

**B. Tech Computer Science and Engineering (Artificial Intelligence and Data Science)**  
**Scheme of Studies/Examination**  
**Semester IV**

S. No.	Course No.	Subject	L:T:P	Hours/Week	Credits	Examination Schedule				Duration of Exam (Hrs.)
						Major Test	Minor Test	Practical	Total	
1	BS-AIDS-202A	Bayesian Data Analysis	3:0:0	3	3	75	25	0	100	3
2	PC-CS-AIDS-204A	Data Science with R Programming	3:0:0	3	3	75	25	0	100	3
3	ES-CS-AIDS-206A	Intelligent Communication Systems	3:0:0	3	3	75	25	0	100	3
4	PC-CS-AIDS-208A	Internet and web technology	3:0:0	3	3	75	25	0	100	3
5	PC-CS-AIDS-210A	Database Management System	3:0:0	3	3	75	25	0	100	3
6	PC-CS-AIDS-212A	Operating system	3:0:0	3	3	75	25	0	100	3
7	PC-CS-AIDS-214LA	R Lab	0:0:2	2	1	0	40	60	100	3
8	PC-CS-AIDS-216LA	Internet and web technology Lab	0:0:2	2	1	0	40	60	100	3
9	PC-CS-AIDS-218LA	Database Management System Lab	0:0:2	2	1	0	40	60	100	3
		<b>Total</b>		<b>24</b>	<b>21</b>	<b>450</b>	<b>270</b>	<b>180</b>	<b>900</b>	
10	MC -901A	Environmental Sciences	3:0:0	3	0	0	100	0	100	3

Bayesian Data Analysis							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	Aim of this course is to equip students with the skills to perform and interpret Bayesian Data analysis						
<b>Course Outcomes(CO)</b>							
<b>CO1</b>	Demonstrate fundamental understanding of Bayesian Inference and models						
<b>CO2</b>	Understand and apply Bayesian statistics, posterior inference and decision analysis for making Bayesian models.						
<b>CO3</b>	Demonstrate Computation, approximation and simulating from probability distributions in Bayesian analysis						
<b>CO4</b>	Understand Bayesian forms of the standard statistical models						

### UNIT – I

#### Fundamental of Bayesian Inference

**Probability & Inference:** The Bayesian Approach, Basic Probability, Bayes' Law, Posterior Distribution, Bayesian Framework, The three steps of Bayesian Data Analysis, Statistical Inference and Bayesian Inference, Discrete Probability Examples: - genetics and spell checking, Bayesian Inference in Applied Science

**Models:** Single and multi-variate models, Bayesian networks, Second-order models (i.e., distributions over distribution parameters), Infinite models: Gaussian process, Dirichlet process, Hierarchical models, Non-parametric models.

### UNIT – II

#### Bayesian Data Analysis

Posterior predictive checking of model in applied Bayesian statistics, Graphical posterior predictive check, Measures of predictive accuracy, Information criteria and cross-validation Model comparison based on predictive performance, Model comparison using Bayes factors, Bayesian decision theory in different contexts, using regression predictions, Multistage decision making, Hierarchical decision analysis for radon measurement, Personal vs. institutional decision analysis.

### UNIT – III

#### Computation & Approximations

Introduction Bayesian computation, Numerical integration, Distributional approximations, Markov chain simulation, Metropolis and Metropolis-Hastings algorithms, Using Gibbs and Metropolis as building blocks, Gibbs Sampling Examples in R and WinBUGS, Inference and assessing convergence, Hamiltonian Monte Carlo, Posterior modes Normal and related mixture approximations, Finding marginal posterior modes using EM, Approximating conditional and marginal posterior densities

### UNIT – IV

#### Regression Models

Bayesian analysis of the classical regression model, Regression for causal inference: incumbency in congressional elections, Goals of regression analysis, Hierarchical Linear Model: - Regression coefficients, Interpreting a normal prior distribution, varying intercepts and slopes, Standard generalized linear model likelihoods, Working with generalized linear models 407 16.3 Weakly informative priors for logistic regression, Models for multivariate and multinomial responses 423 16.7 Loglinear models for multivariate discrete data,

**Nonlinear and Nonparametric Models:** Parametric nonlinear models, Gaussian process models, Finite mixture models, Dirichlet process models.

