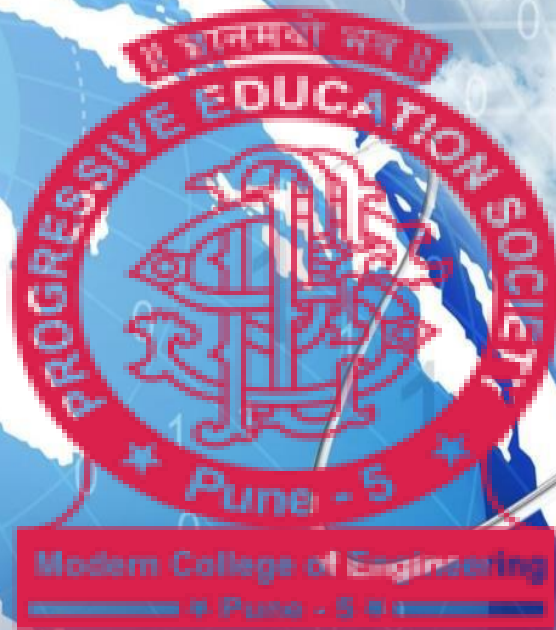**Progressive Education Society's**
# Modern College of Engineering
**Department of Computer Engineering**

# Curriculum Booklet

# Third Year
# 2019 Pattern
# Semester-II

Progressive Education Society's

Modern College of Engineering, Shivajinagar, Pune-05.

Department of Computer Engineering

# Curriculum Booklet

**2019 – Pattern**

**Class: TE Computer Engineering**
**Semester: II**

# Vision of the Institute

"To create a collaborative academic environment to foster professional excellence and ethical values"

# Mission of the Institute

- To develop outstanding professionals with high ethical standards capable of creating and managing global enterprises.

- To foster innovation and research by providing a stimulating learning environment.

- To ensure equitable development of students of all ability levels and backgrounds.

- To be responsive to changes in technology, socio-economic and environmental conditions.

- To foster and maintain mutually beneficial partnerships with alumni and industry.

# Vision of the Department

- To achieve excellence in the field of computing through quality education.

# Mission of the Department

- To develop promising professionals in the field of computing.
- To provide exposure to emerging technologies and inculcate ethics.
- To strengthen association with alumni and industry.

## Objectives of the Institute

- To develop infrastructure appropriate for delivering quality education

- To develop the overall personality of students who will be innovators and future leaders capable of prospering in their work environment.

- To inculcate ethical standards and make students aware of their social responsibilities.

- Promote close interaction among industry, faculty and students to enrich the learning process and enhance career opportunities.

- Encourage faculty in continuous professional growth through quality enhancement programs and research and development activities.

- Foster a healthy work environment which allows for freedom of expression and protection of the rights of all stakeholders through open channels of communication

# Program Educational Objectives

The graduates of Computer Engineering Department will be,

PEO1: Capable of solving real world problems.

PEO2: Capable of working with multidisciplinary projects.

PEO3: Capable to adapt to changing technologies and life management skills.

PEO4: Able to exhibit professional and ethical responsibilities.

# Program Specific Outcomes

Graduate of computer engineering program will demonstrate

- The ability to understand, analyze, develop and evaluate system based on various algorithmic approaches.

- The ability to pursue career in IT industries, to become an entrepreneur and have zest for higher studies.

- The ability to solve problems using engineering principles, tools and techniques.

# Program Outcomes

**1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**2. Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**5. Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**9. Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**10. Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**11. Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## <u>Departmental Academic Planner:  Student Activities</u>

**Year: 2020-2021**                                                                  **Semester: II**

| Sr. No. | Planned Date/Week | Academic Activity |
|---|---|---|
| 1. | 28/12/2020 | Display of Time Table |
| 2. | 01/01/2021 | Term Commencement |
| 3. | 01/01/2021 to 09/01/2021 | Submission of daily report about number of students registered department wise to the Academic Planning Committee |
| 4. | 11/01/2021 to 16/01/2021 | Orientation Program and Curriculum Booklet Circulation |
| 5. | 25/01/2021 to 30/01/2021 | Mentor Mentee Meeting with GFM  (I$^{st}$) |
| 6. | 01/02/2021 | Attendance Review I (Theory + Practical) (I$^{st}$) |
| 7. | 08/02/2021 to 13/02/2021 | MCQ Test – I (SE) and Unit Test – I (TE, BE). |
| 8. | 15/02/2021 to 20/02/2021 | Remedial actions to be taken for low attendance category students and its follow up |
| 9. | 25/02/2021 to 02/03/2021 | Mentor Mentee Meeting with GFM  (II$^{nd}$ ) Display of Results for MCQ – I and Test -I |
| 10. | 01/03/2021 | Attendance Review (Theory + Practical)  (II$^{nd}$ ) |
| 11. | 15/03/2021 | Parents Meet |
| 12. | 25/03/2021 to 01/04/2021 | Mid Term Faculty Feedback from students |
| 13. | 08/03/2021 to 15/03/2021 | MCQ Test – II (SE) and Unit Test – II (TE, BE). |
| 14. | 15/03/2021 to 20/03/2021 | Remedial actions to be taken for low attendance category students and its follow-up. |
| 15. | 30/03/2021 to 06/04/2021 | Mentor Mentee Meeting with GFM (III$^{rd}$). Display of Results for MCQ – II and Test –II. |
| 16. | 03/05/2021 to 08/05/2021 | Course Exit and End Term Feedback from Students. |
| 17. | 03/05/2021 to 08/05/2021 | Graduate Exit and Student Satisfaction Survey by Students. |
| 18. | 03/05/2021 to 08/05/2021 | MCQ Test - III (SE) and Unit Test - III (TE, BE). |
| 19. | 10/05/2021 to 14/05/2021 | End Term Exam (Mock Oral Practical Exam as per the need of course) and Final Submission Display of Results for MCQ |
| 20. | 15/05/2021 | Term End |

**Note: -** .Individual staff can take more assessment test as per their assessment tool planner.
  - SPPU Examination will be scheduled as per SPPU notification.

