN
9	Analyze the architecture, working, and applications of Predictive Systems with a suitable case study.	CO3	AN
10	Evaluate the significance of Computer Vision in healthcare, surveillance, and autonomous systems with examples.	CO3	AN
11	Analyze the working of Optical Character Recognition (OCR) and explain its industrial applications.	CO3	A
12	Design an NLP-based intelligent chatbot and explain the role of various NLP components involved.	CO3	A
13	Examine the applications of sentiment analysis and discuss its advantages and challenges.	CO3	AN
14	Analyze the architecture and working of Recommendation Systems and explain their role in e-commerce platforms.	CO4	AN
15	Compare and contrast Content-Based Filtering and Collaborative Filtering techniques with suitable examples.	CO4	AN
16	Design a Reinforcement Learning model for an autonomous game-playing agent and explain the learning process.	CO4	A
17	Evaluate the role of IoT and Edge AI in enabling smart city applications with suitable examples.	CO4	AN
18	Analyze the impact of Robotics and Automation on industrial productivity, employment, and society.	CO4	AN
19	Examine the ethical challenges, risks, and societal implications of Generative AI and Deepfake technologies.	CO5	AN
20	Design and justify a Responsible AI framework for an AI-based recruitment system ensuring fairness, transparency, accountability, and privacy.	CO5	A

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications

Programme Name: Computer Science & Engineering

Seme: 5

Course Code and Name: Cloud Security & Compliance, 25CS53IB

	Cognitive Level	Remembering						Understanding						Application							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weightage
No.	Type	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	3	1	1						1	1	1	1	0			0	1			
	Marks	3	1	2	0	0	0	0	0	2	3	5	10	0		0	0	5	0	24	16
CO-2	No. of Questions	3	1	1	1					1	1	1	0					2	1		
	Marks	3	1	2	3	0	0	0	0	2	3	5	0	0	0	0	0	10	10	53	35
CO-3	No. of Questions	3	1		1					1	1	1	1			1		1			
	Marks	3	1		3	0	0	0	0	2	3	5	10	0	0	2	0	5	0	22	15
CO-4	No. of Questions	3	1							1	1		0					1	1		
	Marks	3	1		0		0	0	0	2	3	0	0	0	0	0	0	5	10	28	19
CO-5	No. of Questions	3	1							1	1						1		1		
	Marks	3	1		0		0	0		2	3	0	0	0	0	0	3	0	10	23	15
Marks		15	5	4	6		0	0		10	15	15	20	0	0	2	3	25	30		
Total		30						60						60						150	100%
%		20						40						40						100	

Government of Karnataka
Department of Technical Education
Board of Technical Examination
Diploma in Computer Science & Engineering – Semester V

MODEL QUESTION PAPER-1

Course: Cloud Security & Compliance

25CS53IB

Duration: 3 Hours

Max. Marks: 100

Instructions:

1. For Part-A questions, only the first written answers will be considered for evaluation.
2. Answer any FIVE questions from Part-B, Part-C and Part-D Section-I.
3. Answer any THREE questions from Part-D Section-II.
4. Draw neat sketches wherever necessary.
5. Figures to the right indicate marks.

Q.no	Question	Marks	CO	CL
PART – A				
I. Select the correct answer from the choices given			(15 × 1 = 15)	
1	Which cloud service model places the most security responsibility on the customer? a) SaaS b) PaaS c) IaaS d) FaaS	1	CO1	R
2	Which principle states that users should only be given the permissions needed to perform their tasks? a) Separation of Duties b) Least Privilege c) Zero Trust d) Defense in Depth	1	CO1	R
3	Which of the following adds an extra layer of protection to user logins? (A) VPC (B) KMS (C) MFA (D) DoS	1	CO1	R
4	Which algorithm is primarily used for symmetric data encryption at rest? a) RSA b) AES c) SHA-256 d) ECC	1	CO2	R

5	Which AWS service provides centralized key management for data encryption? a) AWS KMS b) Amazon S3 c) AWS CloudTrail d) AWS Shield	1	CO2	R
6	To isolate cloud resources from the public internet, you should configure a) Public Subnet b) Content Delivery Network c) Virtual Private Cloud (VPC) d) Load Balancer	1	CO2	R
7	What is the European privacy law that heavily impacts cloud data storage and compliance? a) HIPAA b) GDPR c) PCI-DSS d) ISO 27001	1	CO3	R
8	The concept that data is subject to the laws of the country in which it is located is known as: a) Data Portability b) Data Localization c) Data Sovereignty d) Data Integrity	1	CO3	R
9	Which document/portal provides AWS compliance reports to customers? (CO3, U) a) AWS Artifact b) AWS Trusted Advisor c) AWS Config d) AWS CloudFormation	1	CO3	R
10	DevSecOps integrates security into which pipeline? a) Data Processing Pipeline b) CI/CD Pipeline c) Network Traffic Pipeline d) Sales Pipeline	1	CO4	R
11	Which of the following is an Azure service used for Container Security? a) Azure Functions b) AKS (Azure Kubernetes Service) c) Azure Blob Storage d) Azure Cosmos DB	1	CO4	R
12	What does CSPM stand for in cloud security? a) Cloud Service Provider Management b) Cloud Security Posture Management c) Cloud System Protocol Monitor d) Continuous Security Provisioning Model	1	CO4	R
13	A security model that requires strict identity verification for every person and device trying to access resources, regardless of location, is called: (CO5, R) a) Perimeter Security b) Hybrid Cloud c) Zero Trust Security d) Multi-Factor Security	1	CO5	R
14	CSPM stands for: (A) Cloud Security Posture Management (B) Cloud System	1	CO5	R

	Performance Monitor (C) Compute Storage Protocol Mechanism (D) Core Security Policy Maker			
15	Which security model assumes that no user or device is trusted by default, even if they are inside the network perimeter? (A) Defense in Depth (B) Zero Trust (C) Shared Responsibility (D) Perimeter Security	1	CO5	R

II. Fill in the blanks by choosing the appropriate answer from the bracket (5 × 1 = 5)
(Multi-Cloud, AWS CloudTrail, GuardDuty, MFA, Encryption)

16	_____ is an AWS service used specifically for API logging and auditing.	1	CO3	R
17	_____ adds an extra layer of protection on top of a username and password.	1	CO1	R
18	17. Converting plain text into unreadable ciphertext is known as _____.	1	CO2	R
19	AWS _____ is an intelligent threat detection service that continuously monitors for malicious activity.	1	CO4	R
20	A strategy that uses services from more than one cloud provider is known as a _____ environment.	1	CO5	R

PART – B

III. Answer ANY FIVE of the following (5 × 2 = 10)

21	State any two common cloud security threats.	2	CO1	R
22	What is the purpose of a Security Group in AWS?	2	CO2	R
23	Explain the term 'Data Localization'.	2	CO3	U
24	Briefly define the term 'Data Breach'.	2	CO1	U
25	Define 'Incident Response' in a cloud context.	2	CO2	U
26	Why is 'Data Sovereignty' a concern for multinational companies?	2	CO3	A

27	Define a CI/CD pipeline.	2	CO4	U
28	What is the Zero Trust Security Model?	2	CO5	U
PART – C IV. Answer ANY FIVE of the following (5 × 3 = 15)				
29	Explain how data is encrypted in transit using SSL/TLS.	3	CO2	R
30	State the three main objectives of the HIPAA compliance framework.	3	CO3	R
31	Discuss the role of IAM Roles versus IAM Users.	3	CO1	U
32	Explain how infrastructure-as-code (IaaS) improves cloud security consistency.	3	CO4	U
33	How does Blockchain technology potentially enhance cloud security?	3	CO5	U
34	Briefly explain how OAuth and JWT can secure cloud-based APIs.	3	CO3	U
35	Discuss the benefits of using AWS KMS for encryption.	3	CO2	U
36	Analyze the impact of a Zero Trust architecture on traditional perimeter security.	3	CO5	A
PART – D Section I V. Answer ANY FIVE of the following (5 × 5 = 25)				
37	Explain the Shared Responsibility Model with a neat diagram.	5	CO1	U
38	Explain the implications of Data Sovereignty laws on a global cloud deployment.	5	CO3	U
39	Discuss how Virtual Private Clouds (VPCs) and Subnets are configured to secure cloud networks.	5	CO2	U
40	Detail the security implications of moving from a traditional on-premise data center to an IaaS cloud model.	5	CO1	A

41	Formulate a centralized monitoring strategy for AWS using CloudWatch and AWS Security Hub.	5	CO2	A
42	Explain the process of setting up a secure VPN connection between a corporate office and a cloud VPC.	5	CO2	A
43	Analyze the security risks associated with serverless architectures (like AWS Lambda) and suggest mitigations.	5	CO4	A
44	Detail the best practices for Secure Software Development (SDLC) in the cloud.	5	CO3	A
PART – D Section II VI. Answer ANY THREE of the following (3 × 10 = 30)				
45	Explain the Shared Responsibility Model across IaaS, PaaS, and SaaS. How does this model dictate the security configurations a customer must manage?	10	CO1	U
46	Design a secure network architecture on AWS/Azure for a web application handling sensitive financial data. Ensure your design incorporates VPCs, public/private subnets, Security Groups, Network ACLs, and automated monitoring.	10	CO2	A
47	Comprehensively explain the implementation of secure authentication and authorization for a cloud-native SaaS application. Detail the OAuth 2.0 authorization code flow and how JWTs securely transmit claims between microservices.	10	CO3	U
48	Evaluate the challenges of securing a Hybrid and Multi-Cloud environment. Propose an architectural solution that implements centralized IAM, unified monitoring, and a Zero Trust framework.	10	CO5	A
49	Write a comprehensive note on DevSecOps. Explain how tools like Terraform/CloudFormation automate security configurations, and discuss container security in environments like EKS or AKS.	10	CO4	A

Question Bank: Cloud Security and Compliance (25CS53IB)

MCQ

Q.No	Question	Marks	CO	Cognitive Level
1	What does IAM stand for in cloud security? (A) Internet Access Module (B) Identity and Access Management (C) Internal Application Monitoring (D) Intrusion Alert Mechanism	1	CO-01	Remembering
2	Which cloud service model provides the infrastructure, but leaves OS and application security entirely to the user? (A) SaaS (B) PaaS (C) IaaS (D) DaaS	1	CO-01	Remembering
3	In the Shared Responsibility Model, who is primarily responsible for the physical security of the data center? (A) The Customer (B) The Cloud Provider (C) The Auditor (D) The End User	1	CO-01	Remembering
4	Which of the following adds an extra layer of protection to user logins? (A) VPC (B) KMS (C) MFA (D) DoS	1	CO-01	Remembering
5	A malicious insider threat is best mitigated by applying: (A) DDoS Protection (B) Open network access (C) Principle of Least Privilege (D) Unencrypted storage	1	CO-01	Remembering
6	Which is a primary challenge in Cloud Security compared to Traditional Security? (A) Physical locks on doors (B) Lack of direct control over the physical infrastructure (C) Slower hardware (D) Fewer available tools	1	CO-01	Remembering
7	Which AWS service is specifically designed for creating and managing cryptographic keys? (A) AWS IAM (B) AWS KMS (C) AWS Shield (D) Amazon S3	1	CO-02	Remembering
8	What acts as a virtual firewall for your EC2 instances to control inbound and outbound traffic? (A) Route 53 (B) Security Group (C) Amazon CloudFront (D) AWS ACM	1	CO-02	Remembering
9	Which service provides protection against Distributed Denial of Service (DDoS) attacks on AWS? (A) AWS Shield (B) AWS KMS (C) AWS CloudTrail (D) Amazon Macie	1	CO-02	Remembering
10	Network ACLs (Access Control Lists) operate at which level within a Virtual Private Cloud (VPC)? (A) Instance level (B) Region level (C) Subnet level (D) Account level	1	CO-02	Remembering
11	Which AWS tool is utilized to monitor and log all API calls made within an account? (A) CloudWatch (B) CloudTrail (C) Security Hub (D) Config	1	CO-02	Remembering
12	Data encrypted while it is moving across a network is known as data encrypted: (A) At rest (B) In transit (C) In memory (D) In isolation	1	CO-02	Remembering
13	Which compliance framework governs the protection of personal data for citizens in the European Union? (A) HIPAA (B) PCI-DSS (C) GDPR (D) FedRAMP	1	CO-03	Remembering

14	HIPAA is a regulatory compliance framework primarily focused on which industry? (A) Financial (B) Healthcare (C) E-commerce (D) Education	1	CO-03	Remembering
15	Which AWS portal provides on-demand access to AWS's security and compliance reports? (A) AWS Artifact (B) AWS Config (C) AWS Trusted Advisor (D) AWS Shield	1	CO-03	Remembering
16	Data Sovereignty refers to: (A) Encrypting all data (B) Deleting unused data (C) Data being subject to the laws of the country where it is physically located (D) Compressing data	1	CO-03	Remembering
17	In DevSecOps, what does SDLC stand for? (A) Security Development Lifecycle (B) Software Development Life Cycle (C) System Deployment Life Cycle (D) Secure Data Logic Control	1	CO-03	Remembering
18	Which international standard formally specifies an Information Security Management System (ISMS)? (A) ISO 27001 (B) IEEE 802.11 (C) NIST 800-53 (D) SOC 2	1	CO-03	Remembering
19	Which of the following is an example of an AWS serverless compute service? (A) Amazon EC2 (B) Amazon S3 (C) AWS Lambda (D) Amazon VPC	1	CO-04	Remembering
20	What does EKS stand for in the context of AWS container services? (A) Elastic Kernel Service (B) Elastic Kubernetes Service (C) Encrypted Key Store (D) Enterprise Knowledge System	1	CO-04	Remembering
21	Integrating security checks directly into CI/CD pipelines is a core principle of: (A) Traditional Waterfall (B) DevSecOps (C) ITIL (D) Manual Auditing	1	CO-04	Remembering
22	Which Azure service provides a cloud-native SIEM (Security Information and Event Management) solution? (A) Azure Sentinel (B) Azure Functions (C) Azure Blob (D) Azure VNet	1	CO-04	Remembering
23	AWS GuardDuty is best described as a: (A) Managed firewall (B) Threat detection service using machine learning (C) Relational database (D) Key management system	1	CO-04	Remembering
24	CSPM stands for: (A) Cloud Security Posture Management (B) Cloud System Performance Monitor (C) Compute Storage Protocol Mechanism (D) Core Security Policy Maker	1	CO-04	Understanding
25	An infrastructure that strategically combines resources from AWS, Azure, and GCP is known as: (A) Single Cloud (B) Hybrid Cloud (C) Multi-Cloud (D) Private Cloud	1	CO-05	Understanding
26	Which security model assumes that no user or device is trusted by default, even if they are inside the network perimeter? (A) Defense in Depth (B) Zero Trust (C) Shared Responsibility (D) Perimeter Security	1	CO-05	Understanding

27	A deployment model that connects an organization's on-premises private infrastructure with a public cloud is called a: (A) Hybrid Cloud (B) Multi-Cloud (C) Community Cloud (D) SaaS	1	CO-05	Understanding
28	Which of the following is a prominent tool used for Multi-Cloud Security and posture management? (A) Microsoft Word (B) Prisma Cloud (C) Oracle DB (D) Apache HTTP	1	CO-05	Understanding
29	How is Blockchain increasingly being utilized in cloud security? (A) To speed up CPUs (B) To provide immutable, tamper-proof audit logs (C) To compress video files (D) To cool down servers	1	CO-05	Understanding
30	AI and Machine Learning are heavily used in modern cloud security primarily for: (A) Writing marketing copy (B) Creating UI designs (C) Automated anomaly and threat detection (D) Building physical servers	1	CO-05	Understanding