#### **Suggested Books:**

1. Bayesian Data Analysis, by Andrew Gelman, John Carlin, Hal Stern, David Dunson, Aki Vehtari, and Donald Rubin, Chapman and Hall/CRC
2. Data Analysis: A Bayesian Tutorial, D. S. Sivia, Clarendon Press, 1996
3. Doing Bayesian Data Analysis: A Tutorial Introduction with R, John Kruschke, Academic press.



PC-CS-AIDS- 204A	<b>Data Science and R Programming</b>						
<b>Lecture</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Credit</b>	<b>Major Test</b>	<b>Minor Test</b>	<b>Total</b>	<b>Time</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>75</b>	<b>25</b>	<b>100</b>	<b>3 Hrs.</b>
<b>Purpose</b>	<b>To Describe what Data Science is and the skill sets needed to be a data scientist</b>						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Basics of Data Science, Explain basic Statistics. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data.						
<b>CO2</b>	Using R to carry out basic statistical modeling and analysis.						
<b>CO3</b>	Explain the significance of exploratory data analysis (EDA) in data science. Apply basic tools (plots, graphs, summary statistics) to carry out EDA.						
<b>CO4</b>	Describe the Data Science Process and how its components interact via machine learning models.						

### UNIT -I

What is Data Science, What does Data Science involve, Era of Data Science, Business Intelligence vs Data Science, Life cycle of Data Science, Tools of Data Science, Introduction to Big Data and Hadoop, Introduction to R, Introduction to Spark, Introduction to Machine Learning.

Statistics: Describing a Single Set of Data, Central Tendencies, Dispersion, Correlation, Simpson’s Paradox, Some Other Correlational Caveats, Correlation and Causation. Probability: Dependence and Independence, Conditional Probability, Bayes’s Theorem, Random Variables, Normal Distribution, Binary distribution.

### UNIT -II

R Programming, What is R, Installing R and RStudio, RStudio Overview, Working in the Console , Writing data, Reading from csv files, Data Types, Operators, Functions, Vectors, Data Frames, Factors, Sorting Numeric, Character, and Factor Vectors, Special Values, Installing and loading packages, Setting up your working directory, Downloading and importing data, Working with missing data , Extracting a subset of a data frame, Writing R scripts, Creating reports, Flow Control, while loops, for loops, If / else, Debugging tools, Data Analysis Pipeline, Data Extraction, Types of Data, Raw and Processed, Data Wrangling

### UNIT -III

Data Manipulation in R, List Management, Data Transformation, Merging Data Frames, Outlier Detection, Combining multiple vectors, Logical Regression, Hierarchical Clustering, PCA for Dimensionality Reduction, Data Import Techniques, Exploratory Data Analysis, Visualization of Data, Loading different types of dataset in R, Arranging the data, Plotting the graphs, Statistical graphs, Creating bar chart and dot plot, Creating histogram and box plot, Plotting with base graphics, Plotting and coloring in R

### UNIT -IV

Machine Learning using R: Modeling, Linear Regression, Logistic Regression, K-Means, K-Means++, Hierarchical Clustering – Agglomerative, CART, Random forest, Naïve Bayes, Implementing Support Vector Machine in R,

## Suggested Book

1. R for Data Analysis in Easy Steps by Mike Mc Grath .
2. Beginning Data Science in R: Data Analysis, Visualization, and Modelling for the Data Scientist by Thomas Mailund.
3. The Elements of Statistical Learning, 2nd edition. — Springer, 2009. Hastie, T., Tibshirani, R., Friedman, J.
4. Statistical Analysis with R For Dummies by: Joseph Schmuller.
5. Machine Learning: A Probabilistic Perspective. Murphy, K. - MIT Press, 2012.
6. “Practical Data Science with R”. Nina Zumel, John Mount. Manning, 2014.
7. Advanced R: Data Programming and the Cloud by by: Matt Wiley, Joshua F. Wiley.
8. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython ,2nd edition, Wes McKinney, O'Reilly Media (2017)

Intelligent Communication Systems							
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	To gain a broad understanding of intelligent communication system and its scope in various emerging areas.						
<b>Course Outcomes(CO)</b>							
<b>CO1</b>	To be able to understand the theoretical basis of communication system process						
<b>CO2</b>	Demonstrate the concept of Information theory and describe various sources available to transfer the information.						
<b>CO3</b>	To have the in depth knowledge of the Communication Network Structure and study various protocols.						
<b>CO4</b>	To deal with the practical aspect of intelligent communication system.						

