

- Central limit theorem, which helps to understand the remarkable fact that the empirical frequencies of so many natural populations, exhibit a bell shaped curve.

### Detailed Syllabus

#### UNIT-I: 15 mark

**Probability Functions and Moment Generating Function:** Sample space, Probability set function, Real random variables - Discrete and continuous, Cumulative distribution function, Probability mass/density functions, Transformations, Mathematical expectation, Moments, Moment generating function, Characteristic function.

#### UNIT-II: 20 mark

**Univariate Discrete and Continuous Distributions:** Discrete distributions: Uniform, Bernoulli, Binomial, Negative binomial, Geometric and Poisson; Continuous distributions: Uniform, Gamma, Exponential, Chi-square, Beta and normal; Normal approximation to the binomial distribution.

#### UNIT-III: 20 mark

**Bivariate Distribution:** Joint cumulative distribution function and its properties, Joint probability density function, Marginal distributions, Expectation of function of two random variables, Joint moment generating function, Conditional distributions and expectations.

#### UNIT-IV: 20 mark

**Correlation, Regression and Central Limit Theorem:** The Correlation coefficient, Covariance, Calculation of covariance from joint moment generating function, Independent random variables, Linear regression for two variables, The method of least squares, Bivariate normal distribution, Chebyshev's theorem, Strong law of large numbers, Central limit theorem and weak law of large numbers.

#### Text Books:

- Hogg, Robert V., McKean, Joseph W., & Craig, Allen T. (2013). *Introduction to Mathematical Statistics* (7th ed.). Pearson Education, Inc.
- Basic Statistics –Agarwal B.L, New age international, 6th edition, 2013
- Miller, Irwin & Miller, Marylees. (2014). John E. Freund's *Mathematical Statistics wit Applications* (8th ed.). Pearson. Dorling Kindersley (India).

#### References:

- Medhi J – Statistical methods, New age International, Second edition, Reprint 2013
- Walpole, Myers et al. –Probability and statistics for scientists and engineers., Pearson Education, Ninth edition, 2013
- Applied Statistics and probability for Engineers, Runger and Montgomery, Wiley, 6th Edition
- Ross, Sheldon M. (2014). *Introduction to Probability Models* (11th ed.). Elsevier Inc. AP.

**BCA409: Database Management Systems (Discipline Specific Core Course)**

**Credit: 06**

**Total Marks: 100 Marks (Theory: 75 Marks, Internal Assessment: 25 Marks)**

### Workload: 4 Lectures (Per Week), 4 Practical (Per Week)

#### Course Objective

The course introduces the foundations of database management systems focusing on significance of a database, relational data model, schema creation and normalization, transaction processing, indexing, and the relevant data structures (files and B+-trees).

#### Course Learning Outcomes

On successful completion of the course, students will:

1. Describe major components of DBMS and their function
2. Model an application's data requirements using conceptual modelling tools like ER diagrams and design database schemas based on the conceptual model.
3. Write queries in relational algebra / SQL
4. Normalize a given database schema to avoid data anomalies and data redundancy. Describe the notions of indexes, views, constraints and transactions.

#### Detailed Syllabus

##### UNIT-I: 10 mark

**Introduction to databases:** Characteristics of database approach, data models, database system architecture, data independence and data abstraction.

##### UNIT-II: 10 mark

**Data modeling:** Entity relationship (ER) modeling: Entity types, relationships, constraints, ER diagrams, EER model

##### UNIT-III: 10 mark

**Relation data model:** Relational model concepts, relational constraints, relational algebra.

##### UNIT-IV: 15 mark

**SQL queries:** SQL data definition, data types, specifying constraints, Queries for retrieval, insertion, deletion, updation, introduction to views.

##### UNIT-V: 15 mark

**Database design:** Mapping ER/EER model to relational database, functional dependencies, Lossless decomposition, Normal forms (upto BCNF).

##### UNIT-VI: 15 mark

**Transaction and data storage:** Introduction to transaction processing: ACID properties, concurrency control; Introduction to indexing structures for files.