Fill in the Blanks

Q.No	Question	Marks	CO	Cognitive Level
31	In cloud computing, SaaS stands for _____ as a Service.	1	CO-01	Remembering
32	A sudden flood of malicious internet traffic meant to overwhelm a cloud application is called a _____ of Service attack.	1	CO-01	Remembering
33	The _____ Responsibility Model dictates which security tasks are handled by the provider and which by the customer.	1	CO-01	Remembering
34	In IAM, a _____ is a collection of users that all share the same permission policies.	1	CO-01	Remembering
35	MFA, or Multi-Factor _____, requires a user to provide two or more verification factors to gain access.	1	CO-01	Remembering
36	A malicious _____ is a threat actor who possesses authorized access to a cloud system but uses it to cause harm.	1	CO-01	Remembering
37	Data encryption _____ transit protects data while it is moving across networks.	1	CO-02	Remembering
38	AWS _____ is a managed service that makes it easy for you to create and control encryption keys.	1	CO-02	Remembering
39	A Virtual Private _____ (VPC) provides an isolated virtual network environment in the cloud.	1	CO-02	Remembering
40	Network _____ Lists act as a firewall at the subnet level within a VPC.	1	CO-02	Remembering
41	AWS _____ provides centralized management of security alerts and automated compliance checks.	1	CO-02	Remembering
42	In Azure, object storage is handled by Azure _____ Storage.	1	CO-02	Remembering
43	The _____ framework is a strict data privacy regulation enacted by the European Union.	1	CO-03	Remembering
44	Healthcare organizations in the US must ensure their cloud environments comply with the _____ regulatory framework.	1	CO-03	Remembering

45	Data _____ refers to the legal concept that digital data is subject to the laws of the country in which it is stored.	1	CO-03	Remembering
46	The process of integrating security practices into every phase of the Software Development Life Cycle is called _____.	1	CO-03	Remembering
47	In AWS, compliance reports and security agreements can be downloaded directly from the AWS _____ portal.	1	CO-03	Remembering
48	JSON Web Tokens (_____) are frequently used to secure APIs in cloud-based applications.	1	CO-03	Remembering
49	AWS _____ is a serverless compute service that runs code in response to events without provisioning servers.	1	CO-04	Remembering/U nderstanding
50	The Azure equivalent to AWS's managed Kubernetes service (EKS) is known as _____ (Azure Kubernetes Service).	1	CO-04	Remembering/U nderstanding
51	Integrating automated security testing into a CI/CD pipeline is a fundamental practice of _____.	1	CO-04	Remembering/U nderstanding
52	Cloud Security _____ Management (CSPM) tools continuously monitor cloud environments for risk and misconfigurations.	1	CO-04	Remembering/U nderstanding
53	AWS _____ is an intelligent threat detection service that continuously monitors for malicious activity.	1	CO-04	Remembering/U nderstanding
54	Azure _____ is Microsoft's cloud-native SIEM and SOAR solution for advanced threat response.	1	CO-04	Remembering/U nderstanding
55	A _____-cloud architecture utilizes cloud services from more than one public cloud provider, such as using both AWS and GCP.	1	CO-05	Remembering/U nderstanding
56	Integrating an on-premises enterprise data center with a public cloud provider creates a _____ cloud environment.	1	CO-05	Remembering/U nderstanding
57	The _____ Trust security model operates on the principle of 'never trust, always verify'.	1	CO-05	Remembering/U nderstanding
58	Tools like _____ Cloud are designed specifically to provide visibility and security across multi-cloud environments.	1	CO-05	Remembering/U nderstanding
59	_____ technology can be used in cloud security to create highly secure, decentralized, and immutable audit trails.	1	CO-05	Remembering/U nderstanding
60	Machine _____ algorithms analyze vast amounts of cloud log data to detect unusual patterns indicative of a cyber attack.	1	CO-05	Remembering/U nderstanding

Question Type: 2 Marks

Q.No	Question	Marks	CO	Cognitive Level
61	Define IaaS (Infrastructure as a Service).	2	CO-01	Remembering
62	What is the principle of Least Privilege in IAM?	2	CO-01	Remembering
63	State two common Cloud Security threats.	2	CO-01	Remembering
64	What is the Shared Responsibility Model?	2	CO-01	Remembering
65	Why is Multi-Factor Authentication (MFA) critical?	2	CO-01	Remembering
66	Define a malicious insider threat.	2	CO-01	Remembering
67	What is the difference between encryption 'at rest' and 'in transit'?	2	CO-02	Remembering
68	What is the function of AWS KMS?	2	CO-02	Remembering
69	Define a Virtual Private Cloud (VPC).	2	CO-02	Remembering
70	What is the difference between a Security Group and a Network ACL?	2	CO-02	Remembering
71	What is AWS CloudTrail used for?	2	CO-02	Remembering

72	What is the purpose of AWS Shield?	2	CO-02	Remembering
73	What does GDPR stand for and what is its primary purpose?	2	CO-03	Remembering
74	Define Data Sovereignty.	2	CO-03	Remembering
75	What is the function of AWS Artifact?	2	CO-03	Remembering
76	What is DevSecOps?	2	CO-03	Understanding
77	What is HIPAA?	2	CO-03	Understanding
78	Why are JWTs (JSON Web Tokens) used in cloud applications?	2	CO-03	Understanding
79	Define Serverless Computing.	2	CO-04	Understanding
80	What is the purpose of AWS GuardDuty?	2	CO-04	Understanding
81	What does CSPM stand for?	2	CO-04	Understanding
82	What is Amazon EKS?	2	CO-04	Understanding
83	Define a CI/CD pipeline.	2	CO-04	Understanding
84	What is the role of Azure Sentinel?	2	CO-04	Understanding
85	Define a Hybrid Cloud environment.	2	CO-05	Understanding
86	Define a Multi-Cloud strategy.	2	CO-05	Understanding
87	What is the Zero Trust Security Model?	2	CO-05	Understanding
88	List one tool used for Multi-Cloud security management.	2	CO-05	Understanding
89	How is Machine Learning used in cloud security?	2	CO-05	Understanding
90	What is a key security challenge in a Multi-Cloud environment?	2	CO-05	Understanding

Question Type: 3 Marks

Q.No	Question	Marks	CO	Cognitive Level
91	Explain the security implications of utilizing the SaaS service model compared to IaaS.	3	CO-01	Remembering/Understanding
92	Describe the key differences between traditional IT security and cloud-based security models.	3	CO-01	Understanding
93	How does IAM handle identity management through Users, Groups, and Roles?	3	CO-01	Remembering
94	Explain how a Denial of Service (DoS) attack specifically targets cloud infrastructure.	3	CO-01	Understanding
95	What are IAM Policies and how do they enforce security rules?	3	CO-01	Remembering
96	Discuss why insecure APIs are considered a major vulnerability in cloud applications.	3	CO-01	Remembering/Understanding
97	Explain how a VPC isolates network traffic using subnets.	3	CO-02	Remembering
98	Describe the process of encrypting an AWS EBS Volume using AWS KMS.	3	CO-02	Understanding
99	How does an Intrusion Detection System (IDS) function within a cloud network?	3	CO-02	Understanding
100	Explain the role of AWS Security Hub in centralizing security alerts.	3	CO-02	Remembering/Understanding
101	Describe how to securely store SSL/TLS certificates using AWS Certificate Manager (ACM).	3	CO-02	Remembering/Understanding

102	What is the process of setting up Automated Incident Response using cloud-native monitoring tools?	3	CO-02	Remembering/Understanding
103	Explain the importance of the ISO 27001 standard for a cloud service provider.	3	CO-03	Remembering/Understanding
104	How do Data Localization Laws impact where a company can host its cloud databases?	3	CO-03	Remembering/Understanding
105	Describe the process of generating and reviewing compliance reports using Azure Compliance Manager.	3	CO-03	Understanding
106	Explain how the Secure Software Development Life Cycle (SDLC) is implemented in the cloud.	3	CO-03	Understanding
107	How do you secure API endpoints using OAuth in a cloud environment?	3	CO-03	Understanding
108	Discuss the security considerations when migrating an application to a PaaS environment.	3	CO-03	Understanding
109	Explain the security advantages of using serverless architectures like AWS Lambda.	3	CO-04	Understanding
110	Describe how security is integrated into a CI/CD pipeline (DevSecOps).	3	CO-04	Understanding
111	How does AWS Inspector help in maintaining container and EC2 security?	3	CO-04	Remembering/Understanding
112	Explain the role of Microsoft Defender for Cloud in Azure environments.	3	CO-04	Remembering/Understanding
113	What are the best practices for securing containerized workloads in Kubernetes (AKS/EKS)?	3	CO-04	Remembering/Understanding
114	How is Threat Intelligence actively applied in cloud security posture management?	3	CO-04	Remembering/Understanding
115	Compare the security complexities of a Hybrid Cloud versus a Single Public Cloud.	3	CO-05	Remembering/Understanding
116	Explain how Prisma Cloud (or CloudBolt) assists in securing multi-cloud architectures.	3	CO-05	Remembering/Understanding
117	Describe the core principles required to implement a Zero Trust architecture in a cloud network.	3	CO-05	Remembering/Understanding
118	How can Blockchain technology provide immutable audit trails for cloud transactions?	3	CO-05	Remembering/Understanding
119	Discuss how AI-driven anomaly detection mitigates zero-day threats in the cloud.	3	CO-05	Remembering/Understanding
120	What are the specific IAM challenges when managing identities across a Multi-Cloud environment?	3	CO-05	Remembering/Understanding

Question Type: 5 Marks

Q.No	Question	Marks	CO	Cognitive Level
121	Analyze a scenario where a company suffers a data breach due to an overly permissive S3 bucket. Explain how applying the Shared	5	CO-01	Application/Understanding

	Responsibility Model and IAM policies could have prevented it.			
122	Compare and contrast the security challenges of managing an on-premises data center versus an AWS-hosted infrastructure.	5	CO-01	Understanding
123	Design a secure IAM hierarchy for a startup with Developers, HR, and Admin teams, explicitly detailing the use of Roles, Groups, and MFA.	5	CO-01	Understanding
124	Evaluate the threat of 'Malicious Insiders' in a cloud environment and propose three strategic mitigation techniques.	5	CO-01	Understanding
125	Explain how insecure APIs expose cloud applications to vulnerabilities and demonstrate how to secure them.	5	CO-01	Application
126	Analyze the operational impact of a Distributed Denial of Service (DDoS) attack on an e-commerce cloud platform and discuss mitigation strategies.	5	CO-01	Application
127	Design a secure network architecture using an AWS VPC, detailing the placement of public subnets, private subnets, Security Groups, and NACLs.	5	CO-02	Understanding
128	Formulate an incident response plan utilizing AWS CloudWatch and CloudTrail to automatically detect and isolate a compromised EC2 instance.	5	CO-02	Application
129	Explain the end-to-end process of implementing encryption 'at rest' and 'in transit' for an Azure Blob Storage environment.	5	CO-02	Understanding
130	Demonstrate how AWS Shield and a properly configured Web Application Firewall (WAF) collaborate to prevent DDoS and SQL injection attacks.	5	CO-02	Understanding
131	Evaluate the effectiveness of Cloud Firewalls versus traditional physical firewalls when managing highly scalable cloud traffic.	5	CO-02	Understanding
132	Outline a step-by-step procedure to perform a forensic investigation on a cloud server using logs from AWS Security Hub.	5	CO-02	Application
133	Analyze the legal and technical implications of GDPR compliance for a US-based company storing European customer data in an AWS region.	5	CO-03	Application
134	Design a compliance auditing strategy for a healthcare application using AWS Artifact to ensure HIPAA adherence.	5	CO-03	Understanding
135	Evaluate the impact of Data Sovereignty and Data Localization laws on selecting global availability zones for cloud deployment.	5	CO-03	Understanding
136	Formulate a strategy for implementing DevSecOps principles to secure a SaaS application during its development lifecycle.	5	CO-03	Understanding

137	Explain how to technically secure cloud-based APIs utilizing JWT (JSON Web Tokens) and OAuth 2.0 authorization frameworks.	5	CO-03	Understanding
138	Analyze a case study where failure to implement proper cloud governance resulted in massive compliance fines, and outline the corrective Azure Compliance Manager configurations.	5	CO-03	Understanding
139	Design a secure CI/CD pipeline using GitHub Actions or AWS CodePipeline that includes automated vulnerability scanning before deploying to AWS EKS.	5	CO-04	Application
140	Evaluate the unique security threats associated with Serverless computing (AWS Lambda) compared to traditional virtual machines, and propose mitigation strategies.	5	CO-04	Understanding
141	Demonstrate how AWS GuardDuty utilizes machine learning threat intelligence to identify unauthorized cryptocurrency mining in an AWS account.	5	CO-04	Application
142	Explain the configuration and security monitoring capabilities of Microsoft Defender for Cloud across an Azure infrastructure.	5	CO-04	Understanding
143	Formulate a comprehensive security posture management strategy using CSPM tools to automatically detect misconfigured public buckets and open ports.	5	CO-04	Application
144	Analyze the security architecture required to isolate and protect containerized microservices running within an Azure Kubernetes Service (AKS) cluster.	5	CO-04	Understanding
145	Design a secure Hybrid Cloud architecture connecting an on-premises corporate network to an AWS VPC using VPNs and encrypted tunnels.	5	CO-05	Understanding
146	Evaluate the operational and security challenges of managing a Multi-Cloud environment utilizing both AWS and GCP simultaneously.	5	CO-05	Application
147	Formulate an implementation plan for a Zero Trust Security Model across a remote workforce accessing cloud-based corporate applications.	5	CO-05	Application
148	Analyze how Blockchain technology can be integrated into cloud storage systems to guarantee the integrity and immutability of financial audit logs.	5	CO-05	Understanding
149	Explain how AI and Machine Learning are revolutionizing real-time threat detection and automated incident response in multi-cloud platforms.	5	CO-05	Understanding
150	Demonstrate how tools like Prisma Cloud provide a unified security posture, compliance	5	CO-05	Application

	reporting, and threat defense across a complex Multi-Cloud deployment.			
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Question Type: 10 Marks

Q.No	Question	Marks	CO	Cognitive Level
151	Comprehensively evaluate the Shared Responsibility Model across IaaS, PaaS, and SaaS models. Provide detailed examples of security tasks that shift between the cloud provider and the customer for each model.	10	CO-01	Application
152	Design an enterprise-grade Identity and Access Management (IAM) framework. Detail the implementation of RBAC (Role-Based Access Control), strict password policies, programmatic access keys rotation, and universal MFA enforcement.	10	CO-01	Application/Understanding
153	Analyze a major real-world cloud data breach (e.g., Capital One). Break down the attack vectors used (such as SSRF or misconfigured IAM roles), the vulnerabilities exploited, and the precise IAM and cloud security best practices that would have prevented it.	10	CO-01	Understanding
154	Compare Traditional IT Security architectures with modern Cloud Security architectures. Discuss the paradigm shift from perimeter-based firewalls to identity-centric security, elasticity, and programmable infrastructure.	10	CO-01	Application
155	Develop a comprehensive threat mitigation strategy for a financial services cloud migration. Explicitly address Data Breaches, Insecure APIs, Malicious Insiders, and DoS attacks with specific cloud-native counter-measures.	10	CO-01	Application
156	Evaluate the impact of poorly configured APIs in cloud ecosystems. Design a secure API architecture incorporating rate limiting, mutual TLS authentication, strict input validation, and API Gateway security controls.	10	CO-01	Application
157	Design a highly secure, multi-tier Virtual Private Cloud (VPC) architecture. Provide a detailed topology including Public/Private subnets, NAT Gateways, precise Security Group rules, subnet-level Network ACLs, and Bastion Hosts.	10	CO-02	Understanding
158	Develop an automated Incident Response mechanism in AWS. Detail how to use CloudTrail to track an unauthorized configuration change, trigger an EventBridge rule, execute a Lambda function to isolate the resource, and notify the security team via SNS.	10	CO-02	Application