#### UNIT – I

**Communication System:** Elements of communication system, introduction to analog and digital communication systems, Nyquist, Sampling Theorem. Quantization, Pulse Code Modulation, Delta Modulation, Pass band Digital Transmission via Carrier Modulation: ASK, FSK, BPSK, and QPSK. Multiplexing technique: Time Division Multiplexing (TDM), Frequency Division Multiplexing (FDM).

#### UNIT – II

**Information Theory:** Introduction to information theory, Information sources; average code word length; Huffman encoding; Channel capacity, discrete memory less channels and capacity, channel coding theorem; theory and practice of error-control coding: trellis diagram and the Viterbi algorithm, connection-type communication and connectionless-type communication, numbering plan.

#### UNIT – III

**Communication Network Structure:** Telephone Network Architecture, Computer Network Architecture: Computer Network, Network Architecture, OSI Protocol, Specific Structure of the OSI Reference Model, Internet Network Architecture: TCP/IP Protocol, TCP/IP Subprotocol Structure.

**Advances in Communication Networks:** Integrated Services Digital Network, N-ISDN, B- ISDN, Session Initiation Protocol (SIP), Asynchronous Transfer Mode

#### UNIT – IV

**Intelligent Communication Systems:** Concept of Intelligent Communication Systems, Functions of the Intelligent Processing Layer, Structure of the Knowledge-Base System, Design Methodology for Telecommunication Services: state-of-the-art design methodology, definition, graph theory, conflicts among telecommunication services, conflict of charge policy, high-level description of telecommunication.

**Basic Technology of the Intelligent Communication System:** Application of Production Rules to Telecommunications, Description of Telecommunication Services in a Semantic Network, Symbolic Logic, Predicate Logic: Definitions and Operations for Predicate Logic, Clausal Form, Herbrand Universe and the Herbrand Theorem, Proof of Tautology, Resolution Principle, Logical Consequence, Horn Set, Application to Telecommunication Service.

#### Suggested Books

1. **Communication Systems: Analog and Digital** by R. P. Singh and B. D. Sapre, Tata- McGraw Hill
2. **Intelligent Communication Systems- Nobuyoshi Terashima (2001) Reference**
3. **B.P. Lathi and Z. Ding: Modern Digital and Analog Communication Systems, Fourth Edition, 2010, ISBN-13: 978-0-19-533145-5 (main text)**

PC-CS-AIDS- 208A	Internet & Web technology						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	To gain a broad understanding of the discipline of Web engineering and its application to the development and management of Web Applications.						
<b>Course Outcomes</b>							
<b>CO1</b>	Learn the basic concepts of information and web architecture.						
<b>CO2</b>	Learn about the skills that will enable to design and build high level web enabled applications.						
<b>CO3</b>	Understand the applicability of Java Script as per current software industry standards.						
<b>CO4</b>	Acquaint the latest programming language for the implementation of object based and procedure-based applications using Python.						

### UNIT – I

**Information Architecture:** The role of Information Architect, Collaboration and communication, Organizing information, organizational challenges, Organizing web sites and Intranets, Creating cohesive organization systems, designing navigation systems, types of navigation systems, Integrated navigation elements, designing elegant navigation systems, Searching systems, Searching your web site, designing the search interface, Indexing the right stuff, To search or not to search grouping content, conceptual design, High level Architecture Blueprint. Architectural Page Mockups, Design Sketches.

### UNIT – II

**Introduction to XHTML and HTML5:** Origins and Evolution of HTML and XHTML, Basic Syntax, Standard XHTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5, Syntactic Differences between HTML and XHTML.

**Cascading Style Sheets:** Introduction, Levels of Style Sheets, Style Specification Formats, Selector Forms, Property Value Forms, Font Properties, List Properties, Color, Alignment of Text, Box Model, Background Images, Conflict Resolution.

