LNCT UNIVERSITY, BHOPAL

Programme:- BCA(AI & DA)   **Semester – III**   **wef: July 2022**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Probabilistic Modelling and Reasoning with Python	**BAI-301**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		3	**1**	**0**	**70**	**30**	**100**

Course Objective	The objective of this course is to teach students the concepts of Statistics, probability, probability distribution, and other statistical methods to solve various engineering problems.

Units	Contents (Theory)	Hours /week
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.	**8**
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, χ'' distribution. Expectations, variance and covariance. Probability Inequalities. Bivariate distributions.	**8**
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	**8**
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	**8**

	inference of binomial proportion, comparing Bayesian and frequentist inferences of proportion, comparing Bayesian and frequentist inferences of mean.	
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	**8**

Text Books/ References Book:-
Study Material will be provided.

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Achim Klenke	Probability Theory A Comprehensive Course	Second Edition	Springer, ISBN 978-1-4471-53603
Christian Heumann, Michael Schomaker Shalabh	Introduction to Statistics and Data Analysis With Exercises, Solutions and Applications in R	2016	Springer International Publishing, ISBN 978-3-319-46160-1
Douglas C. Montgomery	Statistics and Probability for Engineers	2012	Wiley India, ISBN: 978-8-126-53719-8.

COURSE OUTCOMES: Students will be able to	
CO1	Learn Basics of Statistics and Probability distributions
CO2	Learn Sampling theory and Theory of Estimation
CO3	Learn Various tests of Hypothesis and Significance
CO4	Learn Correlation and Regression
CO5	Learn fitting of different types of curves.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
R Programming For Data Science and Data Analysis	**BAI-302**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		3	**1**	**0**	**70**	**30**	**100**

Course Objective	The objective of this course is to teach students R Programming Language, basic functions in R programming language and critical techniques.

Units	Contents (Theory)	Hours /week
I	**Getting Started with R and R Workspace**: Introducing R, R as a programming Language, the need of R, Installing R, RStudio, RStudio's user interface, console, editor, environment pane, history pane, file pane, plots pane, package pane, help and viewer pane R Workspace, R's working directory, R Project in R Studio, absolute and relative path, Inspecting an Environment, Inspect existing Symbols, View the structure of object, Removing symbols, Modifying Global Options, Modifying warning level, Library of Packages, Getting to know a package, Installing a Package from CRAN, Updating Package from CRAN, Installing package from online repository, Package Function, Masking and name conflicts	8
II	**Basic Objects and Basic Expressions**: Vectors, Numeric Vectors, Logical Vectors, Character Vectors, subset vectors, Named Vectors, extracting element, converting vector, Arithmetic operators, create Matrix, Naming row and columns, subsetting matrix, matrix operators, creating and subsetting an Array, Creating a List, extracting element from list, subsetting a list, setting value, creating a value of data frame, subsetting a data frame, setting values, factors, useful functions of a data frame, loading and writing data on disk, creating a function, calling a function, dynamic typing, generalizing a function. Assignment Operators, Conditional Expression, using if as expression and statement, using if with vectors, vectorized if: ifelse, using switch, using for loop, nested for loop, while loop	8
III	**Working with Basic Objects**: Working with object function, getting data dimensions, reshaping data structures, iterating over one dimension, logical operators, logical functions, dealing with missing values, logical coercion, math function, number rounding functions, trigonometric functions, hyperbolic functions, extreme functions, finding roots, derivatives and integration, Statistical function, sampling from a vector, Working with random distributions, computing summary statistics, covariance and correlation matrix,	8

IV	**Working with Strings**: Printing string, concatenating string, transforming text, Formatting text, formatting date and time, formatting date and time to string, finding string pattern, using group to extract data, reading data.	**8**
V	**Working with Data**: Visualize and Analyze Data: Reading and Writing Data, importing data using built-infunction, READR package, export a data frame to file, reading and writing Excel worksheets, reading and writing native data files, loading built-in data sets, create scatter plot, bar chart, pie chart, histogram and density plots, box plot, fitting linear model and regression tree	**8**

Text Books/ References Book:-

Study Material will be provided.

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Garrett Grolemund	Hands-On Programming with R	I, 2014	O'Reilly Media, Inc.
Hadley Wickham & Garrett Grolemund	R for Data Science	2017	O'Reilly

COURSE OUTCOMES: Students will be able to	
CO1	Construct and execute basic programs in R using elementary programming techniques.
CO2	Identify and implement appropriate control structures to solve a particular programming problem.
CO3	Work on statistical models with the help of R program.
CO4	Work on strings with the help of R program
CO5	Do plotting and graphing.

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
Data Base Management System	**BAI-303**	**L**	**T**	**J**	**EST**	**CAT**	**Total**
		3	**1**	**0**	**70**	**30**	**100**

Course Objective	The objective of this course is to learn fundamentals of data models and to represent a data base system using ER diagrams, study of SQL and relational data base design.