159	Comprehensively explain Data Protection in the cloud. Detail the mathematical and structural differences between protecting data 'At Rest' using AWS KMS (Envelope Encryption) and 'In Transit' using AWS ACM (TLS Certificates).	10	CO-02	Application
160	Analyze the implementation of Intrusion Detection and Prevention Systems (IDS/IPS) in a cloud environment. Compare agent-based host IPS with network-based cloud firewalls (like AWS Network Firewall) in detecting lateral movement.	10	CO-02	Understanding
161	Formulate a complete log management and security auditing strategy using Azure Monitor and AWS CloudWatch. Detail the retention policies, metric filters, and dashboard configurations required for proactive threat hunting.	10	CO-02	Application
162	Evaluate the defensive architecture against DDoS attacks on public-facing cloud applications. Detail how combining AWS Route 53, Amazon CloudFront, AWS WAF, and AWS Shield Advanced creates a resilient, globally distributed defense layer.	10	CO-02	Understanding
163	Analyze the complexities of Cloud Compliance for a multinational healthcare corporation. Detail how you would architect their cloud environment to simultaneously satisfy HIPAA (US Healthcare), GDPR (EU Privacy), and ISO 27001 standards.	10	CO-03	Understanding
164	Evaluate the legal and technical hurdles of Data Sovereignty and Data Localization laws. Propose a cloud architecture strategy that ensures a global e-commerce application stores user data strictly within their respective geographic borders.	10	CO-03	Application
165	Design a secure Software Development Life Cycle (SDLC) tailored for the cloud. Detail the exact security gates required during the planning, coding (SAST), building (SCA), testing (DAST), and deployment phases.	10	CO-03	Understanding
166	Develop a comprehensive compliance auditing process utilizing AWS Artifact and AWS Config. Explain how to generate audit-ready reports for external regulators proving that all EBS volumes are encrypted and no S3 buckets are public.	10	CO-03	Understanding
167	Comprehensively explain the implementation of secure authentication and authorization for a cloud-native SaaS application. Detail the OAuth 2.0 authorization code flow and how JWTs securely transmit claims between microservices.	10	CO-03	Application

168	Analyze the process of performing Security Assessments and Penetration Testing in cloud environments. Discuss the strict rules of engagement imposed by cloud providers and the methodology for safely testing PaaS infrastructure.	10	CO-03	Understanding
169	Architect a fully automated DevSecOps CI/CD pipeline using cloud-native tools. Detail the integration of source code scanning, container image vulnerability scanning, infrastructure-as-code linting, and automated deployment to Amazon EKS.	10	CO-04	Application
170	Evaluate the unique security paradigm of Serverless Architectures (AWS Lambda/Azure Functions). Discuss risks such as event-data injection, overly broad execution roles, and insecure dependencies, proposing a secure serverless framework.	10	CO-04	Application
171	Design a secure containerized environment using Amazon EKS. Detail the implementation of Kubernetes Role-Based Access Control (RBAC), pod security policies, namespace isolation, and secure image registries (ECR).	10	CO-04	Application
172	Comprehensively analyze the role of Cloud Security Posture Management (CSPM). Detail how a CSPM tool continuously evaluates a multi-account cloud environment against compliance frameworks and automatically remediates drift.	10	CO-04	Application
173	Develop a proactive Threat Hunting and Incident Response strategy using Azure Sentinel and Microsoft Defender for Cloud. Explain how to set up data connectors, write KQL queries to detect anomalies, and automate playbooks for remediation.	10	CO-04	Understanding
174	Evaluate the machine learning capabilities of AWS GuardDuty and Amazon Macie. Detail how these services establish behavioral baselines, detect compromised EC2 instances, and automatically discover and protect PII stored in S3.	10	CO-04	Understanding
175	Design a highly secure Hybrid Cloud architecture for a banking institution. Detail the implementation of AWS Direct Connect/Azure ExpressRoute, VPN fallback, strict on-premises firewall routing, and consistent IAM synchronization using Active Directory.	10	CO-05	Understanding
176	Analyze the strategic and technical challenges of a Multi-Cloud deployment (AWS + GCP + Azure). Formulate a unified security architecture utilizing third-party tools like Prisma Cloud to maintain	10	CO-05	Understanding

	consistent compliance and threat visibility across all platforms.			
177	Comprehensively explain the implementation of a Zero Trust Security Model in a modern cloud ecosystem. Detail the enforcement of micro-segmentation, continuous identity verification, device health checks, and data-centric protection.	10	CO-05	Application
178	Evaluate the potential of Blockchain technology in revolutionizing cloud security. Discuss practical applications such as decentralized identity management, immutable logging of cloud API actions, and securing IoT device communications.	10	CO-05	Application
179	Analyze how Artificial Intelligence and Machine Learning are reshaping the cybersecurity landscape. Detail the arms race between AI-driven defensive tools (anomaly detection, automated SOAR) and AI-powered offensive threats (deepfakes, smart malware).	10	CO-05	Application
180	As a Lead Cloud Security Architect, develop a comprehensive 'Capstone' multi-cloud security policy for an enterprise. Ensure it dictates the strict standards for cross-cloud network peering, unified encryption key management, and automated disaster recovery.	10	CO-05	Application

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications
Programme Name: Computer Science and Engineering

Semester: 05

Course Code and Name: REST API Development with Spring Boot (25CS51IC)

	Cognitive Level	Remembering						Understanding						Application						Analysis							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weight age
No.	Type	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M	MC Q	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	2	1							1	1														1		
	Marks	2	1	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	10	18	12
CO-2	No. of Questions	4	1					1		2	2						2	1	1					1			
	Marks	4	1	0	0	0	0	1	0	4	6	0	0	0	0	0	6	5	10	0	0	0	0	5	0	42	28
CO-3	No. of Questions	4	1	1				1		2							3	2						2	1		
	Marks	4	1	2	0	0	0	1	0	4	0	0	0	0	0	0	9	10	0	0	0	0	0	10	10	51	34
CO-4	No. of Questions	2							1	1								1	1					1			
	Marks	2	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	5	10	0	0	0	0	5	0	25	16.6667
CO-5	No. of Questions		1					1		1			1														
	Marks	0	1	0	0	0	0	1	0	2	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	14	9.33333
Marks		12	4	2	0	0	0	3	1	14	9	0	10	0	0	0	15	20	20	0	0	0	0	20	20		
Total		18						37						55						40						150	100
%		12						24.66666667						36.66666667						26.66666667						100	

Govt. of Karnataka
Department of Technical Education
Board of Technical Examinations
Model Question Paper

Course: REST API Development with Spring Boot

Course Code– 25CS511C

Time: 3 Hours

Max. Marks: 100

Instructions:

For Part –A Questions, only the first written answers will be considered for Evaluation.

PART – A

I. Select the correct answer from the choices given.

(15 × 1 = 15)

Q.No	Question	CO	CL
1	Which technology provides scalable computing resources over the internet? a) IoT b) Cloud Computing c) Blockchain d) AR/VR	CO1	L1
2	Which company is known for cloud-based infrastructure using AWS? a) Tesla b) Amazon c) Netflix d) Oracle	CO1	L1
3	Which Spring container provides advanced bean management features? a) JVM b) Servlet c) ApplicationContext d) JDBC	CO2	L1
4	Which principle allows Spring to manage object creation and dependencies? a) Polymorphism b) Encapsulation c) IoC d) Inheritance	CO2	L1
5	Which annotation is used to bootstrap a Spring Boot application? a) @Controller b) @Service c) @SpringBootApplication d) @Bean	CO2	L1
6	Which file is used to manage Maven dependencies? a) build.xml b) pom.xml c) web.xml d) config.xml	CO2	L1
7	In MVC architecture, which component handles user requests? a) Model b) View c) Controller d) Entity	CO2	L2
8	Which HTTP method is used to create a new resource? a) GET b) POST c) DELETE d) PATCH	CO3	L1
9	Which annotation is used to define a REST controller? a) @Repository b) @Autowired c) @RestController d) @Entity	CO3	L1
10	Which HTTP status code indicates successful processing of a request? a) 404 b) 500 c) 200 d) 401	CO3	L1

Q.No	Question	CO	CL
11	Hibernate is a _____ framework. a) ORM b) Testing c) Security d) Logging	CO3	L1
12	Which annotation is used to extract values from a URL path? a) @RequestParam b) @PathVariable c) @Autowired d) @Bean	CO3	L2
13	JWT stands for _____. a) Java Web Token b) JSON Web Token c) Java Workflow Tool d) JSON Workflow Tool	CO4	L1
14	Which framework provides authentication and authorization in Spring applications? a) Spring MVC b) Spring Data JPA c) Spring Security d) Hibernate	CO4	L1
15	Mockito is mainly used for _____. a) Database connectivity b) Mock object creation c) API deployment d) Authentication	CO5	L2

II. Fill in the blanks by choosing appropriate answers from the bracket. (5 × 1 = 5)

(Data Transfer Object, Efficiency, Configuration, Representational State Transfer, Authorization)

Q.No	Question	CO	CL
16	Digital transformation helps organizations improve _____.	CO1	L1
17	Spring Boot supports automatic _____ of components.	CO2	L1
18	REST stands for _____.	CO3	L1
19	OAuth2 is used for secure _____.	CO4	L2
20	DTO stands for _____.	CO5	L1

PART – B

III. Answer ANY FIVE of the following. Each question carries TWO marks. (5 × 2 = 10)

Q.No	Question	CO	CL
21	Explain any two technologies driving digital transformation.	CO1	L2
22	Differentiate between IoC and DI.	CO2	L2
23	Explain any four advantages of Spring Boot.	CO2	L2
24	Describe REST and its constraints.	CO3	L2
25	Explain the purpose of ResponseEntity.	CO3	L2
26	List any four HTTP status codes with their meaning.	CO3	L1
27	Differentiate authentication and authorization.	CO4	L2
28	Explain the role of DTO in API development.	CO5	L2

PART – C

IV. Answer ANY FIVE of the following. Each question carries THREE marks. (5 × 3 = 15)

Q.No	Question	CO	CL
29	Explain the impact of digital transformation on enterprises.	CO1	L2
30	Describe the Spring Bean Lifecycle.	CO2	L2
31	Illustrate Spring Boot auto-configuration with an example.	CO2	L3
32	Demonstrate the phases of the Maven lifecycle.	CO2	L3
33	Explain MVC architecture with a neat diagram.	CO2	L2
34	Demonstrate the use of @PathVariable and @RequestParam with examples.	CO3	L3
35	Illustrate API testing using Postman.	CO3	L3
36	Demonstrate CRUD operations using Spring Data JPA.	CO3	L3

PART – D (SECTION – I)

V. Answer ANY FIVE of the following. Each question carries FIVE marks. (5 × 5 = 25)

Q.No	Question	CO	CL
37	Analyze the differences between Traditional Spring Framework and Spring Boot.	CO2	L4
38	Apply Dependency Injection in designing a Student Management application.	CO2	L3
39	Develop REST endpoints for an Employee Management System.	CO3	L3
40	Design REST endpoints for a Library Management System.	CO3	L4
41	Construct Entity and Repository classes for a Product Management application.	CO3	L3
42	Analyze the role of ORM in enterprise applications.	CO3	L4
43	Implement role-based access control using Spring Security.	CO4	L3
44	Examine the functions of Spring Security filters.	CO4	L4

PART – D (SECTION – II)

VI. Answer ANY THREE of the following. Each question carries TEN marks. (3 × 10 = 30)

Q.No	Question	CO	CL
45	Assess the digital maturity of an organization and recommend suitable digital transformation technologies.	CO1	L4
46	Develop a Spring Boot application using Maven and demonstrate project configuration.	CO2	L3
47	Design a RESTful Product Management API supporting CRUD operations using appropriate HTTP methods and status codes.	CO3	L4
48	Implement JWT-based authentication for a REST API and demonstrate the authentication workflow.	CO4	L3
49	Explain the role of DTOs, ModelMapper, JUnit, and Mockito in REST API development with suitable examples	CO5	L2

Government of Karnataka
Department of Collegiate and Technical Education
Board of Technical Examination
Model Question Bank

Programme Name: **Computer Science and Engineering**

Semester: **5**

Course Name: **REST API Development With Spring Boot**

Course Code: **25CS51IC**

I. Multiple Choice Questions (1 Marks Each)

SL. NO	QUESTION WITH OPTIONS	CO	CL
1	Which of the following is a key driver of digital transformation? A) Fax Machines B) Artificial Intelligence C) Typewriters D) Dot Matrix Printers	CO1	R
2	Which technology enables on-demand computing resources over the internet? A) Blockchain B) Mainframe Computing C) Cloud Computing D) Compiler	CO1	R
3	Which layer is primarily responsible for storing and managing data in enterprise applications? A) Presentation Layer B) Security Layer C) Business Layer D) Database Layer	CO1	U
4	Netflix uses which technology to provide personalized recommendations? A) Artificial Intelligence B) FTP C) SMTP D) Manual Processing	CO1	U
5	What is the primary purpose of the Spring Framework? A) Database Creation B) Enterprise Application Development C) Networking Management D) Operating System Management	CO2	R
6	Dependency Injection (DI) helps achieve: A) Tight Coupling B) Inheritance C) Loose Coupling D) Serialization	CO2	U
7	Which annotation is commonly used to declare a Spring-managed bean? A) @Component B) @Table C) @Entity D) @Column	CO2	R
8	What is a major advantage of Spring Boot? A) Requires XML Configuration B) No Auto Configuration C) No Embedded Server D) Auto Configuration and Faster Setup	CO2	U

SL. NO	QUESTION WITH OPTIONS	CO	CL
9	Which file contains Maven project configuration details? A) build.xml B) pom.xml C) web.xml D) config.xml	CO2	R
10	Which Maven lifecycle phase compiles source code? A) validate B) clean C) compile D) deploy	CO2	A
11	In MVC architecture, which component handles user requests? A) Controller B) Model C) Repository D) Service	CO2	U
12	Which annotation is used to mark the main Spring Boot application class? A) @Controller B) @Component C) @EnableWeb D) @SpringBootApplication	CO2	R
13	REST stands for: A) Remote State Transfer B) Representational State Transfer C) Resource State Tracking D) Runtime Service Transfer	CO3	R
14	Which HTTP method is generally used to retrieve data from a server? A) GET B) POST C) PUT D) DELETE	CO3	R
15	Which HTTP status code indicates successful processing of a request? A) 404 B) 500 C) 200 D) 301	CO3	U
16	Which annotation is used to create a REST controller in Spring Boot? A) @Controller B) @Component C) @Service D) @RestController	CO3	R
17	Which annotation is used to extract a value from a URL path? A) @RequestParam B) @PathVariable C) @Autowired D) @Bean	CO3	A
18	Which class is used to customize HTTP responses and status codes? A) ResponseEntity B) HttpRequest C) RequestBody D) HttpServlet	CO3	A
19	Which tool is widely used for testing REST APIs? A) Eclipse B) Maven C) Postman D) Tomcat	CO3	R
20	Which interface provides CRUD operations in Spring Data JPA? A) EntityManager B) CrudService C) JdbcTemplate D) JpaRepository	CO3	U
21	Authentication is the process of: A) Assigning Permissions B) Verifying Identity C) Encrypting Data D) Logging Requests	CO4	U
22	JWT stands for: A) JSON Web Token B) Java Web Token C) Java Widget Token D) JSON Widget Transfer	CO4	R
23	Which Spring Security concept determines what resources a user can access? A) Authentication B) Encryption C) Authorization D) Validation	CO4	U
24	Which framework is commonly used for unit testing Java applications? A) Hibernate B) Mockito C) Maven D) JUnit	CO5	R

