LNCT University B.TECH-AIML

III Semester Syllabus

Database Management Systems (AL-301)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Explain various data models with their merits and demerits.
CO2	Construct sql queries using various data manipulation statements.
CO3	Apply normalization upto 3nf on given relations.
CO4	Summarize concurrency control mechanism for database transactions.
CO5	Utilize triggers and cursors in pl/sql programming.

Course content

Unit – I DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Functions of DBA, ER data model: Entitles and attributes, Entity types, Defining the E-R diagram, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables.
Unit -II Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages: SQL-DDL, DML, integrity con straints, various joins, Relational algebra and relational calculus, Relational algebra operations like select, Project, Join, Division, outer union.
Unit- III Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, problems with null valued and , multivalued dependencies. Query Optimization: Introduction, steps of optimization.
Unit-IV Transaction Processing Concepts: -Transaction System, Testing of Serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control.
Unit-V Study of Relational Database Management Systems through Oracle/PL SQL Distributed database, database links, and snapshot. Data dictionary, SQL queries, Data extraction from single, multiple tables equi- join, non equi-join, self -join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical quires, inline queries, flashback queries.

Books Suggested:

1. Date C J, “An Introduction to Database System”, Pearson Educations
2. Korth, Silbertz, Sudarshan, “Fundamental of Database System”, McGraw Hill
3. Rob, “ Data Base System: Design Implementation & Management”, Cengage Learninig
4. Elmasri, Navathe, “Fundamentals Of Database Systems”, Pearson Educations
5. AtulKahate , “ Introduction to Database Management System”, Pearson Educations
6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press,TMH.
7. Paneerselvam,”DataBase Management System”, PHI Learning

Suggested List of Experiments

Suggested list of experiments:- Lab Assignments:

1. Delete duplicate row from the table.

2. Display the alternate row from table.

3. Delete alternate row from table.

4. Update multiple rows in using single update statement.

5. Find the third highest paid and third lowest paid salary.

6. Display the 3rd, 4th, 9th rows from table.

7. Display the ename, which is start with j, k, l or m.

8. Show all employees who were hired the first half of the month.

9. Display the three record in the first row and two records in the second row and one record in the third row in a single sql statements.

10. Write a sql statements for rollback commit and save points.

11. Write a pl/sql for select, insert, update and delete statements.

12. Write a pl/sql block to delete a record. If delete operation is successful return 1 else return 0.

13. Display name, hire date of all employees using cursors.

14. Display details of first 5 highly paid employees using cursors.

15. Write a database trigger which fires if you try to insert, update, or delete after 7'o' clock.

16. Write a data base trigger, which acts just like primary key and does not allow duplicate values.

17. Create a data base trigger, which performs the action of the on delete cascade.

18. Write a data base trigger, which should not delete from emp table if the day is Sunday.

19. In this subject the students are supposed to prepare a small database application in complete semester like financial accounting system, Railway reservation system,institute timetable management system. Student record system, library management system, hospital management system etc. in RDBMS as follows:

Section A:

Solving the case studies using ER datamodel (design of the database)

Section B:

Implement a miniproject for the problem taken in section A.

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Operating Systems (AL-302)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Compare various types of operating systems
CO2	Analyse fcfs, sstf, scan and look disk scheduling algorithm techniques
CO3	Implement fcfs, sjf, priority, and CPU scheduling algorithm.
CO4	Summarize various memory management techniques.
CO5	Differentiate between remote procedure call and remote method invocation.

Course content

Unit-1 Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems – Concept of Virtual Machine. Process Management. Processes: Definition , Process Relationship , Process states , Process State transitions , Process Control Block ,Context switching – Threads – Concept of multithreads , Types of threads. Process Scheduling: Definition , Scheduling objectives ,Types of Schedulers ,Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) , Scheduling algorithms : Pre emptive and Non , pre emptive , FCFS – SJF – RR , Multiprocessor scheduling , IPC.