**(Prof. Dr. Mrs. S .A. Itkar)**
**HOD**

# Course Structure

| | | Savitribai Phule Pune University | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Third Year of Computer Engineering (2019 Course)** | | | | | | | | | | | | |
| | | **(With effect from Academic Year 2021-22)** | | | | | | | | | | | | |
| | | **Semester VI** | | | | | | | | | | | | |
| Course Code | Course Name | Teaching Scheme (Hours/week) $$ | | | Examination Scheme and Marks | | | | | | | Credit Scheme | | |
| | | $$ | Practical | Tutorial | Mid-Sem | End-Sem | Term work | Practical | Oral | Total | Lecture | Practical | Tutorial | Total |
| 310251 | Data Science and Big Data Analytics | 04 | - | - | 30 | 70 | - | - | - | 100 | 03 | - | - | 03 |
| 310252 | Web Technology | 04 | - | - | 30 | 70 | - | - | - | 100 | 03 | - | - | 03 |
| 310253 | Artificial Intelligence | 04 | - | - | 30 | 70 | - | - | - | 100 | 03 | - | - | 03 |
| 310254 | Elective II | 04 | - | - | 30 | 70 | - | - | - | 100 | 03 | - | - | 03 |
| 310255 | Internship** | - | - | - | - | - | 100** | - | - | 100 | - | - | - | 04** |
| 310256 | Data Science and Big Data Analytics Laboratory | - | 04 | - | - | - | 50 | 25 | - | 75 | - | 02 | - | 02 |
| 310257 | Web Technology Laboratory | - | 02 | - | - | - | 25 | - | 25 | 50 | - | 01 | - | 01 |
| 310258 | Laboratory Practice II | - | 04 | - | - | - | 50 | 25 | - | 75 | - | 02 | - | 02 |
| | **Total** | 12 | 10 | - | 120 | 280 | 225 | 50 | 25 | 700 | 12 | 09 | - | 21 |
| 310259 | Audit Course 6 | | | | | | | | | | | | | **Grade** |
| | **Total** | | | | | | | | | | 12 | 09 | - | 21 |

| **310254 Elective II Options:** | **310259 Audit Course 6 Options:** |
|---|---|
| 310254(A) Information Security | 310259(A) Digital and Social Media Marketing |
| 310254(B) Augmented and Virtual Reality | 310259(B) Sustainable Energy Systems |
| 310254(C) Cloud Computing | 310259(C) Leadership and Personality Development |
| 310254(D) Software Modeling and Architectures | 310259(D) Foreign Language |
| | 310259(E) Learn New Skills |

**Laboratory Practice II:**
Assignments from **Artificial Intelligence** and **Elective II**.

**\*\* Internship:**
**Internship** guidelines are provided in course curriculum sheet.

**$$ Hours/Week for Theory Course in Third Year of Engineering, Semester VI:**

As per the apex bodies' recommendations and guidelines, it is need of the day to train the pre-final year students for the industrial readiness through internship. As per the guidelines of AICTE, the duration of internship is 4-6 weeks after completion of semester V and before commencement of semester VI, so it is apparent that the contact hours of the TE students need to be managed meticulously. It becomes mandatory as per the structure that 4 credits for internship must earned by the students. **Per semester, 15 weeks duration that is suggested ideally by the affiliated university will eventually reduce to fruitful 12 weeks after the implementation of the revised curriculum (2019 Course). With the evaluatory introduction of internship in the structure, we are left with the choice of 4 theory courses in the sixth semester with 12 weeks instead of traditional 15 weeks.** To balance the credits and to achieve the minimum required contact hours, it is the reasonable choice to allot 4 hours / week for each theory course of the sixth semester of Third year of Engineering. The additional one lecture/ week will definitely be instrumental in achieving the largest of minimum contact hours. As such there is no correspondence of weekly load and credits earned, the credit allotted per course remain intact despite of the change. **So it is almost imperative that the commencement of VI Semester need to be approx. 3 weeks beyond the schedule.**

# Curriculum

**Name of the Course:** Data Science and Big Data Analytics

| Weekly Work Load (in Hrs) | Lecture | Tutorial | Practical |
|---|---|---|---|
| | 04 | 00 | 04 |

| Insem | Theory | Practical | Oral | TermWork | Total Marks | Credit |
|---|---|---|---|---|---|---|
| 30 | 70 | 25 | NA | 50 | 175 | 06 |

## 1.1 Course Objective

- To understand the need of data science and Big Data
- To understand computational statistics in data science
- To study and understand the different technologies used for big data processing
- To understand apply data modeling strategies
- To learn data analytics using python programming
- To be conversant with advances in analytics

## 1.2 Course Outcomes

After completion of the course, learner should be able to

- Analyze needs and challenges for Data Science Big Data Analytics
- Apply statistics for Big Data Analytics
- Apply the lifecycle of Big Data analytics to real world problems
- Implement Big Data Analytics using Python programming
- Implement data visualization using visualization tools in Python programming
- Design and implement Big Databases using the Hadoop ecosystem

## 1.3 Syllabus
### UNITWISE SYLLABUS AND OUTCOMES

| **UNIT – I (Introduction to Data Science and Big Data), CO1** |
|---|
| Basics and need of Data Science and Big Data, Applications of Data Science, Data explosion, 5 V's of Big Data, Relationship between Data Science and Information Science, Business intelligence versus Data Science, Data Science Life Cycle, Data: Data Types, Data Collection. Need of Data wrangling, Methods: Data Cleaning, Data Integration, Data Reduction, Data Transformation, Data Discretization. |
| **Case Studies:** Create academic performance dataset of students and perform data preprocessing using techniques of data cleaning and data transformation |

| **Outcomes** – At the end of this unit students will be able to - | **No. of Lectures** – 07 |
|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Explain Data Science Life Cycle | L2 |
| 2 | Apply different data preprocessing techniques on dataset | L3 |

## UNIT – II (Statistical Inference), CO2

Need of statistics in Data Science and Big Data Analytics, Measures of Central Tendency: Mean, Median, Mode, Mid-range. Measures of Dispersion: Range, Variance, Mean Deviation, Standard Deviation. Bayes theorem, Basics and need of hypothesis and hypothesis testing, Pearson Correlation, Sample Hypothesis testing, Chi-Square Tests, t-test.

**Case Studies:** For an employee dataset, create measure of central tendency and its measure of dispersion for statistical analysis of given data.

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Make use of various measures of central tendency on dataset | L3 |
| 2 | Explain Hypothesis testing. | L2 |

## UNIT – III (Big Data Analytics Life Cycle), CO3

Introduction to Big Data, sources of Big Data, Data Analytic Lifecycle: Introduction, Phase 1: Discovery, Phase 2: Data Preparation, Phase 3: Model Planning, Phase 4: Model Building, Phase 5: Communication results, Phase 6: Operationalize.