SL. NO	QUESTION WITH OPTIONS	CO	CL
25	What is the primary purpose of DTOs (Data Transfer Objects)? A) Store Database Tables B) Transfer Data Between Layers C) Manage Security D) Configure Maven	CO5	AN

II. Fill in the blank Questions (1 Marks Each)

SL. NO	FILL IN THE BLANK	CO	CL
1	_____ is the process of integrating digital technologies into business operations.	CO1	R
2	_____ computing provides on-demand access to shared computing resources over the internet.	CO1	R
3	Artificial Intelligence enables machines to perform tasks that normally require human _____.	CO1	U
4	Netflix uses _____ algorithms to recommend movies and TV shows to users.	CO1	U
5	The Spring Framework promotes loose coupling through _____ Injection.	CO2	R
6	A Spring Boot project is typically managed using _____ or Gradle.	CO2	R
7	The _____ file contains Maven project configuration information.	CO2	R
8	The annotation used to mark the main Spring Boot application class is _____.	CO2	U
9	In MVC architecture, the _____ component handles incoming user requests.	CO2	U
10	Spring Boot provides an embedded _____ server for running web applications.	CO2	U
11	REST stands for Representational State _____.	CO3	R
12	The HTTP method used to retrieve resources from a server is _____.	CO3	R
13	The HTTP method commonly used to create a new resource is _____.	CO3	U
14	The annotation _____ is used to create RESTful web service controllers.	CO3	R
15	The annotation used to extract values from URL paths is _____.	CO3	A
16	The class _____ is used to customize HTTP responses and status codes.	CO3	A
17	_____ is a popular tool used for testing REST APIs.	CO3	R
18	In Spring Data JPA, the _____ interface provides CRUD operations.	CO3	U
19	_____ is the process of verifying the identity of a user.	CO4	U
20	JWT stands for JSON Web _____.	CO4	R

SL. NO	FILL IN THE BLANK	CO	CL
21	The Spring Security concept that controls access permissions is called _____.	CO4	U
22	Passwords should be stored in _____ form rather than plain text.	CO4	U
23	_____ is a widely used framework for unit testing Java applications.	CO5	R
24	DTO stands for Data Transfer _____.	CO5	R
25	Unit testing helps developers verify that individual software _____ work correctly.	CO5	AN

III. Questions carrying 2 Marks

SL. NO	QUESTIONS	CO	CL
1	Define Digital Transformation. Mention any two benefits of Digital Transformation in modern enterprises.	CO1	R
2	Explain Cloud Computing. List any two advantages of cloud-based services.	CO1	U
3	What is Artificial Intelligence (AI)? Mention any two real-world applications of AI.	CO1	U
4	Differentiate between traditional applications and digital applications (any two points).	CO1	AN
5	Define Enterprise Application. State any two characteristics of enterprise applications.	CO1	R
6	What is the Spring Framework? Mention any two features of Spring Framework.	CO2	R
7	Explain Dependency Injection (DI) with a suitable example.	CO2	U
8	What is Spring Boot? How is it different from the Spring Framework?	CO2	AN
9	What is Maven? Mention any two advantages of using Maven in Spring Boot projects.	CO2	U
10	Explain the purpose of the pom.xml file in a Maven project.	CO2	U
11	Draw and explain the MVC architecture used in Spring applications.	CO2	A
12	List any four commonly used Spring Boot annotations and their purpose.	CO2	R
13	Define REST. Mention any four characteristics of RESTful web services.	CO3	R
14	Differentiate between GET and POST HTTP methods.	CO3	AN
15	Explain the purpose of HTTP status codes with suitable examples.	CO3	U
16	What is the role of @RestController and @RequestMapping annotations in Spring Boot?	CO3	U
17	Explain the use of @PathVariable and @RequestParam with examples.	CO3	A
18	What is ResponseEntity? Why is it used in REST APIs?	CO3	U
19	What is Postman? Explain its role in REST API testing.	CO3	U

SL. NO	QUESTIONS	CO	CL
20	What is Spring Data JPA? Mention any two advantages of using JPA repositories.	CO3	U
21	Define Authentication and Authorization. Differentiate between them.	CO4	AN
22	What is JWT (JSON Web Token)? Mention its major components.	CO4	U
23	Explain the role of Spring Security in securing REST APIs.	CO4	U
24	What is Unit Testing? Mention any two advantages of unit testing.	CO5	R
25	Explain the purpose of DTO (Data Transfer Object) in Spring Boot applications.	CO5	A

IV. Questions carrying 3 Marks

SL. NO	QUESTION	CO	CL
1	Explain the impact of Digital Transformation on business organizations with suitable examples.	CO1	U
2	Describe the role of Cloud Computing in modern enterprise applications.	CO1	U
3	Explain how Artificial Intelligence and Machine Learning are transforming digital businesses.	CO1	AN
4	Compare traditional software systems with digital enterprise systems in terms of architecture, scalability, and accessibility.	CO1	AN
5	Explain the architecture of a typical enterprise application with a neat diagram.	CO1	A
6	Describe the architecture of the Spring Framework and explain its core modules.	CO2	U
7	Explain the concept of Inversion of Control (IoC) and Dependency Injection (DI) in Spring.	CO2	U
8	Compare Spring Framework and Spring Boot with respect to configuration, deployment, and development effort.	CO2	AN
9	Explain the Maven project lifecycle and its important phases.	CO2	U
10	Describe the role of Maven dependencies and repositories in a Spring Boot project.	CO2	U
11	Explain MVC architecture in Spring Boot with a suitable example.	CO2	A
12	Describe the purpose of commonly used Spring Boot annotations such as @SpringBootApplication, @Autowired, and @Component.	CO2	U
13	Explain the principles and constraints of RESTful web services.	CO3	U
14	Differentiate between REST and SOAP web services.	CO3	AN
15	Explain the functions of HTTP methods GET, POST, PUT, and DELETE with examples.	CO3	U
16	Discuss the significance of HTTP status codes in REST API development.	CO3	U

SL. NO	QUESTION	CO	CL
17	Explain the use of @RestController, @RequestMapping, and @PathVariable annotations with examples.	CO3	A
18	Describe the process of testing REST APIs using Postman.	CO3	A
19	Explain CRUD operations using Spring Data JPA repositories.	CO3	U
20	Discuss the role of ResponseEntity in handling API responses.	CO3	U
21	Explain the working of Authentication and Authorization in REST API security.	CO4	U
22	Describe the structure and working of a JSON Web Token (JWT).	CO4	U
23	Explain how Spring Security helps in securing REST APIs.	CO4	A
24	Discuss the importance of unit testing in software development using JUnit.	CO5	U
25	Explain the purpose and advantages of using DTOs in Spring Boot applications.	CO5	AN

V. Questions carrying 5 Marks

SL. NO	QUESTION	CO	CL
1	Explain the concept of Digital Transformation. Discuss its benefits and challenges faced by organizations during implementation.	CO1	AN
2	Describe how Cloud Computing, Artificial Intelligence, and Big Data contribute to digital business transformation.	CO1	AN
3	Explain the layered architecture of an enterprise application with a neat diagram.	CO1	A
4	Analyze the role of digital technologies in transforming traditional business processes into smart business solutions.	CO1	AN
5	Discuss the importance of enterprise applications in modern organizations and explain their key characteristics.	CO1	U
6	Explain the architecture of the Spring Framework and discuss the responsibilities of its core modules.	CO2	U
7	Illustrate the working of Inversion of Control (IoC) and Dependency Injection (DI) using a suitable Spring Boot example.	CO2	A
8	Compare Spring Framework and Spring Boot with respect to configuration, deployment, dependency management, and development effort.	CO2	AN
9	Explain the Maven Build Lifecycle. Discuss the purpose of important phases with examples.	CO2	U
10	Explain the complete flow of request processing in Spring MVC architecture with a neat diagram.	CO2	A
11	Develop the structure of a basic Spring Boot project and explain the role of each	CO2	A

SL. NO	QUESTION	CO	CL
	component.		
12	Explain the significance of Spring Boot starters, auto-configuration, and embedded servers in rapid application development.	CO2	AN
13	Explain REST architecture and discuss all REST constraints with suitable examples.	CO3	U
14	Compare REST and SOAP web services based on architecture, performance, scalability, and ease of development.	CO3	AN
15	Design a REST API for a Student Management System and explain the use of HTTP methods for CRUD operations.	CO3	A
16	Explain the lifecycle of a REST API request from client request to database response in Spring Boot.	CO3	A
17	Discuss different HTTP status codes used in REST APIs and explain their significance with examples.	CO3	U
18	Explain the implementation of database connectivity in Spring Boot using Spring Data JPA and Repository interfaces.	CO3	A
19	Explain Authentication and Authorization in REST APIs. Compare their roles in securing web applications.	CO4	AN
20	Describe the structure, generation, validation, and advantages of JSON Web Tokens (JWT) in API security.	CO4	U
21	Explain the architecture and workflow of Spring Security in securing RESTful web services.	CO4	A
22	Analyze common security threats in REST APIs such as SQL Injection, XSS, and CSRF, and suggest preventive measures.	CO4	AN
23	Explain Unit Testing in Spring Boot using JUnit. Write the steps involved in creating and executing test cases.	CO5	A
24	Discuss the importance of DTOs in enterprise applications. Explain how DTOs improve performance and maintainability.	CO5	AN
25	Explain the complete software development workflow for REST API development, testing, deployment, and maintenance using Spring Boot tools and frameworks.	CO5	AN

IV. Questions carrying 10 Marks

SL. NO	QUESTION	CO	CL
1	Explain Digital Transformation in detail. Discuss the technologies driving digital transformation and their impact on modern enterprises with suitable examples.	CO1	AN
2	Describe the architecture of an enterprise application. Explain the functions of each layer with a neat diagram.	CO1	A
3	Analyze the role of Cloud Computing, Artificial Intelligence, Big Data, and IoT in digital business transformation.	CO1	AN
4	Compare traditional enterprise applications with modern digital enterprise systems in terms of architecture, scalability, deployment, and maintenance.	CO1	AN
5	Discuss the challenges and opportunities faced by organizations during digital transformation. Illustrate with real-world examples.	CO1	AN
6	Explain the architecture of the Spring Framework. Discuss the role and interaction of its major modules with a neat diagram.	CO2	U
7	Describe Inversion of Control (IoC) and Dependency Injection (DI) in detail. Explain their implementation in Spring Boot with examples.	CO2	A
8	Compare Spring Framework and Spring Boot. Explain how Spring Boot simplifies enterprise application development.	CO2	AN
9	Explain Maven architecture and Build Lifecycle. Discuss the role of POM, dependencies, plugins, and repositories in project management.	CO2	U
10	Explain Spring MVC architecture. Describe the complete flow of request processing from client request to response generation using a neat diagram.	CO2	A
11	Design and explain the structure of a Spring Boot project for a Student Management System. Explain the role of Controller, Service, Repository, and Entity classes.	CO2	A
12	Explain Spring Boot auto-configuration, starter dependencies, embedded servers, and application properties with suitable examples.	CO2	AN
13	Explain REST architecture and discuss all REST constraints in detail with suitable examples.	CO3	U
14	Design a RESTful web service for an Employee Management System supporting CRUD operations. Explain the implementation using appropriate HTTP methods and URL mappings.	CO3	A
15	Explain the implementation of CRUD operations using Spring Boot REST APIs and Spring Data JPA with suitable code snippets.	CO3	A
16	Compare REST and SOAP web services based on architecture, communication protocol, performance, scalability, security, and ease of development.	CO3	AN

SL. NO	QUESTION	CO	CL
17	Explain the lifecycle of a REST API request in Spring Boot from client request to database interaction and response generation.	CO3	A
18	Discuss the role of Spring Data JPA in database integration. Explain entity mapping, repositories, and CRUD operations with examples.	CO3	U
19	Explain Authentication and Authorization mechanisms used in REST APIs. Discuss their implementation in Spring Security.	CO4	A
20	Describe the structure and working of JWT (JSON Web Token). Explain the process of token generation, validation, and authorization in REST APIs.	CO4	A
21	Explain the architecture and workflow of Spring Security. Discuss how it secures RESTful web services from unauthorized access.	CO4	U
22	Analyze common security threats in REST APIs such as SQL Injection, Cross-Site Scripting (XSS), Cross-Site Request Forgery (CSRF), and Broken Authentication. Suggest suitable countermeasures.	CO4	AN
23	Explain Unit Testing and Integration Testing in Spring Boot. Develop test cases using JUnit and discuss their importance in software quality assurance.	CO5	A
24	Explain the concept of DTO (Data Transfer Object). Discuss its implementation, advantages, and role in layered architecture with examples.	CO5	AN
25	Discuss best practices for developing, testing, securing, documenting, deploying, and maintaining REST APIs in Spring Boot applications.	CO5	AN

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications

Programme Name: Computer Science & Engineering

Semester: 5

Course Code and Name: Cyber Physical Systems 25CS51I

	Cognitive Level	Remembering						Understanding						Application							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weightage
No.	Type	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	3	1	1						1	1	1	1	0			0	1			
	Marks	3	1	2	0	0	0	0	0	2	3	5	10	0		0	0	5	0	24	16
CO-2	No. of Questions	3	1	1	1					1	1	1	0					2	1		
	Marks	3	1	2	3	0	0	0	0	2	3	5	0	0	0	0	0	10	10	53	35
CO-3	No. of Questions	3	1		1					1	1	1	1			1		1			
	Marks	3	1		3	0	0	0	0	2	3	5	10	0	0	2	0	5	0	22	15
CO-4	No. of Questions	3	1							1	1		0					1	1		
	Marks	3	1		0		0	0	0	2	3	0	0	0	0	0	0	5	10	28	19
CO-5	No. of Questions	3	1							1	1						1		1		
	Marks	3	1		0		0	0		2	3	0	0	0	0	0	3	0	10	23	15
Marks		15	5	4	6		0	0		10	15	15	20	0	0	2	3	25	30		
Total		30						60						60						150	100%
%		20						40						40						100	

Government of Karnataka
Department of Technical Education
Board of Technical Examination
Diploma in Computer Science & Engineering – Semester V

MODEL QUESTION PAPER-1

Course: Cyber Physical Systems

25CS51ID

Duration: 3 Hours

Max. Marks: 100

Instructions:

1. For Part-A questions, only the first written answers will be considered for evaluation.
2. Answer any FIVE questions from Part-B, Part-C and Part-D Section-I.
3. Answer any THREE questions from Part-D Section-II.
4. Draw neat sketches wherever necessary.
5. Figures to the right indicate marks.