Units	Contents (*Theory*)	Hours /week
I	**Database Concepts**: Data, Information & Knowledge, Introduction to Database Management System (DBMS): Database Concepts, Why database, characteristics of data in database, Advantages of DBMS, Overview of Database Models: Hierarchical Model, Network Model, Relational Model and Object Oriented Model. Three levels of Database Architecture: Conceptual, Physical and Logical levels. Entity Relationship Model: Entity, Attributes, Relationships, E-R Modeling Symbols.	**8**
II	**Relational DBMS:** RDBMS Terminology, Relational Data Structure, Data Integrity, Codd's Rule, Overview of Relational Algebra and Relational Calculus, Relational Database Design: Primary Keys, Foreign Keys, Candidate Keys, Relationships, Normalization, Purpose of Normalization, First Normal Form, Second Normal Form, Third Normal Form.	**8**
III	**SQL:** SQL Data Types and Literals, DDL, DML, DQL, DCL, DAS, TCS, SQL operators, Creating Database, Creating, Modifying and Deleting Tables, Creating View, Indexes, Queries: Insert, Select, Update, Where Clause, Having Clause, Sub-Queries, Order By, Grouping, Creating Variables, Functions: Aggregate and Scalar, Joins, Unions, Triggers, Procedures.	**8**
IV	Transactions: Transaction concept, Transaction Properties, Transaction States, Concurrency Control: Concurrency Control Schemes - Lock Based Protocols, Timestamp Based Protocols, Deadlock handling, User Defined Transactions.	**8**
V	Database Security: Data Security Risks, Data security requirements, Database Users, Database Backup, Database Recovery: Types of database Failures, Recovery Techniques -Deferred Update, Immediate Update and Shadow paging, Database Privileges – System Privileges and Object Privileges, Overview of Data Storage	**8**

Devices.	

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Silberschatz, Korth&Sudarshan	Database System Concepts	7th ed., 2018	McGraw Hill. New York
S. K. Singh	Database Systems, Concepts, Design and Applications	2011	Dorling Kindersley (India),
Raghu Ramakrishnan, Johannes Gehrke	Database Management Systems	2nd ed., Release, 2001	McGraw-Hill
Elmsari, Navathe	Fundamentals of Database Systems	5th Edition	Pearson Education

COURSE OUTCOMES: Students will be able to	
CO1	Understand database concepts and database management system software
CO2	Understand RDBMS and Normailzation.
CO3	Write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS.
CO4	Understand Transactions
CO 5	Identify database failures and understand database privileges.

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Programme:- BCA(AI & DA)   **Semester – III**   **wef: July 2022**

Name of Paper	Paper Code	Theory					
		Credit			Marks		
Software Engineering	BAI-304	L	T	J	EST	CAT	Total
		3	1	0	70	30	100

Course Objective	The objective of this course is to enhance knowledge of basic SW engineering methods and practices, and their appropriate application, software designing , testing Strategies and UML models.

Units	Contents (*Theory*)	Hours /week
I	**Introduction:**-Software Product and Process Characteristics, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model, Incremental Model, Spiral Model, Rational Unified process and Agile model .	8
II	**Software Requirement Analysis**: Requirement Specifications: Need for SRS, Nature of SRS, Characteristics, Components of SRS.Requirements analysis: Feasibility Study, Information Modeling, IEEE Standards for SRS, Cost Estimation: COCOMO Model, Designing Concepts: Design Principles, Module level concepts- Cohesion and Coupling, Design notations and specifications, Verification, Metrics.	8
III	**Object Oriented Design**: Concepts, Design Notation and Specification, Design methodology, metrics. Debugging Process: Information Gathering, Fault Isolation, Fault Confirmation, Documentation, Fixing fault isolation.	8
IV	**Testing:** Testing Fundamental, Functional Testing (Black Box), Structural Testing (White Box), Alpha And Beta Testing, Testing Object Oriented Programs, Testing Process: Comparison of Different Testing, Level of Testing. Project management for special classes of software projects: Using CASE tools, CBSE.	8
V	**UML**: An overview of UML- UML notations, UML Class diagrams- association, multiplicity, generalization, aggregation, interfaces.	8

Text Books/ References Book:-			
Name of Authors	**Titles of the Book**	**Edition**	**Name of the Publisher**
Ian Sommerville	Software Engineering	9th Edition	Pearson Education Ltd, 2010

Roger S. Pressman	Software Engineering, A Practitioner's approach	7th Edition	McGRAW-HILL Publication, 2010
Pankaj Jalote	An integrated approach to Software Engineering	3rd Edition	Narosa Publishing House, 2013
COURSE OUTCOMES: Students will be able to			
CO1	Understand software development life cycles.		
CO2	Understand elicitation process and SRS		
CO3	Apply object oriented designing to an application		
CO4	Understand testing Strategics		
CO5	Prepare UML diagrams		

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Name of Paper	Paper Code	Theory					
		Credit			Marks		
		L	T	J	EST	CAT	Total
Soft Skills	**BAI-305**	3	1	0	70	30	100

Course Objective	The objective of this course is to make the students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice

Units	Contents (*Theory*)	Hours /week
I	**Introduction:** Process of Communication, Language as a Tool, Levels of Communication, Communication Networks, Importance of Technical Communication. Definition of Noise, Classification of Barriers. **Know Thyself:** Introduction to Soft skills-Self discovery-Developing positive attitude-Improving perceptions-Forming values.	8
II	**Impact of Technology:** Software for Creating Messages, Software for Writing Documents, Software for Presenting Documents, Transmitting Documents, Effective use of Available Technology. **Interpersonal Skills**: Developing interpersonal relationship, Team building, group dynamics,Net working-Improved work relationship.	8
III	**Communication Skills**: Introduction, Types of Listening, Traits of good Listener, Active versus passive listening, implications of effective listening. Art of listening-Art of reading, Art of speaking ,Art of writing ,Art of writing ,e-mails ,email etiquette.	8
IV	**Effective Presentation Skills:** Introduction, Defining purpose, Analyzing Audience and Locale, Organizing Contents, preparing outline, Visual Aids, Understanding Nuances of Delivery, Kinesics, Proxemics, Paralinguistic's, Chronemics, Sample speech. **Corporate Skills:** Developing body language, Practicing etiquette and mannerism, Time management-Stress management.	8

| V | **Job Skills:** Writing resume, Interview skills-Group discussion, Group Discussion types, Group discussion as part of selection process, Mock interview-Mock GD , Goal setting , Career planning. | **8** |

Text Books/ References Book:-

Name of Authors	Titles of the Book	Edition	Name of the Publisher
Meena.K and V.Ayothi	Soft Skills : A Road Map to Success	2013	P.R. Publishers & Distributors
Alex K.	Soft Skills – Know Yourself & Know the World	2012	S. Chand & Company LTD
M.AshrafRizivi	Effective Technical Communication	2009	Tata McGraw Hill
Meenakshi Raman and Sangeeta Sharma	Technical Communication - Principles and Practices	2010	Oxford University Press

COURSE OUTCOMES: Students will be able to	
CO1	Effectively communicate through verbal/oral communication and improve the listening skills .
CO2	Write precise briefs or reports and technical documents.
CO3	Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.
CO4	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
CO5	Prepare resume for the job as well as job skills will be developed.

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
Programming Lab in Python	**BAI-306**	**P**	**J**	**ESP**	**CAP**	**Total**
		2	-	30	20	50

Contents (Practical):-

1. Syntax basics: Arithmetic/String Operations, Input/Output.

2. Control Flow constructs: If-else, Relational and Logical Operators.

3. Iteration: While loop, for loop.

4. Collections: Lists, Tuples.

5. Collections: Sets, Dictionary.

6. Functions and Modules: Sys, Math, Time.

7. File Handling: Data streams, Access modes, Read/Write/Seek.

8. OOP's,Classes, Objects, Exception handling.

9. GUI programming: TkInter.

10. Complete Python based project.

Name of Paper	Paper Code	Practical				
		Credit	Marks			
Programming Lab in DBMS	**BAI-307**	**P**	**J**	**ESP**	**CAP**	**Total**
		2	-	30	20	50

Contents (Practical):

1. Write a query to create information of 'employees' (table name) in an organization with field Emp_id, EName, Salary, Commission, Hire_date, Address.

2. Write a Query to selective insertion only for Name and salary. (We assume that NOT NULL constraint apply is not on other fields).

3. Write a Query to display Name and Salary of employees table where salary is equal 5000.

4. Write a Query to display total income of every employee.

5. Write a Query to display employees name in descending order with salary.

6. Write a Query to display salary of employees between 40,000 to 50,000.

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

8. Write a PL/SQL for select, insert, update and delete statements.

9. Display name, hire date of all employees using SQL.

10. Display details of first 5 highly paid employees in SQL.

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

12. Solving the case studies using ER Data Model (design of the database) & implement a Mini Project for the any problem taken by you.

Name of Paper	Paper Code	Practical				
		Credit		Marks		
Mini Project in Python /Internship Evaluation-I	**BAI-308**	**P**	**J**	**ESP**	**CAP**	**Total**
		0	1	30	20	50

Note:-Design a project using features of Python and evaluation of Internship will be done after II semester.

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Name of Paper	Paper Code	Practical				
		Credit		Marks		
		P	J	ESP	CAP	Total
CRT Training – I	**BAI-309**	-	-	-	-	-

Note: - This training will include aptitude skills related to verbal ability, quantitative aptitude, logical reasoning and data presentation.

Quantitative Ability:-

1. Number   System
2. Percentage
3. Ratio and Proportion
4. Partnership
5. Profit & Loss
6. Simple & Compound Interest
7. Average

Logical Reasoning:-

1. Coding-Decoding
2. Sitting Arrangements
3. Direction Sense Test
4. Blood Relations
5. Syllogism
6. Series

Verbal Ability:-

1. Noun
2. Pronoun
3. Adjectives
4. Tenses
5. Verb
6. Preposition
7. Article
8. Synonyms
9. Vocabulary