**Case Studies**: Global Innovation Social Network and Analysis (GINA).

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Explain Data Analytic Lifecycle | L2 |
| 2 | Illustrate GINA case study | L2 |

## UNIT – IV (Predictive Big Data Analytics with Python), CO2 and CO4

Introduction, Essential Python Libraries, Basic examples. Data Preprocessing: Removing Duplicates, Transformation of Data using function or mapping, replacing values, Handling Missing Data. Analytics Types: Predictive, Descriptive and Prescriptive. Association Rules: Apriori Algorithm, FP growth. Regression: Linear Regression, Logistic Regression. Classification: Naïve Bayes, Decision Trees. Introduction to Scikit-learn, Installations, Dataset, mat plotlib, filling missing values, Regression and Classification using Scikit-learn.

**Case Studies:** Use IRIS dataset from Scikit and apply data preprocessing methods

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Explain Naïve bayes classifier, Decision tree, Regression | L2 |
| 2 | Illustrate Apriori Algorithm with suitable example | L2 |

## UNIT – V(Big Data Analytics and Model Evaluation), CO2 and CO4

Clustering Algorithms: K-Means, Hierarchical Clustering, Time-series analysis. Introduction to Text Analysis: Text-preprocessing, Bag of words, TF-IDF and topics. Need and Introduction to social network analysis, Introduction to business analysis. Model Evaluation and Selection: Metrics for Evaluating Classifier Performance, Holdout Method and Random Sub sampling, Parameter Tuning and Optimization, Result Interpretation, Clustering and Time-series analysis using Scikitlearn, sklearn. metrics, Confusion matrix, AUC-ROC Curves, Elbow plot.

**Case Studies**: Use IRIS dataset from Scikit and apply K-means clustering methods

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |

| 1 | Explain K-mean clustering algorithm. | L2 |
|---|---|---|
| 2 | Explain Text Analysis. | L2 |

**UNIT – VI (Data Visualization and Hadoop), CO5 and CO6**

Introduction to Data Visualization, Challenges to Big data visualization, Types of data visualization, Data Visualization Techniques, Visualizing Big Data, Tools used in Data Visualization, Hadoop ecosystem, Map Reduce, Pig, Hive, Analytical techniques used in Big data visualization. Data Visualization using Python: Line plot, Scatter plot, Histogram, Density plot, Box- plot.

**Case Studies:** Use IRIS dataset from Scikit and plot 2D views of the dataset

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Explain data visualization Techniques | L2 |
| 2 | Explain data visualization tools | L2 |

## 1.4 TEXT Books

1. David Dietrich, Barry Hiller, "Data Science and Big Data Analytics", EMC education services, Wiley publication, 2012, ISBN0-07-120413-X

2. Jiawei Han, Micheline Kamber, and Jian Pie, "Data Mining: Concepts and Techniques" Elsevier Publishers Third Edition, ISBN: 9780123814791, 9780123814807

## 1.5 Reference Books

1.EMC Education Services, "Data Science and Big Data Analytics- Discovering, analyzing Visualizing and Presenting Data"
2.DT Editorial Services, "Big Data, Black Book", DT Editorial Services, ISBN: 9789351197577, 2016 Edition
3.Chirag Shah, "A Hands-On Introduction To Data Science", Cambridge University Press, (2020), ISBN : ISBN 978-1-108-47244-9
4.Wes McKinney, "Python for Data Analysis ",O' Reilly media,ISBN: 978-1-449-31979-3
5.Trent Hauk, "Scikit-learn Cookbook", Packt Publishing, ISBN: 9781787286382
6.Jenny Kim, Benjamin Bengfort, "Data Analytics with Hadoop", OReilly Media, Inc.,ISBN: 9781491913703
7.Venkat Ankam,"Big Data Analytics", Packt Publishing, ISBN: 9781785884696 Home
8.Seema Acharya, Subhashini Chellappan, "Big Data And Analytics", Wiley publication,ISBN: 9788126579518

## 1.6 Teaching Plan
### Academic Year: 2021-2022 (Term-II)

### TEACHING PLAN

**Class –** TE
**Course Name –** Data Science and Big Data Analytics
**Course Code –** 310251                                    **Course No. –** 311
**Teaching Scheme**                                          **Marking Scheme**
**Theory –** 4Hrs/wk                                         **Theory Marks (100)**
                          **ISE –** 30 **ESE –** 70

----------------------------------------------------------------------------------------------------

| Sr. No. | Unit | Broad Topic to be covered | Books Referred | Total Lectures Planned | Mode of Delivery |
|---------|------|---------------------------|----------------|------------------------|------------------|
| 1 | I | Introduction to Data Science and Big Data | T1, R1&R3 | 7 | Discussion, Presentations and Board Activity |
| 2 | II | Statistical Inference | T1 & R1 | 7 | Discussion, Presentations Board Activity & Problem Solving |
| 3 | III | Big Data Analytics Life Cycle | T1 & R1 | 7 | Discussion, Presentations and Board Activity |
| 4 | IV | Predictive Big Data Analytics with Python | T1,R1,R4,R7 | 7 | Discussion, Presentations and Board Activity Problem Solving |
| 5 | V | Big Data Analytics and Model Evaluation | T1,R1,R7 | 7 | Discussion, Presentations and Board Activity |
| 6 | VI | Data Visualization and Hadoop | T1,R1 | 7 | Discussion, Presentations and Board Activity |

# 1.7 Assessment Tools Details

**Internal Assessment Tools (20% Weightage)**

| Sr. No. | Assessment Tool | Marks | Marks scale down to |
|---------|-----------------|-------|---------------------|
| 1 | Class Test (T1 to T3) | Each 20 marks | 60 |
| 2 | Assignment (A1 to A2) | Each 20 marks | 40 |
| 3 | Quiz (Q1) | 20 | 20 |
| **Total** | | | **120** |

**Assessment tools**

**Class Tests (T1 to T3),** each of 20 marks.

**Quiz (Q1)**

20 questions of 1 mark each to check if the student has understood the concept/topic.