### UNIT – III

**Java Script:** Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching Using Regular Expressions, Errors in Scripts

### UNIT – IV

**Python:** Introduction to Python, Data Types and Expressions, Control Statements, Strings and Text Files, Lists and Dictionaries, Design with Functions, Design with Classes

#### Suggested Books:

- By Peter Morville, Louis Rosenfeld, “Information Architecture on the World Wide Web”, O’Reilly Media, 2006.
- Robert W. Sebesta, “Programming The World Wide Web”, Eight Edition, Pearson India, 2015.
- Kenneth A. Lambert, “The Fundamentals of Python: First Programs”, 2011, Cengage Learning.
- Thomas A Powell, “HTML The Complete Reference”, Tata McGraw Hill Publications.

PC-CS-AIDS- 210A	Data Base Management Systems						
Lecture	Tutorial	Praqctica 1	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	To familiarize the students with Data Base Management system						
<b>Course Outcomes</b>							
<b>CO1</b>	To provide introduction to relational model.						
<b>CO2</b>	To learn about ER diagrams and SQL.						
<b>CO3</b>	To understand about the concept of functional dependencies.						
<b>CO4</b>	To understand about Query Processing and Transaction Processing.						

### UNIT – I

**Introduction:** Concept & Overview of DBMS, Advantages of DBMS over file processing system, Database Languages, Responsibilities of Database Administrator, Database Users, Three Schema architecture of DBMS & Data Independence, Data Models.

**Entity-Relationship Model:** Basic concepts, Mapping Constraints, Keys, Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features: Specialization and Generalization.

### UNIT – II

**The Relational Data Model & Algebra:** Relational Model: Structure of relational Databases, Relational Algebra & various operations (Set operation, select, project, joins, division), Relational Calculus: Domain, Tuple.

#### Integrity Constraints & Introduction to SQL:-

Domain Constraints, Referential Integrity Constraints, Basic Structure & Concept of DDL, DML, DCL, Aggregate Functions, Null Values, Introduction to views, creating, modifying and deleting views.

### UNIT – III

**Relational Database Design:** Functional Dependency, Different anomalies in designing a Database., Normalization – 1NF, 2NF, 3NF, Boyce-CODD Normal Form, Normalization using multi-valued dependencies, 4NF, 5NF.

### UNIT – IV

**Transaction Processing Concept:** Introduction to transaction processing, transaction model properties, serializability: -Serial, non-serial and Serializable Schedules, Conflict Serializability.

**Concurrency Control: Need** of concurrency control, Different concurrency control Techniques: locking based, timestamps-based technique. Deadlock handling and Recovery Techniques: - Deferred update/ immediate update, shadow paging.

#### Suggested Books:

- Elmasri and Navathe , “Fundamentals of Database Systems” , Addison-Wesley,
- Silberschatz, and Korth ,”Database System Concepts”, McGraw-Hill
- Date , “An Introduction to Database Systems” ,Addison-Wesley,
- Bhattacharyya, “Database Management Systems” , Tata McGraw-Hill Publishing.

.PC-CS-AIDS-212A	OPERATING SYSTEMS						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	3	75	25	100	3 Hrs.
<b>Purpose</b>	To familiarize the students with the basics of Operating Systems.						
<b>Course Outcomes (CO)</b>							
CO1	To understand the structure and functions of Operating system.						
CO2	To learn about processes, threads and scheduling algorithms.						
CO3	To understand the principle of concurrency.						
CO4	To understand the concept of deadlocks.						
CO5	To learn various memory management schemes.						
CO6	To study I/O management and file systems.						
CO7	To study the concept of protection and security.						

### UNIT – I

**Introduction:** Introduction to OS. Operating system functions, Different types of O.S.: batch process, multi-programmed, time-sharing, real-time, distributed, parallel.

**System Structure:** Computer system operation, I/O structure, storage structure, storage hierarchy, different types of protections, operating system structure (simple, layered, virtual machine), O/S services, system calls.

### UNIT – II

**CPU scheduling:** scheduling criteria, preemptive and non-preemptive scheduling, scheduling algorithms, algorithm evaluation, multi-processor scheduling.