UNIT- II Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery. Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, and Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem etc., Scheduling, Scheduling Algorithms

Unit – III Basic Memory Management: Definition, Logical and Physical address map, Memory allocation : Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction , Paging : Principle of operation – Page allocation – Hardware support for paging – ,Protection and sharing – Disadvantages of paging.
Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies : Optimal (OPT) , First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)
Unit – IV Principles of I/O Hardware: I/O devices, Disk structure, Disk scheduling algorithm File concept, Aaccess methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous,linked, indexed), Free-space management (bit vector, linked list, grouping).
Unit -V Security Environment, Design Principles Of Security, User Authentication, Protection Mechanism: Protection Domain, Access Control List Introduction to Network, Distributed and Multiprocessor Operating Systems. Case Studies: Unix/Linux, WINDOWS and other Contemporary Operating Systems.

Books Suggested:

1. Modern Operating system by Andrew S. Tanenbaum , PHI

2. Operating system concepts, by Abraham Silberschatz, Willey.

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List of Experiment

1. Write a program to implement FCFS CPU scheduling algorithm.
2. Write a program to implement SJF CPU scheduling algorithm.
3. Write a program to implement Priority CPU Scheduling algorithm.
4. Write a program to implement Round Robin CPU scheduling algorithm.
5. Write a program to compare various CPU Scheduling Algorithms over differentScheduling Criteria.
6. Write a program to implement classical inter process communication problem(producerconsumer).
7. Write a program to implement classical inter process communication problem(ReaderWriters).
8. Write a program to implement classical inter process communication problem(Dining_Philosophers).
9. Write a program to implement & Compare various page replacement algorithm.
10. Write a program to implement & Compare various Disk & Drum scheduling Algorithms
11. Write a program to implement Banker's algorithms.
12. Write a program to implement Remote Proccedure Call(RPC).
13. Write a Devices Drivers for any Device or pheriperal.

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Statistical Modelling and Data Reasoning with Python AL 303

COURSE OUTCOMES:

After Completing the course student should be able to

CO1	Explain the data gathering techniques, Inspect the data using descriptive statistics
CO2	Illustrate the probability and conditional probability concepts
CO3	Distinguish between various probability distributions and analyze the data following different probability distributions
CO4	Solve the inferential statistics problems using point and interval estimation techniques
CO5	Infer the statistical problems using hypothesis testing and p-value

Course content

UNIT–I Introduction to Statistics: Introduction to Statistics. Role of statistics in scientific methods, current applications of statistics. **Scientific data gathering:** Sampling techniques, scientific studies, observational studies, data management. **Data description:** Displaying data on a single variable (graphical methods, measure of central tendency, measure of spread), displaying relationship between two or more variables, measure of association between two or more variables.

UNIT- II Probability Theory: Sample space and events, probability, axioms of probability, independent events, conditional probability, Bayes' theorem. Random Variables: Discrete and continuous random variables. Probability distribution of discrete random variables, binomial distribution, poisson distribution. Probability distribution of continuous random variables, The uniform distribution, normal (gaussian) distribution, exponential,distribution,gamma distribution, beta distribution, t,distribution, $\chi^{"}$ distribution. Expectations, vari ance and covariance. Probability Inequalities. Bivariate distribution.

UNIT -III **Point Estimations:** Methods of finding estimators, method of moments, maximum likelihood estimators, bayes estimators. Methods of evaluating estimators, mean squared error, best unbiased estimator, sufficiency and unbiasedness **Interval Estimations:** Confidence interval of means and proportions, Distribution free confidence interval of percentiles

UNIT – IV **Test of Statistical Hypothesis and p-values**: Tests about one mean, tests of equality of two means, test about proportions, p-values, likelihood ratio test, Bayesian tests **Bayesian Statistics:** Bayesian inference of discrete random variable, Bayesian inference of binomial proportion, comparing Bayesian and frequentist inferences of proportion, comparing Bayesian and frequentist inferences of mean