**Assignment (A1 to A2),** *each of 20 marks*

**1.8 SCHEDULE OF ASSESSMENT TOOL**

**Class –** TE

**Course Name –** Data Science and Big Data Analytics

| | |
|---|---|
| **Course Code –** 310251 | **Course No. –** 311 |
| **Teaching Scheme** | **Marking Scheme** |
| **Theory –** 4Hrs/wk | **Theory Marks (100)** |
| | **ISE –** 30 **ESE –** 70 |

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**Detail Schedule / Plan of conduction of assessment tool:**

| Sr. No. | CO No. | Assessment Tool | Marks | Schedule |
|---|---|---|---|---|
| 1 | Analyze needs and challenges for Data Science Big Data Analytics | Class Test-1 | 20 | Last Week Feb 2022 |
| 2 | Apply statistics for Big Data Analytics | Quiz-1 | 20 | Last Week March 2022 |
| 3 | Apply the lifecycle of Big Data analytics to real world problems | Class Test-2 | 20 | First Week April 2022 |
| 4 | Implement Big Data Analytics using Python programming | Assignment No.1 | 20 | Last Week April 2022 |
| 5 | Implement data visualization using visualization tools in Python programming | Class Test-3 | 20 | First Week May 2022 |
| 6 | Design and implement Big Databases using the Hadoop ecosystem | Assignment No.2 | 20 | First Week May 2022 |

# 1.9 Question Bank
## Unit-1

| Q.No | Questions |
|------|-----------|
| 1 | List and Explain any Four Application of Data Science. |
| 2 | Explain 5 V's of Big Data? |
| 3 | Differentiate between Business Intelligence Vs Data Science |
| 4 | Explain data science life cycle? |
| 5 | Explain different types of data in Big Data? |
| 6 | What is need of Data Wrangling? |
| 7 | Explain Data Cleaning method of data wrangling? |
| 8 | Explain Data Integration of data wrangling? |
| 9 | Explain Data Transformation method of data wrangling? |
| 10 | Explain Data Discretization method of data wrangling? |
| 11 | What is data Science? Differentiate between Business Intelligence and Data Science. |

## Unit -2

| Q.No | Questions |
|------|-----------|
| 1 | What are the Measures of Central Tendency? |
| 2 | Calculate the Mean, Mode, Median, Mid-Range for following data S={1,2,5,4,3,1,6,7,8} |
| 3 | What is Mean by Hypothesis Testing? Explain need of hypothesis testing. |
| 4 | What are steps involved in hypothesis testing? |
| 5 | Explain Pearson Correlation. |
| 6 | Write short note on Chi-square test and t-test? |
| 7 | What are the Measures of Central Dispersion? |
| 8 | Explain Naïve Bayes theorem with Suitable example to solve any classification problem? |

## Unit -3

| Q.No | Questions |
|------|-----------|
| 1 | What are the Sources of Big Data? |
| 2 | Explain Model Building phase with example. |
| 3 | What is driving data deluge? Explain with one example. |
| 4 | Explain big data analytics architecture with diagram. |
| 5 | What is data discovery phase? Explain with example. |
| 6 | What is data Model Planning phase? Explain with example. |
| 7 | What is data communication phase? Explain with example. |
| 8 | Explain Data analytical life cycle? |
| 9 | Explain GINA(Global Innovation Social Network and Analysis) |

## Unit -4

| Q.No | Questions |
|------|-----------|
| 1 | Write Pseudo code for Apriori Algorithm. Derive useful association rule for following transactional database using Apriori algorithm if Confidence is 70% and minimum support is 50%.<br>**Transaction ID        Item Purchased**<br>1          Bread,Cheese,Egg,Juice<br>2          Bread, Cheese, Juice<br>3          Bread, Milk, Yogurt<br>4          Bread, Juice, Milk<br>5          Cheese, Juice, Milk |
| 2 | What is data Preprocessing? What are different ways to handle missing values in dataset explain with suitable commands used in python programming? |
| 3 | Explain various data pre-processing steps. Discuss essential python libraries for preprocessing. |
| 4 | What are Association Rule? Explain Apriori Algorithm in brief? |
| 5 | Explain Linear and Logistic Regression. |
| 6 | Explain scikit-learn library for matplotlib with example. |
| 7 | What is mean by descriptive and prescriptive analytics? |
| 8 | Explain transformation of data using function and mapping. |
| 9 | Explain naïve Bayes theorem with suitable example. |
| 10 | Write short note on decision tree. |

## Unit -5

| Q.No | Questions |
|------|-----------|
| 1 | What is clustering?with suitable example explain the steps involved in K-means algorithm. |
| 2 | Write short note on 1)Time Series Analysis 2)TF-IDF |
| 3 | Write short note on 1)AVC-ROC curve 2)Confusion Matrix |
| 4 | Discuss Holdout method and Random sub sampling methods. |
| 5 | Explain Test Preprocessing. |
| 6 | What is Hierarchical clustering? Explain it with example. |
| 7 | Explain Elbow plot in brief. |
| 8 | Explain need of social network analysis. |
| 9 | Discuss parameter tuning and optimization methods of model evaluation and selection. |
| 10 | Explain concept of Business Analysis. |

## Unit -6

| Q.No | Questions |
|------|-----------|
| 1 | Explain Hadoop Ecosystem in brief. |
| 2 | What is Map Reduce? How Map Reduce technique will process input text file which contains following words and Show the step-by-step output of Map reduce technique.<br>**Dear, Bear, River**<br>**Car, Car, River**<br>**Deer, Car, Bear** |
| 3 | What is data visualization? What are the different Challenges in data visualization? |
| 4 | Explain Data visualization techniques? |
| 5 | Explain in brief tools used data visualization. |
| 6 | With a suitable example explain Histogram and its usages |
| 7 | Describe the data visualization tool "Tableau". Explain its applications in brief. |
| 8 | With a suitable example explain and draw a box plot and explain its usages. |
| 9 | Describe challenges of data visualization. Draw box plot and explain its usages |
| 10 | List and Explain types of data visualization |
| 11 | Explain analytical techniques used in big data visualizations. |
| 12 | Explain Hadoop components Hive and Pig. |

# Curriculum

## Name of the Subject – Web Technology

| Weekly Work Load(in Hrs) | Lecture | Tutorial | Practical |
|---|---|---|---|
| | 4 | - | - |

| In-Sem | Theory | Total Marks | Credit |
|---|---|---|---|
| 30 | 70 | 100 | 3 |

## 1.1 Course Objectives
- To learn the fundamentals of web essentials and markup languages
- To use the Client side technologies in web development
- To use the Server side technologies in web development
- To understand the web services and frameworks

## 1.2 Course Outcomes
- Implement and analyze behavior of web pages using HTML and CSS
- Apply the client side technologies for web development
- Analyze the concepts of Servlet and JSP
- Analyze the Web services and frameworks
- Apply the server side technologies for web development
- Create the effective web applications for business functionalities using latest web development platforms