**Threads:** overview, benefits of threads, user and kernel threads.

**Process Management:** Concept of processes, process states, process control, co-operating processes, inter-process communication.

**Process Synchronization:** background, critical section problem, critical region, synchronization hardware, Classical problems of synchronization, semaphores.

### UNIT – III

**Deadlocks:** Concept of deadlock, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

**Memory Management:** background, logical vs. physical address space, contiguous memory allocation, paging, segmentation, segmentation with paging. Concept of fragmentation.

**Virtual Memory:** background, demand paging, concept of page replacement, page replacement algorithms, allocation of frames, thrashing.

### Unit-IV

**File Systems:** file concept, file organization and access methods, allocation methods, directory structure, free-space management

**I/O Management:** I/O hardware, polling, interrupts, DMA, kernel I/O subsystem (scheduling, buffering, caching, spooling and device reservation)

**Disk Management:** disk structure, disk scheduling (FCFS, SSTF, SCAN,C-SCAN) , disk reliability, disk Performance parameters

#### **Protection and Security:**

Goals of protection and security, security attacks, authentication, program threats, system threats, threat monitoring.

**Case studies:** UNIX file system, Windows file system

#### **Suggested Books:**

- Operating System Concepts”, Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne, Wiley
- Operating systems: a concept based approach”, Dhananjay M. Dhamdhare, McGraw Hill .
- Operating Systems : Internals and Design Principles, William Stallings, Pearson
- Operating Systems Design and Implementation” ,(Prentice Hall Software Series) Andrew S Tanenbaum and Albert S Woodhull.
- Taub and Schilling, Principles of Communication Systems, TMH.
- Mithal G K, Radio Engineering, Khanna Pub.
- Simon Haykin, Communication Systems, John Wiley.

**Note: The Examiner will be given the question paper template and will have to set the question paper according to the template provided along with the syllabus.**

PC-CS-AIDS-214LA	R Lab						
Lecture	Tutorial	Practical	Credit	Minor Test	Practical	Total	Time
0	0	2	1	40	60	100	3 Hour
<b>Purpose</b>	To Describe what Data Science is and the skill sets needed to be a data scientist						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	Install and use R for simple programming tasks. Extend the functionality of R by using add-on packages.						
<b>CO2</b>	Extract data from files and other sources and perform various data manipulation tasks on them. 4. Code statistical functions in R.						
<b>CO3</b>	Use R Graphics and Tables to visualize results of various statistical operations on data .						
<b>CO4</b>	Apply the knowledge of R gained to data Analytics for real life applications.						

### LIST OF PRACTICALS

1. Write an R script, to create R objects for calculator application and save in a specified location in disk.
2. Write an R script to find basic descriptive statistics using summary, str, quartile function on sample datasets.
3. Write an R script to find subset of dataset by using subset (), aggregate () functions on sample dataset.
4. Write an R script for Reading different types of data sets (.txt, .csv) from web and disk and writing in file in specific disk location.
5. Write an R script for Reading Excel data sheet and XML dataset.
6. Find the data distributions using box and scatter plot of sample dataset.
  - a. Find the outliers using plot.
  - b. Plot the histogram, bar chart and pie chart on same data.
7. How to find a correlation matrix and plot the correlation on sample data set.
  - a. Plot the correlation plot on dataset and visualize giving an overview of relationships among data
  - b. Analysis of covariance: variance (ANOVA), if data have categorical variables
8. Import a data from web storage. Name the dataset and now do Logistic Regression to find out relation between variables that are affecting the admission of a student in a institute based on his or her GRE score, GPA obtained and rank of the student. Also check the model is fit or not. require (foreign), require(MASS).
9. Apply multiple regressions, if data have a continuous independent variable. Apply on above dataset (in Que 8).
10. Apply regression Model techniques to predict the data on above dataset (in Que 8).