Q.no	Question	Marks	CO	CL
PART – A				
I. Select the correct answer from the choices given			(15 × 1 = 15)	
1	Which of the following is NOT a core component of the CIA triad? a) Confidentiality b) Integrity c) Availability d) Authentication	1	CO1	R
2	Which layer of the OSI model does the IP protocol operate on? a) Data Link Layer b) Network Layer c) Transport Layer d) Application Layer	1	CO1	R
3	A physical device that responds to electronic signals to perform mechanical work in a CPS is called an: a) Actuator b) Sensor c) Microcontroller d) Router	1	CO1	R
4	Which protocol is primarily used for secure web communication? a) HTTP b) FTP c) HTTPS (SSL/TLS) d) Telnet	1	CO2	R
5	Which of the following is an asymmetric encryption algorithm? a) AES b) DES c) RSA d) Blowfish	1	CO2	R
6	Which security protocol is recommended for securing modern Wi-Fi networks? a) WEP b) WPA c) WPA2/WPA3 d) TKIP	1	CO2	R
7	Which malware restricts access to the infected computer system and demands payment?	1	CO3	R

	a) Spyware b) Ransomware c) Trojan Horse d) Rootkit			
8	What type of attack involves an attacker secretly intercepting and possibly altering communication between two parties? a) DDoS Attack b) Phishing c) On the Path (MitM) Attack d) Dictionary Attack	1	CO3	R
9	Meltdown and Spectre are primarily known as what type of vulnerabilities? a) Network Vulnerabilities b) Web Application Vulnerabilities c) Hardware Vulnerabilities d) CI	1	CO3	R
10	Which tool is commonly used for network packet analysis? a) Metasploit b) Nmap c) Wireshark d) Autopsy	1	CO4	R
11	What does SIEM stand for? a) System Information and Event Monitoring b) Security Information and Event Management c) Standard Integration of Enterprise Malware d) Secure Internet and Extranet Management	1	CO4	R
12	What is the purpose of hashing in forensic analysis? a) To compress large files b) To ensure data integrity by verifying file signatures c) To encrypt network traffic d) To scan open ports	1	CO4	R
13	What is the first phase of penetration testing? a) Exploitation b) Reconnaissance c) Post-Exploitation d) Reporting	1	CO5	R
14	Which cloud computing model provides virtualized computing resources over the internet? a) SaaS b) PaaS c) IaaS d) DaaS	1	CO5	R
15	Which of the following is an example of an Asymmetric Encryption algorithm? a) AES b) DES c) RSA d) RC4	1	CO5	R

**II. Fill in the blanks by choosing the appropriate answer from the bracket
(Digital Certificate, Wireshark, SIEM, Phishing, Burp suite)**

(5 × 1 = 5)

16	A network of private computers infected with malicious software and controlled as a group without the owners' knowledge is called a _____.	1	CO3	R
17	_____ is a popular packet analyzer tool used for network troubleshooting and analysis.	1	CO1	R
18	A _____ binds a public key to an entity's identity, ensuring secure communications.	1	CO2	R

19	A _____ solution aggregates and analyzes activity from many different resources across your entire IT infrastructure.	1	CO4	R
20	_____ Suite is a popular tool used for testing Web Application Security.	1	CO5	R
PART – B III. Answer ANY FIVE of the following (5 × 2 = 10)				
21	Define Cyber-Physical Systems (CPS) with a simple example.	2	CO1	R
22	What is the use of a Digital Certificate?	2	CO2	R
23	State the difference between a virus and a worm.	2	CO3	U
24	List the components of the CIA Triad.	2	CO1	U
25	What is the Least Privilege Principle?	2	CO2	U
26	Explain the process and implications of Wi-Fi Password Cracking.	2	CO3	A
27	What is an Indicator of Compromise (IoC)?	2	CO4	U
28	Differentiate between Red Team and Blue Team operations.	2	CO5	U
PART – C IV. Answer ANY FIVE of the following (5 × 3 = 15)				
29	Briefly explain the concept of a Zero Trust Architecture (ZTA).	3	CO2	R
30	Outline the stages of a Phishing attack.	3	CO3	R
31	Briefly explain the three pillars of the CIA Triad.	3	CO1	U
32	What are Indicators of Compromise (IoCs)? Provide two distinct examples.	3	CO4	U
33	Explain the difference between Symmetric and Asymmetric Encryption.	3	CO5	U
34	Explain the process and implications of Wi-Fi Password Cracking.	3	CO3	U
35	Describe the functionality of Honeypots in an enterprise network.	3	CO2	U
36	Compare IaaS and PaaS cloud delivery models with suitable examples.	3	CO5	A
PART – D Section I V. Answer ANY FIVE of the following (5 × 5 = 25)				
37	Elaborate on the architecture of a Cyber-Physical System, detailing its physical components, computational elements, and networking infrastructure.	5	CO1	U
38	Describe five different types of malwares (e.g., Spyware, Ransomware, Rootkit, Trojan, Worm) and their specific behavioral symptoms.	5	CO3	U
39	Explain the working mechanism of SSL/TLS and its significance in securing web communications.	5	CO2	U

40	Analyze the challenges and opportunities in the integration of Cloud Computing and Edge Computing within CPS.	5	CO1	A
41	Explain how Multi-Factor Authentication (MFA) significantly strengthens system security, and provide examples of modern MFA implementation methods.	5	CO2	A
42	Detail the process of securing Wireless Networks. Compare WEP, WPA2, and WPA3 protocols.	5	CO2	A
43	Explain the Incident Response Life Cycle as per standard industry frameworks.	5	CO4	A
44	Discuss the critical importance of software updates and patch management in maintaining the security posture of a CPS.	5	CO3	A
PART – D Section II VI. Answer ANY THREE of the following (3 × 10 = 30)				
45	Describe the fundamental principles of TCP/IP and OSI Model Security Considerations, highlighting common vulnerabilities at different layers.	10	CO1	U
46	Design a secure network architecture for a Smart Manufacturing plant, incorporating a DMZ, Firewalls, and VLAN segmentation.	10	CO2	A
47	Elaborate on Advanced Persistent Threats (APTs). Discuss their lifecycle, common attack vectors, and comprehensive strategies an organization should implement to detect and respond to an APT.	10	CO3	U
48	Explain the role of Identity and Access Management (IAM) policies in securing AWS cloud resources.	10	CO5	A
49	Explain how you would utilize a SIEM system (like Splunk or ELK Stack) to correlate logs and identify the attacker's footprint for handling a suspected data breach involving unauthorized data exfiltration.	10	CO4	A

Question Bank: Cyber Physical Systems (25CS51ID)

Question Type: MCQ

Q.No	Question	Marks	CO	Cognitive Level
1	Which component of the CIA triad ensures data is not altered by unauthorized entities? (A) Confidentiality (B) Integrity (C) Availability (D) Authentication	1	CO-01	Remembering
2	Which layer is NOT part of the OSI Model? (A) Physical (B) Application (C) Internet (D) Transport	1	CO-01	Remembering
3	What does CPS stand for? (A) Cyber-Personal System (B) Cyber-Physical System (C) Cloud-Physical System (D) Core-Processing System	1	CO-01	Remembering
4	Which protocol is connectionless and used for fast data transmission? (A) TCP (B) HTTP (C) UDP (D) SSH	1	CO-01	Remembering
5	Wireshark is primarily used for: (A) Antivirus scanning (B) Packet capture and analysis (C) Web browsing (D) Text editing	1	CO-01	Remembering
6	Which of the following is a key characteristic of a CPS? (A) Isolation from physical world (B) Integration of computation and physical processes (C) Lack of sensors (D) Software-only focus	1	CO-01	Remembering
7	Which physical component converts electrical signals into physical movement in a CPS? (A) Sensor (B) Router (C) Actuator (D) Switch	1	CO-02	Remembering
8	What is the function of a Human Machine Interface (HMI)? (A) Store cloud data (B) Allow operators to interact with the CPS (C) Generate malware (D) Encrypt passwords	1	CO-02	Remembering
9	Which network technology connects smart devices over the internet? (A) IoT (B) VGA (C) HDMI (D) SATA	1	CO-02	Remembering
10	Which of the following handles processing close to the data source rather than in the cloud? (A) Mainframe (B) Edge Computing (C) Quantum Computing (D) Data Warehousing	1	CO-02	Remembering
11	Which sensor is commonly used to measure temperature and humidity? (A) PIR (B) Ultrasonic (C) DHT11 (D) LDR	1	CO-02	Remembering

12	What protocol is lightweight and often used for IoT communication? (A) FTP (B) MQTT (C) SMTP (D) POP3	1	CO-02	Remembering
13	Which malware encrypts files and demands payment for the decryption key? (A) Spyware (B) Ransomware (C) Adware (D) Worm	1	CO-03	Remembering
14	Which of the following is a Social Engineering attack? (A) Buffer Overflow (B) Phishing (C) SQL Injection (D) XSS	1	CO-03	Remembering
15	A firewall that keeps track of the state of active connections is known as a: (A) Packet filter (B) Proxy firewall (C) Stateful firewall (D) Stateless firewall	1	CO-03	Remembering
16	Meltdown and Spectre are examples of what type of vulnerability? (A) Software (B) Network (C) Hardware (D) Protocol	1	CO-03	Understanding
17	Which method involves trying all possible password combinations to gain access? (A) Dictionary attack (B) Brute force (C) Password spraying (D) Tailgating	1	CO-03	Understanding
18	What does DDoS stand for? (A) Distributed Denial of Service (B) Direct Denial of Server (C) Data Denial of System (D) Distributed Data over Server	1	CO-03	Understanding
19	Which system aggregates log data from multiple sources for security monitoring? (A) SIEM (B) CRM (C) ERP (D) DBMS	1	CO-04	Understanding
20	What are 'Magic Bytes' used for in digital forensics? (A) Encrypting files (B) Identifying file types (C) Deleting logs (D) Routing packets	1	CO-04	Understanding
21	Which phase is typically the first in the Incident Management Lifecycle? (A) Containment (B) Eradication (C) Preparation/Identification (D) Recovery	1	CO-04	Understanding
22	What does an IoC (Indicator of Compromise) represent? (A) A normal network ping (B) Evidence that a breach or attack has occurred (C) An internal HR policy (D) A type of sensor	1	CO-04	Understanding
23	Which tool is commonly used for memory dump analysis? (A) Wireshark (B) Volatility (C) Nmap (D) Excel	1	CO-04	Understanding
24	In incident management, a 'False Positive' refers to: (A) A real attack missed (B) A benign event flagged as an attack (C) A successful hack (D) A hardware failure	1	CO-04	Understanding
25	Which encryption type uses the same key for both encryption and decryption? (A) Asymmetric (B) Symmetric (C) Hashing (D) Public Key	1	CO-05	Understanding
26	AWS, Azure, and GCP are examples of: (A) Cloud vendors (B) Antivirus software (C) Edge devices (D) SIEM tools	1	CO-05	Understanding

27	Which tool is heavily used for network scanning and vulnerability discovery during penetration testing? (A) Autopsy (B) Nmap (C) Splunk (D) Word	1	CO-05	Understanding
28	The 'Shared Responsibility Model' in cloud computing dictates that: (A) The cloud provider handles all security (B) The customer handles all security (C) Security obligations are shared between the provider and customer (D) No security is needed	1	CO-05	Understanding
29	Which of the following is a Web Application vulnerability? (A) VLAN hopping (B) MAC spoofing (C) Cross-Site Scripting (XSS) (D) ARP poisoning	1	CO-05	Understanding
30	What does IAM stand for in cloud security? (A) Internet Application Management (B) Identity and Access Management (C) Internal Asset Monitoring (D) Intrusion Avoidance Mechanism	1	CO-05	Understanding

Question Type: Fill in the Blanks

Q.No	Question	Marks	CO	Cognitive Level
31	The acronym TCP stands for Transmission _____ Protocol.	1	CO-01	Remembering
32	The NIST and ISO 27001 are examples of widely recognized security _____.	1	CO-01	Remembering
33	A Cyber-_____ System integrates computation, networking, and physical processes.	1	CO-01	Remembering
34	Port scanning can be effectively performed using the command-line tool _____.	1	CO-01	Remembering
35	The CIA Triad stands for Confidentiality, _____, and Availability.	1	CO-01	Remembering
36	In the OSI model, the _____ layer is responsible for logical IP addressing.	1	CO-01	Remembering
37	Sensors collect data from the physical world, while _____ perform physical actions based on control signals.	1	CO-02	Remembering
38	The architecture where data is processed closer to the sensors rather than in a centralized cloud is called _____ computing.	1	CO-02	Remembering
39	HMI stands for Human _____ Interface.	1	CO-02	Remembering
40	The widely used lightweight messaging protocol for IoT devices is _____.	1	CO-02	Remembering
41	In a CPS, the continuous interplay between the cyber computational core and the _____ environment is essential.	1	CO-02	Remembering
42	_____ theory plays a vital role in ensuring real-time responsiveness in Cyber-Physical Systems.	1	CO-02	Remembering
43	_____ is a type of malware designed to secretly observe and gather user information without their consent.	1	CO-03	Remembering

44	An attacker physically following an authorized person into a restricted area is known as _____.	1	CO-03	Remembering
45	A _____ attack overwhelms a target system with a flood of internet traffic, making it unavailable.	1	CO-03	Remembering
46	Spectre and _____ are critical hardware vulnerabilities found in modern computer processors.	1	CO-03	Remembering
47	A _____ firewall monitors the state of active connections to determine which network packets to allow through.	1	CO-03	Understanding
48	A _____ attacker tricks a victim into revealing sensitive information by impersonating a trusted entity.	1	CO-03	Understanding
49	The term _____ represents the various stages involved in handling a security breach from detection to resolution.	1	CO-04	Understanding
50	Splunk and ELK stack are prominent examples of _____ systems used for log analysis.	1	CO-04	Understanding
51	In digital forensics, a file's _____ signature (or magic bytes) helps uniquely identify its format.	1	CO-04	Understanding
52	IoC stands for _____ of Compromise.	1	CO-04	Understanding
53	The tool _____ is widely used by incident responders to capture and analyze system RAM memory dumps.	1	CO-04	Understanding
54	A security alert triggered by benign, normal activity is classified as a _____ positive.	1	CO-04	Understanding
55	_____ encryption algorithms, like RSA, use a pair of public and private keys.	1	CO-05	Understanding
56	SaaS stands for _____ as a Service in cloud delivery models.	1	CO-05	Understanding
57	The AWS security service that manages user permissions is known as _____ (Identity and Access Management).	1	CO-05	Understanding
58	The popular penetration testing framework used to find and exploit vulnerabilities is called _____.	1	CO-05	Understanding
59	Testing for vulnerabilities like SQL Injection and XSS is part of _____ application security testing.	1	CO-05	Understanding
60	The concept of _____ Responsibility defines what the cloud provider secures versus what the customer must secure.	1	CO-05	Understanding

Question Type: 2 Marks

Q.No	Question	Marks	CO	Cognitive Level
61	Define the CIA Triad.	2	CO-01	Remembering
62	State the primary difference between TCP and UDP.	2	CO-01	Remembering
63	What is a Cyber-Physical System (CPS)?	2	CO-01	Remembering
64	List two main characteristics of a CPS.	2	CO-01	Remembering
65	What is the purpose of packet encapsulation?	2	CO-01	Remembering
66	Identify two common security frameworks.	2	CO-01	Remembering
67	What is the function of a sensor in a CPS?	2	CO-02	Remembering
68	What is the function of an actuator in a CPS?	2	CO-02	Remembering