## 1.3 Syllabus

| Unit | Course Contents | Hours |
|:---:|:---|:---:|
| **I** | **Web Essentials and Mark-up language- HTML** | **07** |
| | The Internet, basic internet protocols, the World Wide Web, HTTP Request message, HTTP response message, web clients, web servers.HTML: Introduction, history and versions.HTML elements: headings, paragraphs, line break, colors and fonts, links, frames, lists, tables, images and forms, Difference between HTML and HTML5. CSS: Introduction to Style Sheet, CSS features, CSS core syntax, Style sheets and HTML, Style rule cascading and inheritance, text properties. Bootstrap**.** | |
| **II** | **Client Side Technologies: JavaScript and DOM** | **07** |
| | **JavaScript**: Introduction to JavaScript, JavaScript in perspective, basic syntax, variables and data types, statements, operators, literals, functions, objects, arrays, built in objects, JavaScript debuggers. **DOM**: Introduction to Document Object Model, DOM history and levels, intrinsic event handling, modifying element style, the document tree, DOM event handling, jQuery, Overview of Angular JS | |
| **III** | **Java Servlets and XML** | **07** |
| | **Servlet:** Servlet architecture overview, A "Hello World" servlet, Servlets generating dynamic content, Servlet life cycle, parameter data, sessions, cookies, URL rewriting, other Servlet capabilities, data storage, Servlets concurrency, databases (MySQL) and Java Servlets. **XML**: XML documents and vocabularies, XML declaration, XML Namespaces, DOM based XML processing, transforming XML documents, DTD: Schema, elements, attributes. **AJAX**: Introduction, Working of AJAX. | |
| **IV** | **JSP and Web Services** | **07** |
| | **JSP**: Introduction to Java Server Pages, JSP and Servlets, running JSP applications, Basic JSP, JavaBeans classes and JSP, Support for the Model-View-Controller paradigm, JSP related technologies. **Web Services**: Web Service concepts, Writing a Java Web Service, Writing a Java web service client, Describing Web Services: WSDL, Communicating Object data: SOAP. **Struts**: Overview, architecture, configuration, actions, interceptors, result types, validations, localization, exception handling, annotations. | |
| **V** | **Server Side Scripting Languages** | **07** |

| | | |
|---|---|---|
| | PHP: Introduction to PHP, uses of PHP, general syntactic characteristics, Primitives, operations and expressions, output, control statements, arrays, functions, pattern matching, form handling, files, cookies, session tracking, using MySQL with PHP, WAP and WML. Introduction to ASP.NET: Overview of the .NET Framework, Overview of C#, Introduction to ASP.NET, ASP.NET Controls, Web Services. Overview of Node JS. | |
| **VI** | **Ruby and Rails** | **07** |
| | **Introduction to Ruby**: Origins & uses of Ruby, scalar types and their operations, simple input and output, control statements, fundamentals of arrays, hashes, methods, classes, code blocks and iterators, pattern matching. **Introduction to Rails**: Overview of Rails, Document Requests, Processing Forms, Rails Applications and Databases, Layouts, Rails with Ajax. Introduction to EJB. | |

## 1.4 TEXT Books

1. Jeffrey C.Jackson, "Web Technologies: A Computer Science Perspective", Second Edition, Pearson Education, 2007, ISBN 978-0131856035

2. Robert W. Sebesta," Programming the World Wide Web", 4th Edition, Pearson education, 2008

## 1.5 Reference Books

1    Marty Hall, Larry Brown, "Core Web Programming", Second Edition, Pearson Education, 2001, ISBN 978-0130897930.

2    H.M. Deitel, P.J. Deitel and A.B. Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006, ISBN 978-0131752429.

3    Chris Bates, "Web Programming Building Internet Applications", 3rd Edition, Wiley India, 2006.

4    Xue Bai et al, "The web Warrior Guide to Web Programming", Thomson, 2003.

# 1.6 Teaching Plan

| Sr. No. | Unit | Broad Topic to be covered | Books Referred | Total Lectures Planned | Mode of |
|---|---|---|---|---|---|
| 1 | I | Web Essentials and Mark-up language- HTML | [T1,R1] | 07 | Discussion, Presentations Problem Solving |
| 2 | II | Client Side Technologies: JavaScript and DOM | [T1,R2] | 07 | Discussion, Problem Solving and Board Activity |
| 3 | III | Java Servlets and XML | [T1,R2,R3] | 07 | Discussion, Problem Solving and Board Activity |
| 4 | IV | JSP and Web Services | [T1,,R3] | 07 | Discussion, Problem Solving and Board Activity |
| 5 | V | Server Side Scripting Languages | [R2,R3] | 07 | Discussion, Problem Solving and Board Activity |
| 6 | VI | Ruby and Rails | [T1,R3] | 07 | Discussion, Presentations, Board Activity, and Problem Solving |

# 1.7 Assessment Tools Details

| Sr. No. | Assessment Tool | Marks | Marks scale down to |
|---------|-----------------|-------|---------------------|
| 1 | Theory Test 1 | 20 | 20 |
| 2 | Theory Test 2 | 20 | 20 |
| 3 | Theory Test 3 | 20 | 20 |
| | | Total | 60 |

**Assessment Tools:**

**Theory  Tests (T1 to T3)**

**each of 20 Marks**

## 1.8 SCHEDULE OF ASSESSMENT TOOL

**Class** – TE B
**Course Name** – Web Technology
**Course Code** – 310252　　　　　　　　　　**Course No.** – 312
**Teaching Scheme**　　　　　　　　　　　　**Marking Scheme**
**Theory** – 4 Hrs/wk　　　　　　　　　　　Theory Marks
　　　　　　　　　　　　　　　　　　　　　**ISE** – 30 **ESE** – 70

**Detail Schedule / Plan of conduction of assessment tool:**

| Sr. No. | CO No. | Assessment Tool | Marks | Schedule |
|---------|--------|-----------------|-------|----------|
| 1 | C312.1 Implement and analyse behaviour of web pages using HTML and CSS | Test -1(T1) | 20 | 22nd Mar 2022 |
| 2 | C312.2 Apply the client-side technologies for web development | | | |
| 3 | C312.3 Analyse the concepts of Servlet and JSP | Test -2(T2) | 20 | 12th Apr 2022 |
| 4 | C312.4 Analyse the Web services and frameworks | | | |
| 5 | C312.5 Apply the server-side technologies for web development | Test -3(T3) | 20 | 11th May 2022 |
| 6 | C312.6 Create the effective web applications for business functionalities using latest web development platforms | | | |

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# 1.9 Question Bank

## Unit No.-I Question Bank: Theory

1.      Define Anchor tag with an example.

2.      List the types of Style sheets.

3.      Define image tag with an example.

4.      Define Ordered list with an example.

5.      Define Heading Tags with an example.

6       a) Explain the structure of the HTML webpage with an example.

        b)      Define List Tag with an example.