Internet & Web Technology Lab						
ES-CS-AIDS-216LA						
Lecture	Tutorial	Practical	Minor Test	Practical	Total	Time
0	0	3	40	60	100	3 Hrs.
<b>Purpose</b>	To introduce the concepts of HTML5, JavaScript and Python.					
<b>Course Outcomes (CO)</b>						
<b>CO1</b>	Design webpages using HTML, JavaScript and CSS.					
<b>CO2</b>	Design and test simple function/program to implement Searching and sorting techniques using Python.					
<b>CO3</b>	Develop program in Java Script for pattern matching using regular expressions and errors in scripts.					
<b>CO4</b>	Design client-server based web applications.					

### LIST OF PRACTICALS

1. Create your own page with your favorite hobbies using HTML, JavaScript and CSS.
2. Create a frameset in HTML that is divided into three sections. The frameset should have three zones.
  - a. The Topmost section of the frameset should take up about just 15% of the browser window. Name this frame title.
  - b. The middle section should be 75% of the browser window. Name this frame title.
  - c. The lower section should be 10% of the browser window. Name this frame menu.
3. Create pages for each section. For the lowermost section, create page that loads the content into the middle section. The topmost section should contain a page describing the web page itself.
4. Create a web page, which displays the map of your country Link, each city /state on the image map, such that the respective HTML page of the city/state is displayed when the user selects an area.
5. Add the tickertape applet to your page by customizing it for the following settings:
  - a. Increase the count by one.
  - b. Accordingly update the message count.
  - c. Change the text color to (237,192,171)
  - d. Experiment with changing the scrolling speed.
  - e. Customize the message text as per your page requirement.
6. Incorporate a quest book into the Diary Food Webpage and use Java Script to build validations into the form.
7. Use Cascading Style sheets (CSS) to modify the following:
  - a. Change background.
  - b. Change font type, face and color.
  - c. Align Text.
  - d. Remove underlines from hyperlinks.
8. Write the program for using JavaScript by using for – loops (through a block of code a number of times), for/in - loops (through the properties of an object), while - loops (through a block of code while a specified condition is true), do/while - loops (through a block of code while a specified condition is true).
9. Write a program in Java Script for the following:
  - a. Copying, passing, and comparing by value
  - b. Copying, passing, and comparing by reference
  - c. References themselves are passed by value
10. Write program in Java Script for pattern matching using regular expressions and errors in scripts.
11. Write a Python function/program that accepts the lengths of three sides of a triangle as inputs. The program output should indicate whether or not the triangle is an equilateral triangle.
12. Write the Python functions for linear search, binary search, selection sort, Bubble Sort, Insertion Sort and converting Fibonacci to a linear algorithm.
13. Write program in Python using Lists and dictionaries, Control statements and Strings and text files.

PC-CS-AIDS-218LA	Database Management Systems Lab						
Lecture	Tutorial	Practical	Credit	Practical	Minor Test	Total	Time
0	0	2	1	60	40	100	3Hour
Purpose	To implement practically the various concepts of DBMS						
	Course Outcomes						
CO1	To understand & Implement basic DDL commands.						
CO2	To learn & Implement DML and DCL commands.						
CO3	To understand the SQL queries using SQL operators.						
CO4	To understand the concept of relational algebra and implement using examples.						

### LIST OF PRACTICALS

1. Create a database and write the programs to carry out the following operation:
  - Add , Delete and modify a record in the database
  - Generate queries
  - Data operations
  - List all the records of database in ascending order.
2. To perform various integrity constraints on relational database.
3. Create a database and perform the following operations:-
  1. Arithmetic and Relational operations
  2. Group by & having clauses
  3. Like predicate for pattern matching in database
4. Create a view to display details of employees working on more than one project.
5. Create a view to display details of employees not working on any project.
6. Using two tables create a view which shall perform natural join, equi join, outer joins.
7. Write a procedure to give incentive to employees working on all projects. If no such employee found give app. Message.
8. Write a procedure for computing amount telephone bill on the basis of following conditions.
  1. telephone rent Rs. 205 including first 105 free units.
  2. if extra units > 0 but < 500 then rate is 80 paise per unit.
  3. if extra units > 500 then rate is Rs. 1.20 per unit.
 For this purpose create a table with name, Phone No., No. of units consumed, bill amount of a customer.
9. Write a procedure for computing income tax of employee on the basis of following conditions:-
  1. if gross pay ≤ 40,000 then I.T rate is 0%.
  2. if gross pay > 40,000 but < 60,000 then I.T rate is 10%.
  3. if gross pay > 60,000 but < 1,00,000 then I.T rate is 20%.
  4. if gross pay > 1,00,000 then I.T rate is 30%.
 For this purpose create a table with name, ssn, gross salary and income tax of the employee.
10. Write trigger for before and after insertion, deletion and updation process.