69	Define Edge Computing.	2	CO-02	Remembering
70	What is an HMI?	2	CO-02	Remembering
71	List two real-world applications of Cyber-Physical Systems.	2	CO-02	Remembering
72	Name a protocol commonly used for IoT device communication.	2	CO-02	Remembering
73	Define Malware.	2	CO-03	Remembering
74	What is Ransomware?	2	CO-03	Remembering
75	Explain the concept of 'Tailgating' in social engineering.	2	CO-03	Remembering
76	What is a DDoS attack?	2	CO-03	Remembering
77	State the difference between a Virus and a Trojan Horse.	2	CO-03	Remembering
78	What is a hardware vulnerability?	2	CO-03	Remembering
79	What is the purpose of Incident Response?	2	CO-04	Remembering
80	Define an Indicator of Compromise (IoC).	2	CO-04	Understanding
81	What is a SIEM system?	2	CO-04	Understanding
82	Differentiate between a True Positive and a False Positive.	2	CO-04	Understanding
83	What is the role of memory analysis in digital forensics?	2	CO-04	Understanding
84	List the basic stages of the incident management lifecycle.	2	CO-04	Understanding
85	Define Cloud Computing.	2	CO-05	Understanding
86	What is the difference between Symmetric and Asymmetric encryption?	2	CO-05	Understanding
87	What is Penetration Testing?	2	CO-05	Understanding
88	List the three primary Cloud delivery models.	2	CO-05	Understanding
89	What does the Shared Responsibility model dictate?	2	CO-05	Understanding
90	Name two tools commonly used in ethical hacking and network scanning.	2	CO-05	Understanding

Question Type: 3 Marks

Q.No	Question	Marks	CO	Cognitive Level
91	Explain the components of the CIA triad with a brief example for each.	3	CO-01	Remembering/Understanding
92	Describe the function of Wireshark in network security.	3	CO-01	Remembering/Understanding
93	Explain the fundamental difference between the OSI model and the TCP/IP model.	3	CO-01	Remembering/Understanding
94	How has the evolution of sensor networks contributed to modern CPS?	3	CO-01	Remembering/Understanding
95	Describe what port scanning is and why it is used.	3	CO-01	Remembering/Understanding
96	Provide three distinguishing features of a Cyber-Physical System.	3	CO-01	Remembering/Understanding
97	Explain the interplay between cyber and physical components in a smart manufacturing plant.	3	CO-02	Remembering/Understanding
98	Describe the architectural layers of a typical Cyber-Physical System.	3	CO-02	Remembering/Understanding

99	How do cloud computing and edge computing complement each other in CPS?	3	CO-02	Remembering/Understanding
100	Explain the role of Machine Learning and AI in enhancing CPS operations.	3	CO-02	Remembering/Understanding
101	Describe how you would interface a DHT11 sensor with a microcontroller to send data.	3	CO-02	Remembering/Understanding
102	Why is communication coordination critical between cyber and physical systems?	3	CO-02	Remembering/Understanding
103	Explain the mechanics of a Phishing attack and how it can be identified.	3	CO-03	Remembering/Understanding
104	Differentiate between a Dictionary attack and a Brute Force password attack.	3	CO-03	Remembering/Understanding
105	What are Meltdown and Spectre, and why are they considered dangerous?	3	CO-03	Remembering/Understanding
106	Describe the principle of 'Defense in Depth' in network security.	3	CO-03	Remembering/Understanding
107	Explain the differences between Packet Filtering, Stateful, and Proxy firewalls.	3	CO-03	Remembering/Understanding
108	Discuss the security implications of an Advanced Persistent Threat (APT).	3	CO-03	Remembering/Understanding
109	Outline the core objectives of an incident management team.	3	CO-04	Remembering/Understanding
110	Explain the importance of Log Correlation in threat detection.	3	CO-04	Remembering/Understanding
111	Describe the difference between Red, Blue, and Purple cybersecurity teams.	3	CO-04	Remembering/Understanding
112	How does a cybersecurity analyst use 'Magic Bytes' and file hashes?	3	CO-04	Remembering/Understanding
113	Explain the function of Disk Imaging in a forensic investigation.	3	CO-04	Remembering/Understanding
114	Discuss the difference between Data and Intelligence in the context of threat analysis.	3	CO-04	Remembering/Understanding
115	Explain the differences between IaaS, PaaS, and SaaS cloud models.	3	CO-05	Remembering/Understanding
116	Describe how SSL/TLS and VPNs provide secure communication over the internet.	3	CO-05	Remembering/Understanding
117	What is the role of IAM (Identity and Access Management) in securing AWS resources?	3	CO-05	Remembering/Understanding
118	Explain the three main phases of penetration testing.	3	CO-05	Remembering/Understanding

119	How does Shodan differ from traditional search engines, and how is it used in IoT security?	3	CO-05	Remembering/Understanding
120	Describe two data protection strategies for securing data at rest in the cloud.	3	CO-05	Remembering/Understanding

Question Type: 5 Marks

Q.No	Question	Marks	CO	Cognitive Level
121	Analyze the importance of applying security frameworks like NIST and ISO 27001 in a corporate network.	5	CO-01	Application
122	Demonstrate how packet encapsulation works across the TCP/IP model layers during data transmission.	5	CO-01	Application
123	Examine the evolution of Cyber-Physical Systems and their foundational technologies.	5	CO-01	Application
124	Discuss the specific cybersecurity considerations required when mapping out an OSI Model architecture.	5	CO-01	Application
125	Apply the CIA triad principles to evaluate the security of an online banking application.	5	CO-01	Application
126	Compare the operational differences between TCP, UDP, and ICMP protocols in the context of network vulnerabilities.	5	CO-01	Application
127	Design a block diagram of a basic Cyber-Physical System for a Smart Agriculture environment.	5	CO-02	Application
128	Evaluate the challenges and opportunities involved in integrating legacy physical components with modern IoT networks.	5	CO-02	Application
129	Analyze the role of real-time control theory in ensuring the safety and reliability of autonomous vehicles.	5	CO-02	Application
130	Explain the step-by-step process of securely sending sensor data to the cloud using the MQTT protocol.	5	CO-02	Application
131	Assess the importance of a well-designed Human-Machine Interface (HMI) in minimizing operational errors in CPS.	5	CO-02	Application
132	Compare the computational element requirements for an embedded system versus a traditional desktop system.	5	CO-02	Application
133	Analyze a scenario involving a Ransomware attack on a hospital CPS. Detail the symptoms, impact, and mitigation strategies.	5	CO-03	Understanding

134	Demonstrate how an attacker might execute an 'Evil Twin' Wi-Fi attack and propose defensive best practices.	5	CO-03	Understanding
135	Evaluate the necessity of software updates and patch management in defending against newly discovered vulnerabilities.	5	CO-03	Understanding
136	Discuss the various methods of social engineering infiltration and how organizations can train employees against them.	5	CO-03	Understanding
137	Explain how a Botnet operates to execute a Distributed Denial of Service (DDoS) attack on a network infrastructure.	5	CO-03	Understanding
138	Design a Defense in Depth strategy for a university campus network, incorporating firewalls, email security, and access controls.	5	CO-03	Understanding
139	Outline a comprehensive Incident Response Plan for a data breach, detailing the steps from alert processing to incident closure.	5	CO-04	Understanding
140	Demonstrate how to ingest, analyze, and correlate network logs using a SIEM system like Splunk to detect anomalies.	5	CO-04	Understanding
141	Analyze the forensic importance of distinguishing between various file signatures, Imphash, and Ssdeep during malware analysis.	5	CO-04	Understanding
142	Evaluate the roles and interactions between Red Teams and Blue Teams during a simulated cyber attack.	5	CO-04	Understanding
143	Explain the methodologies and tools (like Autopsy or FTK Imager) used to perform disk imaging and evidence analysis.	5	CO-04	Understanding
144	Discuss how Threat Intelligence platforms (like VirusTotal and Passive DNS) assist analysts in accessing Indicators of Compromise (IoCs).	5	CO-04	Understanding
145	Apply the Shared Responsibility Model to determine security obligations for a company deploying a database on AWS EC2.	5	CO-05	Understanding
146	Compare Symmetric (AES) and Asymmetric (RSA) encryption, detailing scenarios where each is strictly preferred.	5	CO-05	Application/Understanding
147	Design an Identity and Access Management (IAM) policy structure that strictly enforces the Principle of Least Privilege in the cloud.	5	CO-05	Application/Understanding
148	Explain the methodology of testing Web Application Security for vulnerabilities like SQL Injection and XSS using Burp Suite.	5	CO-05	Application/Understanding
149	Discuss the unique security challenges posed by IoT devices and how tools like Shodan can be used for vulnerability testing.	5	CO-05	Application/Understanding

150	Analyze the technical differences between protecting cloud data 'at rest' versus protecting it 'in transit'.	5	CO-05	Application/Understanding
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Question Type: 10 Marks

Q.No	Question	Marks	CO	Cognitive Level
151	Comprehensively explain the core concepts of the CIA Triad and the NIST Security Framework. Provide real-world examples of how these frameworks guide the implementation of enterprise network security.	10	CO-01	Application
152	Analyze the TCP/IP and OSI Models side-by-side. Detail the security considerations, packet encapsulation processes, and common vulnerabilities associated with each layer.	10	CO-01	Application
153	Develop a comprehensive overview of Cyber-Physical Systems (CPS). Define CPS, trace its evolutionary foundations from embedded systems, and evaluate its critical applications in Healthcare and Manufacturing.	10	CO-01	Understanding
154	Design a secure lab environment architecture. Detail the necessary tools (Wireshark, Kali Linux, VirtualBox), configuration steps, and how you would utilize them to safely analyze malicious network traffic.	10	CO-01	Understanding
155	Discuss the fundamental differences between TCP, UDP, and ICMP. Explain how attackers manipulate the characteristics of these specific protocols to execute network-level cyber attacks.	10	CO-01	Application
156	Evaluate the transformative impact of sensor networks on the physical world. Detail how the continuous aggregation of physical data creates both operational efficiencies and new security challenges.	10	CO-01	Understanding
157	Design a complete Cyber-Physical System architecture for a Smart City traffic management grid. Detail the computational elements, networking infrastructure, sensors, actuators, and required security protocols.	10	CO-02	Understanding
158	Analyze the interplay between cyber and physical components in a modern power grid (Energy sector). Explain the specific communication protocols and the catastrophic risks of cyber-physical desynchronization.	10	CO-02	Understanding
159	Formulate an implementation strategy to interface environmental sensors (like DHT11)	10	CO-02	Understanding

	with an Arduino/Raspberry Pi. Detail the Python scripting logic required to securely transmit this data to a cloud dashboard via MQTT.			
160	Evaluate the integration of edge computing, cloud computing, and machine learning within CPS. Discuss how these technologies collectively reduce latency and improve real-time decision-making in autonomous systems.	10	CO-02	Understanding
161	Discuss the critical importance of Control Systems and Real-Time Systems in CPS. Provide a detailed analysis of how latency or network disruption can critically impact the control theory algorithms governing physical actuators.	10	CO-02	Understanding
162	Construct a comprehensive risk and opportunity assessment matrix for designing a CPS in the Transportation sector (e.g., self-driving cars), explicitly addressing hardware redundancies and human-machine interface (HMI) safeguards.	10	CO-02	Understanding
163	Analyze the lifecycle and operational mechanics of Advanced Persistent Threats (APTs). Detail how an attacker utilizes a combination of social engineering, malware, and hardware vulnerabilities to infiltrate and remain undetected.	10	CO-03	Understanding
164	Develop a comprehensive Defense in Depth architectural strategy for a financial institution. Your design must include the specific configuration of packet-filtering, stateful firewalls, email security protocols (SPF, DKIM, DMARC), and endpoint protections.	10	CO-03	Understanding
165	Evaluate the severe implications of hardware-level vulnerabilities, specifically Meltdown and Spectre. Explain how these exploits bypass traditional software security measures and detail the mitigation strategies required at the OS level.	10	CO-03	Understanding
166	Formulate a detailed threat analysis report on Password Attacks and Wi-Fi Cracking. Compare the mechanisms of dictionary attacks, brute force, and password spraying, and recommend stringent enterprise password policies to defeat them.	10	CO-03	Understanding
167	Comprehensively classify modern malware (Ransomware, Rootkits, Trojans, Spyware). Detail their unique symptoms, methods of	10	CO-03	Understanding

	infiltration via pretexting and SEO poisoning, and the exact steps required for network remediation.			
168	Design an incident response scenario where a corporate network is hit by a massive DDoS attack coordinated by a Botnet. Outline the immediate detection methods, traffic interception strategies, and mitigation protocols.	10	CO-03	Understanding
169	Develop an end-to-end Incident Management Lifecycle protocol for an organization. Detail the specific standard operating procedures (SOPs) for the Preparation, Detection, Containment, Eradication, Recovery, and Post-Incident phases.	10	CO-04	Application/Understanding
170	Analyze the critical function of SIEM systems (like Splunk and ELK Stack) in modern Security Operations Centers (SOCs). Explain how log correlation, alert processing, and visual dashboards enable rapid threat detection.	10	CO-04	Application
171	Comprehensively explain the methodologies of Digital Forensics in Incident Response (DFIR). Detail the technical procedures for capturing and analyzing volatile memory (RAM) dumps and creating secure disk images.	10	CO-04	Understanding
172	Evaluate the role of Threat Intelligence in proactive defense. Explain how security analysts utilize Indicators of Compromise (IoCs), file hashes (Imphash, Ssdeep), and dynamic analysis tools (VirusTotal) to attribute attacks to specific Threat Actors.	10	CO-04	Application
173	Discuss the distinct roles and operational strategies of Red, Blue, and Purple teams during a cybersecurity exercise. Explain how their collaborative efforts improve an organization's overall security posture and incident runbooks.	10	CO-04	Application/Understanding
174	Formulate a structured strategy for distinguishing between True Positives and False Positives in a high-alert SOC environment. Detail how tuning anomaly detection tools and updating resolution codes improves the efficiency of the incident management team.	10	CO-04	Application/Understanding
175	Design a secure, multi-tier cloud infrastructure on AWS. Detail the implementation of the Shared Responsibility Model, the configuration of strict IAM policies, and the deployment of	10	CO-05	Application

	Security Groups to protect sensitive data at rest and in transit.			
176	Comprehensively analyze the phases of Penetration Testing (Reconnaissance, Exploitation, Post-Exploitation). Detail how an ethical hacker utilizes tools like Nmap for scanning and Metasploit for exploitation within a legally sanctioned scope.	10	CO-05	Application/Understanding
177	Evaluate the integration of Cryptography in securing Cyber-Physical Systems. Provide a detailed comparison of Symmetric (AES) and Asymmetric (RSA) encryption, and explain how Public Key Infrastructure (PKI) and digital certificates authenticate communications.	10	CO-05	Application/Understanding
178	Develop a comprehensive vulnerability assessment strategy for an Internet of Things (IoT) ecosystem. Discuss how to identify exposed devices using Shodan, test for default credentials, and secure the communication protocols against interception.	10	CO-05	Application/Understanding
179	Discuss the implementation of secure VPN architectures (IPSec, OpenVPN) and SSL/TLS protocols. Explain step-by-step how these technologies establish secure, encrypted tunnels for remote access to sensitive cloud and CPS resources.	10	CO-05	Application/Understanding
180	Analyze the critical threats facing Web Applications in a cloud environment. Formulate a testing methodology utilizing Burp Suite to identify, exploit, and subsequently patch vulnerabilities such as Cross-Site Scripting (XSS) and SQL Injection.	10	CO-05	Application/Understanding

Govt. of Karnataka
Department of Technical Education
Board of Technical Examination
Table of Specifications

Programme Name: Computer Science & Engineering

Semester 5

Course Code and Name: Software Engineering and Entrepreneurship 25CS54I

	Cognitive Level	Remembering						Understanding						Application							
	PART	A		B	C	D-I	D-II	A		B	C	D-I	D-II	A		B	C	D-I	D-II	Total Marks	Weightage
No.	Type	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M	MCQ	FIB	2M	3M	5M	10M		
		1	1	2	3	5	10	1	1	2	3	5	10	1	1	2	3	5	10		
CO-1	No. of Questions	3	1	1						1	1	1	1	0			0	1			
	Marks	3	1	2	0	0	0	0	0	2	3	5	10	0		0	0	5	0	24	16
CO-2	No. of Questions	3	1	1	1					1	1	1	0					2	1		
	Marks	3	1	2	3	0	0	0	0	2	3	5	0	0	0	0	0	10	10	53	35
CO-3	No. of Questions	3	1		1					1	1	1	1			1		1			
	Marks	3	1		3	0	0	0	0	2	3	5	10	0	0	2	0	5	0	22	15
CO-4	No. of Questions	3	1							1	1		0					1	1		
	Marks	3	1		0		0	0	0	2	3	0	0	0	0	0	0	5	10	28	19
CO-5	No. of Questions	3	1							1	1						1		1		
	Marks	3	1		0		0	0		2	3	0	0	0	0	0	3	0	10	23	15
Marks		15	5	4	6		0	0		10	15	15	20	0	0	2	3	25	30		
Total		30						60						60						150	100%
%		20						40						40						100	

Government of Karnataka
Department of Technical Education
Board of Technical Examination
Diploma in Computer Science & Engineering – Semester V

MODEL QUESTION PAPER-1

Course: Software Engineering and Entrepreneurship

25CS54I

Duration: 3 Hours

Max. Marks: 100

Instructions:

1. For Part-A questions, only the first written answers will be considered for evaluation.
2. Answer any FIVE questions from Part-B, Part-C and Part-D Section-I.
3. Answer any THREE questions from Part-D Section-II.
4. Draw neat sketches wherever necessary.
5. Figures to the right indicate marks.