7       Define Frameset, Frame Tag. Divide the web page into four equal parts each individual part displays different web page.

8       Define Form tag. Design a Registration page by using all Form controls.

9       Define Table tag and their attributes with an example.

10.     Explain about Cascading Style Sheets with an example.

11      Explain various operators and data types available in java script with examples.

12      a) What is the need of scripting languages in web Technologies.

        b)      Build a JavaScript program to convert temperature from Celsius to Fahrenheit and vice versa.

## UNIT-II THEORY QUESTIONS

1.  Explain Document Object Model with suitable examples and code. b)Define Simple AJAX Application.

2.  a) What is JavaScript? What are the features of JavaScript?
    b)  Design A JavaScript to display whether given number is prime or not.

2.  Explain about Function definition, Function calling, Function parameter, return type with a suitable example in JavaScript.

3.  What is JavaScript? Write the advantages of JavaScript

4.  What is the difference between GET and POST methods in JavaScript.

5.  What is the scope of the variables in JavaScript.

6.  Define Event. How events are handled in JavaScript.

7.  What is DATE object in JavaScript.

8.  Define DOM.

## UNIT-III THEORY QUESTIONS

1. Define XML? What are the advantages of XML.

2. Explain about the purpose of DTD.

3. Why are attributes used in XML.

4. Define DTD.

5. Define naming rules in XML.

6. Define XML Schema.

7. Distinguish between DTD and XSD.

8. Define SAX Parser.

9. Distinguish HTML and XHTML.

10. How can both Internal and External DTDs be used in an XML File? Show with an Example

11. What is SAX? Write Advantages, Disadvantages and Features of SAX parser

12. Compare HTML and XML

13. Explain the procedure for validating the XML Documents

14. What is an XML DOM. How DOM parses the XML file.

15. How is Servlet different from an Applet.

16. Explain about Servlet API.

17. How to create a cookie using servlet

18. What is servlet?

19. What are the Difference between Generic Servlet and HTTPServlet?

20. Discuss about Http Request

21. What is Session?

22. Discuss about Http Responses

23. What are the different types of session tracking mechanism supported by Servlets?

24. Explain about Common gateway interface.

25. Justify the Common Gateway Interface (CGI) with neat Diagram

26. What is Servlet? Explain about Servlet API

27. a)What are the advantages of Servlets over CGI.

- Explain Life Cycle of a Servlet.

28. Explain about Lifecycle of a Servlet with neat diagram

29. a)Distinguish between CGI and Servlets

- Develop a Servlet that handles an HTTP POST request.

30. Develop a Servlet that handles an HTTP POST request.

31. What is JDBC.What are the various drivers of JDBC.

a)Distinguish between Get request and Post request type in Servlets. b)Discuss about Session tracking in Servlets with a suitable example.

32. What is JDBC? How to connecting to a database using JDBC

33. Demonstrate the use of Cookies in Servlets with an example.

34. Explain about various types of XML Parsers

35. Define XHTML. What are the differences between XHTML and HTML with an example.

36. Explain about External DTD and their categorization with examples.

37. Explain about XML Schema with an example.

38. a) List the advantages of XML Schemas over DTD s. b)Explain

about Internal DTD's with an example.


## UNIT-IV THEORY QUESTIONS


1. Define JSP expression.

2. What are the directives in jsp with syntax?

3. What is the syntax of jsp?

4. Explain about Scriptlet Tag.

5. What are implicit objects in jsp?

6. Explain about the methods of getProperty() and setProperty().

7. What is jsp?

8. What are the Beans in jsp page.

9. What are the difference between JSP and HTML.

10. How are Cookies used for Session tracking in JSP.

11. Justify the differences between servlets and jsp.

12. Explain about the jsp processing.

13. Explain about the different methods used for Session tracking

14. Explain the components of jsp.

15. Discuss about the code snippets in detail.

16. Explain about the anatomy of jsp.

17. Explain about the getProperty() and setProperty() of beans in jsp.

18. Explain about the JSP directive Elements.Explain each of them in detail.

19. How does Jdbc allows to access database through java

20. Explain about the JDBC Drivers.

## UNIT-V THEORY QUESTIONS

1. Design a PHP program to print reverse of any number

2. Define PHP Function.

3. List various types of arrays supported by PHP. How to declare arrays in PHP.

4. What is the use of $ symbol in PHP, explain with an example.

5. Design a PHP code to swap any two numbers

6. List any two advantages of PHP.

7. Write the structure of PHP script with an example.

8. List various String Functions in PHP.

9. What are the data types supported by PHP.

10. What is the difference between JavaScript and PHP.

11. Define an Array? Explain about the types of Arrays in PHP with an example.

12. Explain variables and operators with example in PHP

13. Explain the predefined and user defined functions in PHP with an example.

14. Explain database connectivity in PHP with reference to MYSQL.

15. a) Define Session and Cookies. Explain with an example program.b)List and explain the Control structures used in PHP.

16. How to read data from web form control like Check boxes explain with an example.

17. a) Design a PHP script for uploading a file to the server and display the uploaded filesdetails.
    b) List and explain the string functions in PHP

18. What are the differences between Get and post methods in form submitting? Give the casewhere we can use get and we can use post methods

19. List the statements that are used to connect PHP with MySQL with an example.

20. a) How to read data from web form control like Text boxes explain with an example
    b)Explain about Conditional Statements in PHP.