UNIT – V **Univariate Statistics using Python:** Mean, Mode. Median, Variance, Standard Deviation, Normal Distribution, t-distribution, interval estimation, Hypothesis Testing, Pearson correlation test, ANOVA F-test

Reference Books:

Achim Klenke, (2014), Probability Theory A Comprehensive Course Second Edition, Springer, ISBN 978-1- 4471-5360-3

Christian Heumann, Michael Schomaker Shalabh (2016), Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R, Springer International Publishing, ISBN 978-3-319-46160-1

Suggested List of Experiments

Practice Statistical functions with Python Statistics Library and apply on dataset for Hypotheiss testing and ANOVA analysis

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Data Visualization AL-304

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Learn Data handling for Data analysis
CO2	Illustrate Data Analytics with Power BI
CO3	Perform data manipulation functions
CO4	Create Gnatt Chart and build basic views
CO5	Evaluate what-if analysis for the data processing and data visualization

Course content

Objectives: The objective of this course is to teach students the concepts of visualization using data and how it is important in business decisions

Unit-I INTRODUCTION TO DATA HANDLING -Overview of Data analysis, Introduction to Data visualization, Working with statistical formulas - Logical and financial functions.

UNIT- II Power BI Analytics, Data Validation & data models, Power Map for visualize data , Power BI Business Intelligence , Data Analysis using statistical methods, Dashboard designing.

Unit – III INTRODUCTION TO DATA MANIPULATION USING FUNCTION: Heat Map, Tree Map, Smart Chart, Azure Machine learning , Column Chart, Line Chart , Pie,Bar, Area, Scatter Chart, Data Series, Axes , Chart Sheet , Trendline

Unit – IV Execute Error Bars, Sparklines, Combination Chart, Gauge, Thermometer Chart Gantt Chart , Pareto Chart etc Pivot Chart, Slicers

Unit -V Frequency Distribution, Tables: Structured References, Table Styles , What-If Analysis: Data Tables| Correlation model |Regression model

Books Suggested:

- "Information Dashboard Design: Displaying Data for At-a-glance Monitoring" by Stephen Few
- "Beautiful Visualization, Looking at Data Through the Eyes of Experts by Julie Steele, Noah Iliinsk

Suggested List of Exp PowerBI basics of data analytics, data visualisation. Overview of python visualtion and other related tools

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Discrete Structure (AL 305)

COURSE OUTCOMES: After Completing the course student should be able to

CO1	Apply the key concepts of set theory and also gain knowledge to computer logics.
CO2	Construct various algebraic structures.
CO3	Analyse method of representing mathematical propositional logic and its application.
CO4	Discuss graph theory concepts to solve complex problems.
CO5	Describe possets, hasse diagram and lattices with suitable example.

Course Contents

UNIT-1 Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations,Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job-Scheduling problem Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions,
pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

UNIT-II Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid,Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group,Permutation groups,Normal subgroup, Homomorphism and isomorphism of Groups,example and standard results, Rings and Fields: definition and standard results.

UNIT-III Propositional Logic: Proposition, First order logic, Basic logical operation,truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications,logical equivalence, predicates, Normal Forms, Universal and existential quantifiers.Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

UNIT-IV Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity,Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs. Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set,isomorphic ordered set, well ordered set, properties of
Lattices, bounded and complemented lattices.

UNIT-V Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimonial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions.

References:

1. C.L.Liu, “Elements of Discrete Mathematics” Tata Mc Graw-Hill Edition.
2. Trembley, J.P & Manohar; “Discrete Mathematical Structure with Application CS”, McGraw Hill.
3. Kenneth H. Rosen, “Discrete Mathematics and its applications”, McGraw Hill.
4. Bisht, “Discrete Mathematics”,Oxford University Press
5. Biswal,”Discrete Mathematics & Graph Theory”, PHI