**NOTE:** A student has to perform at least ten experiments. Seven experiments should be performed from the above list. Remaining three experiments may either be performed from the above list or designed & set by the concerned institution as per the scope of the syllabus

MC-901A	Environmental Sciences						
Lecture	Tutorial	Practical	Credit	Major Test	Minor Test	Total	Time
3	0	0	0	75	25	100	3 Hrs.
<b>Purpose</b>	To learn the multidisciplinary nature, scope and importance of Environmental sciences.						
<b>Course Outcomes (CO)</b>							
<b>CO1</b>	The students will be able to learn the importance of natural resources.						
<b>CO2</b>	To learn the theoretical and practical aspects of eco system.						
<b>CO3</b>	Will be able to learn the basic concepts of conservation of biodiversity.						
<b>CO4</b>	The students will be able to understand the basic concept of sustainable development.						

### UNIT – I

The multidisciplinary nature of environmental studies, Definition, Scope and Importance, Need for public awareness, Natural Resources: Renewable and Non-Renewable Resources: Natural resources and associated problems.

- (a) Forest Resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- (b) Water Resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- (c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- (d) Food Resources: World Food Problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- (e) Energy Resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.
- (f) Land Resources: Land as a resource, land, degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources, Equitable use of resources for sustainable lifestyle.

### UNIT – II

**Ecosystem-Concept of an ecosystem:** Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological Succession, Food Chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest Ecosystem, (b) Grassland Ecosystem, (c) Desert Ecosystem and (d) Aquatic Ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Field Work:** Visit to a local area to document Environment assets-river/forest/grassland/hill/mountain, Visit to a local polluted site-Urban /Rural Industrial/Agricultural, Study of common plants, insects and birds, Study of simple ecosystems-pond, river, hill, slopes etc. (Field work equal to 5 lecture hours).

### UNIT – III

**Biodiversity and its conservation:** Introduction, Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity of global, National and local levels. India as a mega-diversity nation Hot spot of Biodiversity, Threats to biodiversity: Habitat loss, poaching of wild life, man-wildlife conflicts, Endangered and endemic species of India, Conservation of Biodiversity- In situ and Ex-Situ conservation of biodiversity.

**Environmental Pollution Definition:** Cause, effects and control measures of (a) Air Pollution (b) Water Pollution (c) Soil Pollution (d) Marine Pollution (e) Noise Pollution (f) Thermal Pollution (g) Nuclear Hazards

Solid waste management- cause, effects and control measures of urban and industrial wastes, Role of an individual in prevention of pollution, Pollution case studies, Disaster management: floods, earthquake, cyclone and landslides

### UNIT – IV

**Social Issues and the Environment:** From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people: Its problems and concerns, Case Studies: Environmental ethics-issues and possible solutions. Climate

change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies: Wasteland Reclamation, Consumerism and waste products, Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public Awareness, Human population and the Environment, Population growth, variation among nations, Population explosion-Family Welfare Programme, Environment and human health. Human rights, Value Education, HIV/AIDS, Women and Child Welfare, Role of Information Technology in Environment and Human Health, Case Studies, Drugs and their effects; Useful and harmful drugs, Use and abuse of drugs, Stimulant and depression drugs, Concept of drug de-addiction, Legal position on drugs and laws related to drugs.

**Suggested Books:**

- Environmental Studies- Deswal and Deswal. Dhanpat Rai and Co.
- Environmental Science and Engineering Anandan, P. and Kumaravelan, R. 2009. Scitech Publications (India) Pvt. Ltd., India
- Environmental Studies. Daniels Ranjit R. J. and Krishnaswamy. 2013. Wiley India.
- Environmental Science- Botkin and Keller. 2012. Wiley , India

**Note: The Examiner will be given the question paper template to set the question paper.**