## UNIT-VI THEORY QUESTIONS

1. List the features of Ruby?

2. Explain pattern matching operations in Ruby.

3. Explain builtin methods for arrays and lists.

4. List the Uses of Ruby?

5. Explain builtin string operations in Ruby

6. Explain with example, keyboard input and screen output functions in Ruby

7. How a method is created in Ruby? Explain with example.

8. How a Rails application is constructed?

9. Explain form handling with Rails.

10. Explain directory structure for the Rails Application

11. How Rails reacts to a request for a static document?

# Curriculum

## Name of the Subject – Artificial Intelligence

| Weekly Work Load(in Hrs) | Lecture | Tutorial | Practical |
|---|---|---|---|
| | 4 | - | - |

| In-Sem | Theory | Total Marks | Credit |
|---|---|---|---|
| 30 | 70 | 100 | 3 |

## 1.1 Course Objectives

1. To teach various techniques of problem solving and game playing.

2. To introduce the concepts and application areas of Artificial Intelligence.

3. To explain importance of knowledge representation in certainty.

4. To explain NLP, IR and Machine Learning.

5. To give an overview of Planning and how robots perceive and act.

6. To explain robot architecture and its applications in the real world.

## 1.2 Course Outcomes

- Identify and apply suitable Intelligent agents for various AI applications.
- Build smart system using different informed search / uninformed search or heuristic approaches.
- Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
- Apply the suitable algorithms to solve AI problems.
- Implement ideas underlying modern logical inference systems.
- Represent complex problems with expressive yet carefully constrained language of representation

## 1.3 Syllabus

| UNIT – I |
|---|
| Introduction to Artificial Intelligence, Foundations of Artificial Intelligence, History of Artificial Intelligence, State of the Art, Risks, and Benefits of AI, Intelligent Agents, Agents and Environments, Good Behavior: Concept of Rationality, Nature of Environments, Structure of Agents. |
| **Case Study:** Kroger: How This U.S. Retail Giant Is Using AI And Robots To Prepare For The 4th Industrial Revolution |

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | State applications of AI. | L2 |
| 2 | Classify the various applications of AI in the real world. | L2 |
| 3 | Describe Intelligent Agents | L2 |

| UNIT – II |
|---|
| Solving Problems by Searching, Problem-Solving Agents, Example Problems, Search Algorithms, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, |

Heuristic Functions, Search in Complex Environments, Local Search and Optimization Problems.

**Case Study:** 4th Industrial Revolution Using AI, Big Data And Robotics

| **Outcomes** – At the end of this unit students will be able to - | | **No. of Lectures** – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Solve problems using search techniques. | L4 |
| 2 | Apply heuristic search. | L3 |

### UNIT – III

**Topics –**

Game Theory, Optimal Decisions in Games, Heuristic Alpha–Beta Tree Search, Monte Carlo Tree Search, Stochastic Games, Partially Observable Games, Limitations of Game Search Algorithms, Constraint Satisfaction Problems (CSP), Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs.

**Case Study:** Machine Learning At Google: The Amazing Use Case Of Becoming A Fully Sustainable Business

| **Outcomes** – At the end of this unit students will be able to - | | **No. of Lectures** – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Interpret the constraints for a problem and develop a solution for CSP. | L2 |
| 2 | Apply MiniMax Algorithm to design 2-player games. | L3 |
| 3 | Apply Alpha-Beta Cut-off to optimize the search | L4 |

### UNIT – IV

**Topics –**

Logical Agents, Knowledge-Based Agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic, First-Order Logic, Representation Revisited, Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Case Study: BBC To Launch AI - Enabled Interactive Radio Show For Amazon Echo And Google Home Chat bots

| **Outcomes** – At the end of this unit students will be able to - | | **No. of Lectures** – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Explain Logical agents. | L2 |
| 2 | Explain significance of First order Logic | L3 |
| 3 | Relate real world applications based on Knowledge based agents. | L2 |

### UNIT – V

**Topics –**

Inference in First-Order Logic, Propositional vs. First-Order Inference, Unification and First-Order Inference, Forward Chaining, Backward Chaining, Resolution, Knowledge Representation, Ontological Engineering, Categories and Objects, Events, Mental Objects and Modal Logic, Reasoning Systems for Categories, Reasoning with Default Information.
Case Study: The Amazing Ways How Wikipedia Uses Artificial Intelligence

| **Outcomes** – At the end of this unit students will be able to - | | **No. of Lectures** – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Apply Unification algorithm | L4 |
| 2 | Apply resolution and solve problems. | L4 |

| **UNIT – VI** | | |
|---|---|---|
| **Topics –** <br> . Automated Planning, Classical Planning, Algorithms for Classical Planning, Heuristics for Planning, Hierarchical Planning, Planning and Acting in Nondeterministic Domains, Time, Schedules, and Resources, Analysis of Planning Approaches, Limits of AI, Ethics of AI, Future of AI, AI Components, AI Architectures. <br><br> CaseStudy: The Amazing Ways Samsung Is Using Big Data, Artificial Intelligence And Robots To Drive Performance. | | |
| **Outcomes** – At the end of this unit students will be able to - | | **No. of Lectures** – 07 |
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | Apply planning and solve real world problems. | L4 |
| 2 | Explain the limitations of AI | L2 |

## 1.4 Text Books

*1. Stuart Russell and Peter Norvig,"*Artificial Intelligence A Modern Approach". Third Edition Person 2003 ISBN: 10:0136042597.

2. Deepak Khemani, A First Course in Artificial Intelligence, McGraw Hill Education (India), 2013, ISBN: 978-1-25-902998-1.

3.Elaine Rich, Kevin Knight and Nair," Artificial intelligence ", TMH,ISBN-978-0-07008770-5

## 1.5 Reference Book

1. Nilsson Nils J," Artificial intelligence Modern A new Synthesis",Morgan Kaufmann Publishers Inc. San Francisco,CA,ISBN:978-1-55-860467-4

2. Patrick Henry Winstone,"Artificial Intelligence", Addison-Wesley Publishing Company ISBN 0-201-53377-4

3. Andries P. Engelbrencht-computational Intelligence: An Introduction,2nd Edition-Wiley India-ISBN-978-0-470-51250-0

4.Dr.Lavika Goel,"Artificial Intelligence: Concepts and Applications", Wiley India-ISBN-9788126519934

5.Dr.Nilakshi Jain," Artificial Intelligence, As Per AICET: Making a system intelligent" Wiley India-ISBN:9788126579945

# 1.6 Teaching Plan

| Sr. No. | Unit | Broad Topic to be covered | Books Referred | Total Lectures Planned |
|---------|------|----------------------------|----------------|-------------------------|
| 1 | I | Introduction | T1, T2, R3 | 7 |
| 2 | II | Problem-Solving | T1, T2, R3 | 7 |
| 3 | III | Adversarial Search and Games | T1, T2, R3 | 7 |
| 4 | IV | Knowledge | T2, R3 | 7 |
| 5 | V | Reasoning | T2, R3 | 7 |
| 6 | VI | Planning | T2, R3 | 7 |

# 1.7 Assessment Tools Details

| Sr. No. | Assessment Tool | Marks | Marks scale down to |
|---------|-----------------|-------|----------------------|
| 1 | Multiple Choice Questions (MCQ) (Test 1: T1) | 20 | 20 |
| 2 | Tests (T2 and T3) | Each 20 marks | 40 |
| | | Total | 60 |

**Assessment tools**

**Multiple Choice Questions (MCQ)**

20 questions of 1 mark each.

