



**MAHARAJA SURAJMAL BRIJ UNIVERSITY  
BHARATPUR**

**NATIONAL EDUCATION POLICY-2020**

**STRUCTURE OF UG-COMPUTER SCIENCE**

**Three Year Under Graduate Programme in Science/Arts/Commerce**

**Syllabus for III & IV Semester**

**Examination 2025-26**

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डॉ. अरुण कुमार पाण्डेय  
उपकुलसचिव  
प्रभारी अकादमिक प्रथम

B.Sc./B.A./B.Com. Semester - III & IV from Academic Session 2025-26 Onwards

Semester-wise Titles of the Papers in Computer Science

Diploma in B.Sc./B.A./B.Com.

Semester	Code	Paper Title	Course Type	Theory/ Practical	Teaching Hours/ Week	Credits
III	COMP 20T-301	Operating Systems	CC	Theory	4	4
	COMP 20P-302	Operating Systems Lab	CC	Practical	4	2
			<b>Total</b>		<b>8</b>	<b>6</b>
IV	COMP 20T-401	Database Management Systems	CC	Theory	4	4
	COMP 20P-402	DBMS Lab	CC	Practical	4	2
			<b>Total</b>		<b>8</b>	<b>6</b>

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## Course Content for Computer Science Course

### B.Sc./B.A./B.Com. Semesters III and IV

Semester: III

Code: COMP-20T-301	Paper Title: Operating Systems
Credits : 04	Hours/Week: 04

#### **Outcomes:**

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Analyse important algorithms e.g. Process scheduling and memory management algorithms
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques
4. Demonstrate the ability to perform System Administration tasks in LINUX

### **Operating Systems**

#### **Unit I**

**Concepts:** Operating System & its need, Objectives of Operating System, Functions of Operating System, Types of OS: Simple Batch Systems, Multiprogrammed Batch System, Time Sharing Systems, Parallel System, Distributed Systems and Real-Time Systems. Booting Process of OS, Operating System Structure.

#### **Unit II**

**Process Management:** Process Concept, Process States, Process Scheduling.

**CPU Scheduling Algorithms:** Basic Concepts, Scheduling Criteria, FCFS, SJF, Priority, Round-Robin, Multilevel Queue, Multiple Feedback Queue, Multiple- Processor Scheduling.

#### **Unit III**

**Deadlocks:** System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

**Memory Management:** Background, Why use memory management in OS, Logical versus Physical Address Space, Swapping, Contiguous Allocation (Fragmentation), Paging, Segmentation, Basic concept of Virtual Memory and Demand paging.

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## Unit IV

**Storage Management:** Overview of Mass-Storage Structure, Disk Scheduling: FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, RAID technology.

**File System:** Concept, Access Methods, Directory and Disk Structure, File System systems, File, Sharing and File Protection.

### Recommended reference books:

1. A. Silberschatz and P. Galvin, "Operating System Concepts", Addison-Wesley, 5th Ed., 2001.
2. Gary Nutt: Operating Systems-A Modern Perspective (Second Edition), Pearson Education, 2000.
3. Tanenbaum A.S., Modern Operating Systems, PHI Publ.
4. Peterson Richard, "The Complete Reference Linux" Tata McGraw Hill.
5. Simitabha Das, "Unix/Linux Concepts & Applications". Tata McGraw Hill
6. Achyut S. Godbole: Operating Systems, Tata Mc-Graw Hill Publishing Company Limited, 2000.
7. Harvey M. Deitel, Operating Systems, Pearson Education, 2001.

Code: <b>COMP-20P-302</b>	Paper Title: <b>Operating Systems Lab</b>
Credits : <b>02</b>	Hours/Week: <b>04</b>

### Outcomes:

1. Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.,
2. Analyse important algorithms e.g. Process scheduling and memory management algorithms
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management, disk management techniques

### Content:

#### Recommended Experiments

1. Implementation of CPU Scheduling. (i) FCFS, (ii) SJF, (iii) Shortest Remaining Time First and (iv) Priority based
2. Producer-Consumer Problem using Semaphores and Reader Writer Problem
3. Simulate algorithm for deadlock prevention and detection
4. Simulate memory allocation methods: (i) Best Fit, (ii) Worst Fit and (iii) Next Fit

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5. Simulate page replacement algorithms: FIFO, LRU and Optimal
6. Implementation of Disk Scheduling using FCFS, SCAN and C-SCAN algorithm

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## Semester: IV

Code: COMP-20T-401	Paper Title: Data base Management Systems
Credits : 04	Hours/Week: 04

### Outcomes:

1. Understand terms related to database design and management
2. Assess various database models.
3. Evaluate the normality of a logical data model, and correct any anomalies
4. Implement relational databases using MySQL.

## Data base Management Systems

### UNIT- I

**Database System Concepts & Architecture:** Overview of DBMS, Basic DBMS terminology, data base system v/s file system, Advantages and dis-advantages of DBMS, Coded rules, data independence. Architecture of a DBMS, Schemas, Instances, Database Languages, Database Administrator, Data Models.

### UNIT- II

**Data Modeling:** Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation.

**Relational Model :** Concepts, Constraints, Languages, Relational database design by ER & EER mapping, Relational algebra relational calculus. Relational Algebra, Fundamental operations of Relational Algebra.

### UNIT -III

**Database Design:** Functional dependencies, loss less decomposition, Normalization : 1-NF, 2-NF,3-NF and BCNF. **Transaction Management :** Transactions: Concepts, ACID Properties, States Of Transaction, Serializaibility, Isolation, Checkpoints, Deadlock Handling.

**Recovery System & Security :** Failure Classifications, Recovery & Atomicity, Log Base Recovery, Recovery with Concurrent Transactions, Introduction to Security & Authorization.

### UNIT- IV

**Introduction to SQL:** Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.



**Recommended Books:**

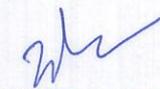
1. Korth H F and Silberschataz A, System Concepts, Sixth Edition; McGraw Hill, 2010
2. Leon, and Leon, SQL Tata McGraw Hill Pub. Co. Ltd.
3. Ivan Bayross; SQL/PL 4<sup>th</sup> Edn: BPB, 2009
4. Navathe S.B. Elmasri R.; Fundamentals of Database Systems, Fifth Edition, Pearson 2011.
5. Ramakrishan and Gharke, Database Management Systems, 3<sup>rd</sup> Ed, Tata McGraw Hill, 2007.
6. Singh S.K.; Database Systems; I Edition; Pearson, 2006.

Code: <u>comp-20P-402</u>	Paper Title: <b>DBMS Lab</b>
Credits : 02	Hours/Week: 04

**Contents:****Recommended Experiments**

1. Analyze the organization and identify the entities, attributes and relationships in it.
2. Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.
3. Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).
4. Represent all the entities (Strong, Weak) in tabular fashion. Represent relationships in a tabular fashion.
5. Apply the First, Second and Third Normalization levels on the database designed for the organization
6. Installation of Mysql and practicing DDL commands .
7. Creating databases, how to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.
8. Practicing DML commands on the Database created for the example organization
9. DML commands are used to for managing data within schema objects. Some examples: SELECT, INSERT, UPDATE, DELETE
10. Practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.
11. Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP BY, HAVING and Creation and dropping of View



  
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