#### Text book:

1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", 5 th Edition, Pearson Education, 2007.
2. A.K. Majumdar, P. Bhattacharyya, Database Management Systems, Tata McGraw-Hill, 1996
3. H. Korth, A. Silberschatz, Database System Concepts, McGraw-Hill (Second Edition), 1991
4. R. Elmasri, S. Navathe, Fundamentals of Database System, Benjamin Cummings (Second Edition), 1994

5. Bipin Desai, An Introduction to Database Systems, Galgotai Publication (West Publishing), 1991.
6. F. Mc-Fadden, J. Hoffer, Modern Database Management, Benjamin cummings (Narosa), (Fourth Edition), 1994

### References:

1. Abrahamsi. Silberschatz, Henry. F. Korth, S. Sudarshan, "Database System Concepts" 6th Edition, McGraw Hill, 2012. 2. C.J.Date, "Introduction to database systems", Eight Edition, Addison Wesley, 2003.
2. Peter Rob, Carlos Coronel, Database Systems: Design, Implementation and Management, Wadsworth Publishing Company, 1993
3. C.J. Date, An Introduction to Database Systems, Volume I, Addison Wesley (Fifth Edition), 1994 . J.D, Ullman, Principles of Database Systems. Galgotia Publishing (Second Edition), 1994. D.M. Kroenke, Database Processing : Fundamentals, Design Implementation, Prentice Hall (Fifth Edition) 1994

### Practical (Database Management System)

Create the following Database  
Salesman

SNUM	SNAME	CITY	COMMISSION
1001	RAM	LONDON	14%
1002	ANAND	NEWDELHI	10%
1003	SHYAM	MUMBAI	13%
1007	MOTILAL	NEWYORK	11%
1004	PIYUSH	BARODA	15%
1006	SEJAL	SPAIN	12%

### Customer

CNUM	CNAME	CITY	RATING	SNUM
2001	Harsh	London	100	1001
2002	Gita	Rome	200	1003
2003	Lalit	Surat	200	1002
2004	Govind	Bombay	300	1002
2008	Chirag	London	100	1001
2006	Chinmay	Surat	400	1007

### Orders

ONUM	AMOUNT	ODATE	CNUM	SNUM
3001	17.79	01/03/21	2009	1007
3003	676.91	01/03/21	2014	1006

3002	1800.21	01/03/21	2019	1004
3005	1650.54	01/03/21	2018	1002
3006	1808.61	01/03/21	2016	1005
3009	1719.32	10/04/21	2013	1008
3007	57.57	10/04/21	2017	1004
3008	7432.00	11/05/21	2020	1005
3010	3108.59	11/05/21	2012	1002
3011	8981.88	11/05/21	2011	1008

### Practical List – 1

Solve the following queries using above databases and where clause range searching and pattern matching.

1. Produce the order no, amount and date of all orders.
2. Give all the information about all the customers with salesman number 1001.
3. Display the following information in the order of city, Sname, Snum and commission.
4. List of rating followed by the name of each customer in Surat.
5. List of snum of all salesmen with order in order table without any duplicates.
6. List of all orders for more than Rs.1000. List of names and cities of all salesmen in London with commission above 10% List all customers excluding those with rating  $\leq 100$  unless they are located in London
7. List all orders for more than Rs.1000 except the orders of snum<1006 of 10/03/21.
8. List all order taken on October 3<sup>rd</sup> or 4<sup>th</sup> or 6<sup>th</sup>, 2008.
9. List all customers whose names begins with a letter 'A'.
10. List all customers whose names begins with letter 'A' to 'G'.
11. List all orders with zero or NULL amount.

### Practical List – 2

1. Solve the following queries using above databases and where clause range searching and pattern matching
2. List all salesmen with their % of commission.
3. Display the no. Of orders for each day in the descending order of the no. Of orders in the following format. FOR dd-mm-yy,there are \_\_\_\_ Orders.
  - a. Assume each salesperson has a 12% commission. Write a query on the order table that will produce the order number, salesman no and the amount of commission for that order.
4. Find the highest rating in each city in the form: For the city (city), the highest rating)
5. List all in descending order of rating. Calculate the total of orders for each day and place the result in descending order.

### BCA410: Web Technologies (Discipline Specific Core Course)

#### Credit 06

**Total Marks: 100 Marks (Theory: 75 Marks, Internal Assessment: 25 Marks)**

**Workload: 4 Lectures (Per Week), 4 Practical (Per Week)**

### Course Objectives:

The course content enables students to:

1. Understand best technologies for solving web client/server problems