Q.no	Question	Marks	CO	CL
PART – A				
I. Select the correct answer from the choices given (15 × 1 = 15)				
1	What does SDLC stand for? a) Software Design Life Cycle b) Software Development Life Cycle c) System Design Life Cycle d) System Development Local Code	1	CO1	R
2	Which phase of SDLC involves creating the architecture of the system? a) Requirement Analysis b) Design c) Testing d) Deployment	1	CO1	R
3	Which Agile ceremony is held daily to discuss progress? a) Sprint Planning b) Sprint Retrospective c) Daily Standup d) Sprint Review	1	CO1	R
4	What is the primary purpose of a Use Case diagram? a) Show database tables b) Capture functional requirements and user interactions c) Display network architecture d) Write code logic	1	CO2	R
5	Which risk type involves potential monetary loss in a software project? a) Strategic b) Technical c) Operational d) Financial	1	CO2	R
6	A representation of a user's need written from their perspective is called a) Test Case b) User Story c) Class Diagram d) ER Diagram	1	CO2	R
7	Which SOLID principle suggests that a class should have only one reason to change?	1	CO3	R

	a) Open-Closed b) Liskov Substitution c) Single Responsibility d) Dependency Inversion			
8	Which DevOps practice automates the testing and building of code every time a team member commits changes? a) Continuous Integration b) Continuous Monitoring c) Continuous Feedback d) Infrastructure as Code	1	CO3	R
9	What is the main objective of Integration Testing? a) Test single functions b) Verify interfaces between modules c) Test system performance d) Test the user interface	1	CO3	R
10	What does MVP stand for in entrepreneurship? a) Most Valuable Product b) Minimum Viable Product c) Major Viable Project d) Minimum Value Pricing	1	CO4	R
11	Which government program is specifically mentioned in the syllabus as supporting startups in Karnataka? a) Make in India b) Startup Karnataka c) Digital India d) Skill India	1	CO4	R
12	Which method emphasizes iterative cycles of small experiments, customer feedback, and rapid adjustments? a) Waterfall b) Lean Startup c) V-Model d) Spiral Model	1	CO4	R
13	Which document outlines the operational and financial objectives of a business? a) Source Code b) Use Case Document c) Business Plan d) Test Case log	1	CO5	R
14	Which legal protection covers inventions and new processes? a) Copyright b) Trademark c) Patent d) Trade Secret	1	CO5	R
15	For a software product, which IPR form protects a novel software algorithm (if eligible) by granting exclusive rights? a) Trademark b) Patent c) Copyright d) Domain registration	1	CO5	R
II. Fill in the blanks by choosing the appropriate answer from the bracket (Waterfall, Lean, Intellectual, UML, Prototype) (5 × 1 = 5)				
16	A software process model that moves in a linear, sequential phase is called the _____ model.	1	CO1	R
17	_____ is a visual modeling language used to specify, visualize, construct, and document the artifacts of a software system.	1	CO2	R
18	. _____ testing involves checking the system as a whole to ensure it meets the specified requirements.	1	CO3	R

19	Patents, copyrights, and trademarks are examples of _____ property.	1	CO5	R
20	The _____ Startup methodology emphasizes rapid iteration, validated learning, and building an MVP.	1	CO4	R
PART – B III. Answer ANY FIVE of the following (5 × 2 = 10)				
21	Define Software Engineering.	2	CO1	R
22	List two financial risks in a software project.	2	CO2	R
23	State any two differences between a product and a project.	2	CO1	U
24	State the difference between a Class Diagram and an Activity Diagram.	2	CO2	U
25	Differentiate between White-box and Black-box testing.	2	CO3	U
26	Briefly explain what market validation means for a startup.	2	CO4	U
27	What is the purpose of an Elevator Pitch?	2	CO5	U
28	Identify two benefits of using Continuous Integration in DevOps.	2	CO3	A
PART – C IV. Answer ANY FIVE of the following (5 × 3 = 15)				
29	State the five SOLID principles of object-oriented design.	3	CO3	R
30	What are the different types of risks in a software project	3	CO2	R
31	Explain the fundamental components of a Use Case diagram.	3	CO2	U
32	Discuss three key traits of a successful entrepreneur.	3	CO4	U
33	Briefly explain three common monetization strategies for software products.	3	CO5	U
34	Discuss the responsibilities of a Scrum Master.	3	CO1	U
35	Discuss the importance of Code Refactoring.	3	CO3	U
36	Briefly explain the Subscription Business Model with an example.	3	CO5	A
PART – D Section I V. Answer ANY FIVE of the following (5 × 5 = 25)				
37	Explain the four core values of the Agile manifesto.	5	CO1	U
38	Elaborate on the Requirement Engineering Process steps.	5	CO2	U

39	Discuss the importance of Software Architecture and distinguish it from Software Design.	5	CO3	U
40	Discuss the advantages and disadvantages of the Waterfall model.	5	CO1	A
41	Describe how Sequence Diagrams are used to model system behavior, detailing the components used.	5	CO2	A
42	Analyse different use cases for a college fest and draw an use case diagram.	5	CO2	A
43	Illustrate the Test-Driven Development (TDD) cycle (Red-Green-Refactor) with a relevant example.	5	CO3	A
44	Formulate a strategy for market testing a new food delivery application in a tier-2 city.	5	CO4	A
PART – D Section II VI. Answer ANY THREE of the following (3 × 10 = 30)				
45	Compare the traditional Waterfall model with Agile. Detail the Agile ceremonies, roles, and values, and explain why the software industry has predominantly shifted to Agile.	10	CO1	U
46	You are tasked to design an Online Food Delivery System. Conduct a risk assessment outlining 3 major risks. Formulate 3 User Stories using the standard template and define Acceptance Criteria for each.	10	CO2	A
47	Write a comprehensive note on the SOLID principles of object-oriented design, explaining each principle with a practical software engineering scenario.	10	CO3	U
48	Assume you are an entrepreneur trying to solve the problem of urban parking. Describe your ideation process, the formulation of your MVP, and your strategy for entering the market.	10	CO4	A
49	Detail the key components of a Business Plan. Why is a well-structured business plan critical before seeking external funding? Explain the different types of investors available for startups.	10	CO5	A

Question Bank: Software Engineering & Entrepreneurship (25CS541)

Question Type: MCQ

Q.No	Question	Marks	CO	Cognitive Level
1	Which of the following is a traditional, sequential software development model? (A) Agile (B) Scrum (C) Waterfall (D) Extreme Programming	1	CO-01	Remembering
2	Which of these is NOT an Agile ceremony? (A) Sprint Planning (B) Daily Standup (C) System Deployment (D) Sprint Retrospective	1	CO-01	Remembering
3	According to the Agile Manifesto, which is valued more? (A) Processes and tools (B) Working software (C) Comprehensive documentation (D) Contract negotiation	1	CO-01	Remembering
4	What does XP stand for in Agile frameworks? (A) Extra Programming (B) Extreme Programming (C) Extended Process (D) Extreme Process	1	CO-01	Remembering
5	Which factor primarily influences software project failures? (A) Clear communication (B) Poor requirement gathering (C) Skilled developers (D) Good leadership	1	CO-01	Remembering
6	Software engineering ethics primarily focus on: (A) Maximizing profit (B) Writing code quickly (C) Public interest and quality (D) Ignoring bugs	1	CO-01	Remembering
7	Which of the following is an example of a Non-Functional Requirement? (A) User login (B) System responding within 2 seconds (C) Adding to cart (D) Generating an invoice	1	CO-02	Remembering
8	Which UML diagram visually represents the interactions between users and the system? (A) Class Diagram (B) Activity Diagram (C) Use Case Diagram (D) Sequence Diagram	1	CO-02	Remembering
9	In the INVEST criteria for User Stories, what does the 'I' stand for? (A) Independent (B) Important (C) Iterative (D) Incremental	1	CO-02	Remembering
10	MoSCoW is a technique primarily used for: (A) Coding (B) Testing (C) Requirement Prioritization (D) Risk mitigation	1	CO-02	Remembering
11	Which tool is widely used for creating and tracking product backlogs and user stories? (A) JIRA (B) Eclipse (C) Wireshark (D) Autopsy	1	CO-02	Remembering
12	A risk related to changing government compliance laws is categorized as a: (A) Technical risk (B) Compliance risk (C) Operational risk (D) Financial risk	1	CO-02	Remembering

13	Which Design Pattern ensures that a class has only one instance? (A) Factory (B) Observer (C) Singleton (D) Adapter	1	CO-03	Remembering
14	Which testing method involves evaluating internal structures or workings of an application? (A) Black-box testing (B) White-box testing (C) User Acceptance Testing (D) Alpha testing	1	CO-03	Remembering
15	What is the primary goal of DevOps? (A) Isolate Dev and Ops teams (B) Bridge the gap between Development and Operations (C) Replace software testing (D) Write documentation	1	CO-03	Remembering
16	What does WBS stand for in Project Management? (A) Work Breakdown Structure (B) Wide Business System (C) Work Backup Strategy (D) Web Based Software	1	CO-03	Understanding
17	Which of these is a popular DevOps tool? (A) JUnit (B) Docker (C) Photoshop (D) Excel	1	CO-03	Understanding
18	Clean Code Principles advocate for: (A) Complex logic (B) Unreadable variable names (C) Simplicity and readability (D) Large, monolithic functions	1	CO-03	Understanding
19	Which of the following represents a key entrepreneurial mindset trait? (A) Avoiding all risks (B) Risk-taking and resilience (C) Ignoring customer feedback (D) Sticking to obsolete ideas	1	CO-04	Understanding
20	What does MVP stand for in Lean Startup methodology? (A) Maximum Value Product (B) Minimum Viable Product (C) Most Valuable Player (D) Minimum Valuable Process	1	CO-04	Understanding
21	In a SWOT analysis, Strengths and Weaknesses are considered: (A) External factors (B) Internal factors (C) Competitor factors (D) Irrelevant factors	1	CO-04	Understanding
22	Which of the following is the first phase in Design Thinking? (A) Prototype (B) Test (C) Empathize (D) Ideate	1	CO-04	Understanding
23	What does 'Pivoting' mean for a startup? (A) Changing the core business strategy based on feedback (B) Closing the company (C) Firing the team (D) Sticking to the original failed plan	1	CO-04	Understanding
24	A startup testing two different landing pages to see which converts better is performing: (A) A/B Testing (B) Load Testing (C) Unit Testing (D) Stress Testing	1	CO-04	Understanding
25	How many core building blocks are there in a standard Business Model Canvas (BMC)? (A) 5 (B) 7 (C) 9 (D) 12	1	CO-05	Understanding

26	The point at which total revenue equals total costs is known as the: (A) Profit Margin (B) Break-even Point (C) Loss Point (D) Capital Peak	1	CO-05	Understanding
27	Which Intellectual Property Right (IPR) protects logos and brand names? (A) Patent (B) Copyright (C) Trademark (D) Trade Secret	1	CO-05	Understanding
28	SaaS stands for: (A) Software as a Service (B) System as a Service (C) Storage as a Service (D) Security as a Service	1	CO-05	Understanding
29	A concise, persuasive speech used to spark interest in a startup is called an: (A) Elevator Pitch (B) Essay (C) Activity Diagram (D) Exit Strategy	1	CO-05	Understanding
30	Raising small amounts of money from a large number of people online is called: (A) Bootstrapping (B) Crowdfunding (C) Angel Investing (D) SEO	1	CO-05	Understanding

Question Type: Fill in the Blanks

Q.No	Question	Marks	CO	Cognitive Level
31	The _____ methodology utilizes short iterations called sprints to develop software.	1	CO-01	Remembering
32	A _____ is a temporary endeavor undertaken to create a unique product, service, or result.	1	CO-01	Remembering
33	The Agile Manifesto prioritizes individuals and _____ over processes and tools.	1	CO-01	Remembering
34	In Scrum, the _____ is responsible for maximizing the value of the product and managing the product backlog.	1	CO-01	Remembering
35	Software Engineering is defined as the systematic application of engineering approaches to the development of _____.	1	CO-01	Remembering
36	The _____ model is a linear sequential software development approach.	1	CO-01	Remembering
37	Requirements that describe what the system should do are called _____ requirements.	1	CO-02	Remembering
38	A _____ diagram in UML shows the sequence of messages passed between objects over time.	1	CO-02	Remembering
39	The Definition of _____ must be met for a user story to be considered complete in Agile.	1	CO-02	Remembering
40	In risk management, a risk's severity is evaluated alongside its _____ of occurrence.	1	CO-02	Remembering
41	_____ is an Agile requirement format typically written as: 'As a [user], I want [goal] so that [reason].'	1	CO-02	Remembering
42	The Kano Model categorizes customer preferences into basic, performance, and _____ features.	1	CO-02	Remembering

43	The _____ design pattern allows incompatible interfaces to work together.	1	CO-03	Remembering
44	Testing the software without knowledge of its internal code structure is known as _____ testing.	1	CO-03	Remembering
45	_____ is the practice of merging development and operations to improve deployment frequency.	1	CO-03	Remembering
46	A software defect life cycle begins when a bug is found and ends when the bug is _____.	1	CO-03	Understanding
47	The _____ architecture pattern divides an application into interconnected, independent services.	1	CO-03	Understanding
48	In project scheduling, estimating the effort required for tasks is known as Agile _____.	1	CO-03	Understanding
49	The core feedback loop of the Lean Startup methodology is Build-_____-Learn.	1	CO-04	Understanding
50	_____ Thinking is a human-centered approach to innovation and problem-solving.	1	CO-04	Understanding
51	A Unique _____ Proposition (USP) differentiates a startup's product from its competitors.	1	CO-04	Understanding
52	A _____ is a low-fidelity, basic version of a product used to gather early customer validation.	1	CO-04	Understanding
53	_____ involves entrepreneurs funding their startup entirely using their own personal savings.	1	CO-04	Understanding
54	In a SWOT analysis, Opportunities and Threats are considered _____ factors.	1	CO-04	Understanding
55	The Business Model _____ is a one-page visual plan used to design and evaluate business models.	1	CO-05	Understanding
56	The process of officially establishing a startup entity with the government is called Company _____.	1	CO-05	Understanding
57	_____ Marketing involves promoting products and services through digital channels and social media.	1	CO-05	Understanding
58	SEO stands for Search Engine _____, a technique used to increase website visibility.	1	CO-05	Understanding
59	A _____ is a legal right granted for an invention to prevent others from making or selling it.	1	CO-05	Understanding
60	An _____ Investor is typically a high-net-worth individual providing financial backing for small startups.	1	CO-05	Understanding

Question Type: 2 Marks

Q.No	Question	Marks	CO	Cognitive Level
61	Define Software Engineering.	2	CO-01	Remembering
62	What are the three core aspects used to distinguish a Product, Project, and Process?	2	CO-01	Remembering
63	List any two Agile ceremonies.	2	CO-01	Remembering
64	What is the primary function of a Scrum Master?	2	CO-01	Remembering
65	Define the Waterfall model.	2	CO-01	Remembering

66	List two common reasons software projects fail.	2	CO-01	Remembering
67	Define Risk Management in software development.	2	CO-02	Remembering
68	What is the difference between Functional and Non-Functional requirements?	2	CO-02	Remembering
69	Write the standard structure of an Agile User Story.	2	CO-02	Remembering
70	What does the acronym INVEST stand for?	2	CO-02	Remembering
71	What is the purpose of a UML Use Case Diagram?	2	CO-02	Understanding
72	List two techniques used for Requirement Prioritization.	2	CO-02	Remembering
73	Define Software Architecture.	2	CO-03	Remembering
74	What is a Design Pattern?	2	CO-03	Remembering
75	Differentiate briefly between QA and QC.	2	CO-03	Remembering
76	What is White-box testing?	2	CO-03	Remembering
77	Define DevOps.	2	CO-03	Remembering
78	What is a Work Breakdown Structure (WBS)?	2	CO-03	Understanding
79	Define entrepreneurship.	2	CO-04	Remembering
80	What is the role of an MVP (Minimum Viable Product)?	2	CO-04	Remembering
81	List the components of a SWOT analysis.	2	CO-04	Remembering
82	What is A/B testing?	2	CO-04	Remembering
83	Define the concept of 'Pivoting' in a startup.	2	CO-04	Remembering
84	What is Lean Startup methodology?	2	CO-04	Understanding
85	What is a Business Model Canvas (BMC)?	2	CO-05	Remembering
86	Define the Break-even Point.	2	CO-05	Remembering
87	What is the difference between a Copyright and a Trademark?	2	CO-05	Remembering
88	List two digital marketing strategies for startups.	2	CO-05	Remembering
89	What is an Elevator Pitch?	2	CO-05	Understanding
90	Define Crowdfunding.	2	CO-05	Understanding

Question Type: 3 Marks

Q.No	Question	Marks	CO	Cognitive Level
91	Explain the core values outlined in the Agile Manifesto.	3	CO-01	Remembering/Understanding
92	Compare the Traditional Waterfall model with Agile methodology.	3	CO-01	Remembering/Understanding
93	Discuss the primary responsibilities of a Product Owner in Scrum.	3	CO-01	Remembering/Understanding
94	Explain the core principles of Extreme Programming (XP).	3	CO-01	Remembering/Understanding
95	Why are Software Engineering ethics important for developers?	3	CO-01	Remembering/Understanding
96	Identify three personal factors that influence software development success.	3	CO-01	Remembering/Understanding
97	Describe the MoSCoW prioritization technique.	3	CO-02	Remembering/Understanding
98	Explain how a Class Diagram differs from a Sequence Diagram in UML.	3	CO-02	Remembering/Understanding

99	What is Story Mapping, and why is it visually useful?	3	CO-02	Remembering/Understanding
100	Differentiate between Business risks and Technical risks with examples.	3	CO-02	Remembering/Understanding
101	Explain the concept of 'Definition of Done' (DoD) in Agile.	3	CO-02	Remembering/Understanding
102	How does the Kano Model help in prioritizing customer requirements?	3	CO-02	Remembering/Understanding
103	Explain the Singleton design pattern and when to use it.	3	CO-03	Remembering/Understanding
104	Differentiate between Static Testing and Dynamic Testing.	3	CO-03	Remembering/Understanding
105	Describe the primary stages of the Defect Life Cycle.	3	CO-03	Remembering/Understanding
106	Explain the concept of Microservices Architecture.	3	CO-03	Remembering/Understanding
107	Why is Software Measurement and Metrics necessary in project management?	3	CO-03	Remembering/Understanding
108	Discuss the role and essential responsibilities of a Software Project Manager.	3	CO-03	Remembering/Understanding
109	Explain the five stages of the Design Thinking process.	3	CO-04	Remembering/Understanding
110	How does the Build-Measure-Learn feedback loop function in Lean Startup?	3	CO-04	Remembering/Understanding
111	Why is identifying customer pain points critical during the ideation phase?	3	CO-04	Remembering/Understanding
112	Explain how wireframing and rapid prototyping help in validating a tech idea.	3	CO-04	Remembering/Understanding
113	Describe the process of conducting a SWOT analysis for a new tech startup.	3	CO-04	Remembering/Understanding
114	Discuss the importance of Karnataka's startup ecosystem and government support.	3	CO-04	Remembering/Understanding
115	Explain the 'Value Proposition' and 'Customer Segments' blocks of the Business Model Canvas.	3	CO-05	Remembering/Understanding
116	Differentiate between SaaS and Freemium business monetization models.	3	CO-05	Remembering/Understanding
117	Explain the purpose of Intellectual Property Rights (IPR) for a software product.	3	CO-05	Remembering/Understanding
118	Describe what an Investor Pitch Deck is and what key slides it should contain.	3	CO-05	Remembering/Understanding
119	Discuss the concept of Growth Hacking and how it benefits early-stage startups.	3	CO-05	Remembering/Understanding
120	Explain the fundamental difference between Angel Investors and Venture Capitalists.	3	CO-05	Remembering/Understanding

Question Type: 5 Marks

Q.No	Question	Marks	CO	Cognitive Level
121	Discuss how applying Agile Scrum ceremonies can resolve common communication issues in software teams.	5	CO-01	Application
122	Analyze a scenario where a project failed due to scope creep; how could Agile principles have prevented it?	5	CO-01	Application
123	Explain the phases of the Software Development Life Cycle (SDLC) using a real-world web app example.	5	CO-01	Application
124	Evaluate the organizational, technical, and personal factors that contribute to project success.	5	CO-01	Application
125	Compare and contrast the practices of Scrum versus Extreme Programming (XP).	5	CO-01	Application
126	Describe the code of ethics a software engineer should follow when handling sensitive user data.	5	CO-01	Application
127	Create 5 User Stories covering the core features of an Online Food Delivery App.	5	CO-02	Application
128	Draw a conceptual UML Use Case diagram for a Smart Parking System involving a Driver and an Admin.	5	CO-02	Application
129	Analyze a given problem statement for an E-commerce site and identify three technical and two financial risks.	5	CO-02	Application
130	Apply the INVEST criteria to evaluate and refine a poorly written user story.	5	CO-02	Application
131	Formulate a risk mitigation strategy for an enterprise cloud migration project.	5	CO-02	Application
132	Organize a set of given requirements into a structured Story Map for a university management system.	5	CO-02	Application
133	Apply the Factory design pattern concept to structure a notification system (Email, SMS, Push).	5	CO-03	Application
134	Develop five critical Black-box test cases for the login module of a secure banking application.	5	CO-03	Application
135	Outline the sequential steps to set up a basic CI/CD DevOps pipeline for a web application.	5	CO-03	Application
136	Create a Work Breakdown Structure (WBS) for developing a simple mobile shopping cart.	5	CO-03	Application

137	Evaluate the benefits of adopting a Microservices architecture over a Monolithic architecture for a scalable platform.	5	CO-03	Application
138	Explain the Seven Testing Principles and apply them to a hypothetical software bug scenario.	5	CO-03	Understanding
139	Perform a complete SWOT analysis for a proposed AI-based student tutoring startup.	5	CO-04	Understanding
140	Apply the Lean Startup Build-Measure-Learn cycle to test a new subscription box service idea.	5	CO-04	Understanding
141	Design a rapid prototyping strategy (MVP) for an on-demand car wash mobile application.	5	CO-04	Understanding
142	Analyze the problem-solution fit for a startup addressing the issue of electronic waste management.	5	CO-04	Understanding
143	Formulate a competitor analysis framework to find the USP of a new social media application.	5	CO-04	Understanding
144	Evaluate the benefits of pivoting a business model when early A/B testing feedback is overwhelmingly negative.	5	CO-04	Understanding
145	Develop a complete Business Model Canvas (BMC) for a cloud-based software-as-a-service (SaaS) product.	5	CO-05	Understanding
146	Calculate the break-even point for a software tool given its fixed costs, variable costs, and subscription price.	5	CO-05	Understanding
147	Formulate a digital marketing and SEO growth strategy for a newly launched local delivery app.	5	CO-05	Understanding
148	Draft the structural outline of a 3-minute Elevator Pitch for an innovative healthcare scheduling platform.	5	CO-05	Understanding
149	Determine the appropriate IPR (Patents vs Copyrights vs Trademarks) needed to fully protect a new mobile game.	5	CO-05	Understanding
150	Analyze the various government schemes in Karnataka (e.g., Elevate 100) and how they specifically benefit early startups.	5	CO-05	Understanding

Question Type: 10 Marks

Q.No	Question	Marks	CO	Cognitive Level
151	Comprehensively compare Traditional Waterfall and Agile methodologies, highlighting scenarios where each approach is most effective and explaining the transition challenges an organization might face.	10	CO-01	Application

152	Elaborate on the roles, artifacts, and ceremonies within the Scrum framework, and explain how they collectively ensure continuous delivery of working software.	10	CO-01	Application
153	Analyze a detailed case study of a failed software project (e.g., healthcare system rollout). Identify the root causes across technical, organizational, and personal factors, and propose an SE framework to fix them.	10	CO-01	Application
154	Evaluate the principles of the Agile Manifesto and Extreme Programming (XP), providing real-world examples of how pair programming and test-driven development improve software quality.	10	CO-01	Application
155	Discuss the comprehensive Software Development Life Cycle (SDLC). Map specific artifacts and ethical considerations to each phase from requirement gathering to maintenance.	10	CO-01	Application
156	Design an organizational transformation plan for a legacy software company shifting to an Agile environment, detailing process assessments and improvement metrics.	10	CO-01	Application
157	For a proposed 'University Complaint Management System', identify all functional and non-functional requirements, categorize them, and create an exhaustive risk management matrix.	10	CO-02	Application
158	Develop a comprehensive Requirement Engineering document for an E-Commerce application, including a Use Case Diagram, Activity Diagram, and prioritized User Stories using MoSCoW.	10	CO-02	Application
159	Formulate a complete Story Mapping session outcome for a Healthcare Appointment Scheduling System, defining epics, user stories, and strict Acceptance Criteria (DoD).	10	CO-02	Application
160	Analyze the different types of software project risks (financial, operational, technical, compliance, strategic). Provide real-world IT examples for each and design a universal mitigation strategy.	10	CO-02	Application
161	Using JIRA as a theoretical tool, construct a complete Product Backlog for a Smart Parking System, detailing how you would manage sprints, prioritize stories, and track technical debt.	10	CO-02	Application

162	Evaluate the Unified Modeling Language (UML) by designing both a Class Diagram and a Sequence Diagram that accurately models the product checkout flow of an online retail system.	10	CO-02	Application
163	Design the software architecture for a high-traffic video streaming service. Compare Layered vs Microservices architectures for this scenario and justify your final choice.	10	CO-03	Application
164	Comprehensively explain the Software Defect Life Cycle. Furthermore, write an exhaustive test plan encompassing unit, integration, and user acceptance test cases for a banking transfer module.	10	CO-03	Application
165	Develop a complete Project Management Plan for a 6-month software project, including a detailed Work Breakdown Structure (WBS), resource allocation strategy, and budget estimation.	10	CO-03	Application
166	Analyze the complete DevOps lifecycle. Explain how continuous integration, continuous delivery, and infrastructure automation specifically solve traditional software operational bottlenecks.	10	CO-03	Application
167	Evaluate the implementation of Clean Code Principles and Secure Coding Practices by refactoring a hypothetical block of poorly written backend code, explaining each improvement made.	10	CO-03	Application
168	Formulate a comprehensive measurement and metrics strategy for an Agile team, detailing exactly which Agile metrics (Velocity, Burndown) will be used to track team performance and software quality.	10	CO-03	Application
169	Apply the Design Thinking methodology from end-to-end to solve the real-world problem of urban traffic congestion, resulting in a conceptual tech-based business solution.	10	CO-04	Application
170	Develop a comprehensive MVP (Minimum Viable Product) launch strategy for an educational platform, detailing wireframing, core feature selection, and the customer validation feedback loop.	10	CO-04	Application
171	Analyze the entrepreneurial journey of a successful Indian tech startup (e.g., Zerodha or Flipkart). Identify their initial problem-solution	10	CO-04	Application

	fit, USP, and how they scaled using startup ecosystem support.			
172	Formulate an exhaustive market research and competitor analysis report for a proposed on-demand home service app, utilizing SWOT and highlighting a unique selling proposition.	10	CO-04	Application
173	Discuss the Lean Startup methodology in depth. Provide a detailed hypothetical scenario of a startup that successfully pivoted its core product after analyzing A/B testing and user feedback data.	10	CO-04	Understanding
174	Evaluate the technological startup ecosystem in Karnataka. Explain how leveraging government support (MSME policies, Startup Karnataka) can systematically lower the barrier to entry for student entrepreneurs.	10	CO-04	Understanding
175	Create a comprehensive Business Model Canvas (BMC) for an innovative AI-driven healthcare diagnostic tool, detailing all 9 building blocks including revenue streams and key partnerships.	10	CO-05	Understanding
176	Develop a complete financial and operational plan for a software startup, explicitly outlining budget forecasting, variable/fixed costing, and calculating the exact break-even point.	10	CO-05	Understanding
177	Formulate a full-scale digital marketing, SEO, and user acquisition strategy designed to grow a bootstrapped SaaS platform from zero to 10,000 active users.	10	CO-05	Understanding
178	Design a compelling Pitch Deck structure targeted at Venture Capitalists. Detail the specific narrative, financial projections, and MVP validation data you would include to secure funding.	10	CO-05	Understanding
179	Analyze the complete legal framework required to launch a tech startup in India, detailing company registration, Terms of Service drafting, and comprehensive Intellectual Property (IPR) protection.	10	CO-05	Understanding
180	Evaluate the pros and cons of various startup funding mechanisms (Bootstrapping, Crowdfunding, Angel Investors, Venture Capital) and recommend a funding timeline for an enterprise SaaS startup.	10	CO-05	Understanding