**Class Tests (T2 to T3), each of 20 marks.**

# Curriculum

## Name of the Subject – Information Security

| Weekly Work Load(in Hrs) | Lecture | Tutorial | Practical |
|---|---|---|---|
| | 4 | - | - |

| In-Sem | Theory | Total Marks | Credit |
|---|---|---|---|
| 30 | 70 | 100 | 3 |

## 1.1 Course Objectives

- To understand the fundamental approaches, principles and apply these concepts in Information Security
- To acquire the knowledge of mathematics for cryptography, understand the concepts of basic cryptography
- To learn standard algorithms and protocols employed to provide confidentiality, integrity andauthenticity
- To acquire the knowledge of security protocol deployed in web security
- To study Information Security tools

## 1.2 Course Outcomes

On completion of the course, learners should be able to

- Model the cyber security threats and apply formal procedures to defend the attacks
- Apply appropriate cryptographic techniques by learning symmetric and asymmetric key cryptographyDesign and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms
- Identify and Evaluate Information Security threats and vulnerabilities in Information systems and apply security measures to real time scenarios
- Demonstrate the use of standards and cyber laws to enhance Information Security in the
- development process and infrastructure protection

## 1.3 Syllabus

| Unit I Introduction to Information Security | |
|---|---|
| **Topics –** Foundations of Security, Computer Security Concepts, The OSI Security Architecture, Securityattacks, Security services, Security mechanism, A Model for Network Security. **Case Study:** Open Source/ Free/ Trial Tools: Clam AV antivirus engine, Anti Phishing,Anti Spyware, Wireshark | |
| **Outcomes** – At the end of this unit students will be able to - | **No. of Lectures** – 05 |
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | **Define** Information security & **Choose** the appropriate method to learn about security basics. | L1 & L2 |
| 2 | **Compare** security and privacy basics | L2 |

## Unit II Symmetric Key Cryptography

**Topics –**
Classical Encryption Techniques: Stream Ciphers, Substitution Techniques: Caesar Cipher, Mono alphabetic Ciphers, Play fair Cipher, Hill Cipher, Poly alphabetic Ciphers, Transposition Techniques, Block Ciphers and Data Encryption standards, 3DES, Advanced Encryption standard

**Case Study:** Open Source/ Free/ Trial Tools: crypt tool

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| Sr. No. | Learning Outcome | Bloom's Level |
| 1 | **Illustrate** use of encryption methods | L2 |
| 2 | **Implemen**t i.e. perform various cryptographic algorithms | L3 |
| 3 | **Demonstrate** various algorithms related to security | L3 |

## UNIT – III Asymmetric Key Cryptography

**Topics –**
**Number theory**: Prime number, Fermat and Euler theorems , Testing for primality,  Chinese reminder theorem, discrete logarithm, Public Key Cryptography and RSA, Key Management, Diffie-Hellman key exchange, El Gamal algorithm, Elliptic Curve Cryptography
**Case Study:** Open Source/ Free/ Trial Tools: crypt tool

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| Sr. No. | Learning Outcome | Bloom's Level |
| 1 | **Understand** Various Theorem | L2 |
| 2 | **Implemen**t i.e. perform various cryptographic algorithms | L3 |
| 3 | **Demonstrate** various algorithms related to security | L3 |

## UNIT – IV Data Integrity Algorithms And Web Security

**Topics –**
**Cryptographic Hash Functions**: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA), SHA-3, MD4, MD5. **Message Authentication Codes**: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs. **Digital Signatures**: Digital Signatures, Schemes, Digital Signature standard, PKI X.509 Certificate.
Web Security issues, HTTPS, SSH, Email security: PGP, S/MIME,  IP Security : IPSec
**Case Study:** Open Source/ Free/ Trial Tools: Open SSL, Hash Calculator Tool : MD5, SHA1, SHA256, SHA 512

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 09 |
|---|---|---|
| Sr. No. | Learning Outcome | Bloom's Level |
| 1 | **Explain** Cryptographic Hash Function | L2 |
| 2 | **Explain** significance of Authentication | L3 |
| 3 | **Solve** various methods for authentication  protocols | L3 |

## UNIT – V
## Network and System Security

**Topics –**

The OSI Security architecture, Access Control, Flooding attacks, DOS, Distributed DOS attacks Intrusion detection, Host based and network based Honeypot, Firewall and Intrusion prevention system, Need of firewall, Firewall characteristics and access policy, Types of Firewall, DMZ networks, **Intrusion prevention system:** Host based, Network based, Hybrid.

Operating system Security, Application Security, Security maintenance, Multilevel Security, Multilevel Security for role based access control, Concepts of trusted system, Trusted computing.

**Case Study:** Open Source/ Free/ Trial Tools: DOS Attacks, DDOS attacks, Wireshark, Cain and Abel, iptables/ Windows Firewall, Suricata, fail2ban, Snort

| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No** | **Learning Outcome** | **Bloom's Level** |
| 01 | Analyze the performance of computer system having firewalls | L3 |
| 02 | Differentiating various intrusion detection methods | L3 |

## UNIT – VI Cyber Security and Tools

**Topics –** Introduction, Cybercrime and Information Security, Classification of Cybercrimes, The legal perspectives-Indian perspective, Global perspective, Categories of Cybercrime, Social Engineering, Cyber stalking, Proxy servers and Anonymizers, Phishing, Password Cracking, Key-loggers and Spywares, The Indian IT Act-Challenges, Amendments, Challenges to Indian Law and Cybercrime Scenario in India, Indian IT Act.

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| Outcomes – At the end of this unit students will be able to - | | No. of Lectures – 07 |
|---|---|---|
| **Sr. No.** | **Learning Outcome** | **Bloom's Level** |
| 1 | **Organize** ie.getting importance of data security. | L3 |
| 2 | **Evaluate** various methods of cyber security. | L3 |

## 1.4 Text Books

| Sr.No | | Text Books |
|---|---|---|
| **1** | **T1** | William Stallings, "Cryptography and Network Security Principals and Practice", Seventhedition, Pearson , ISBN : 978-1-292-15858 |
| **2** | **T2** | William Stallings, Lawrie Brown, "Computer Security Principles and Practice", 3rd_Edition,Pearson , ISBN : 978-0-13-3777392-7 |
| **3** | **T3** | Nina Godbole, Sumit Belapure, "Cyber Security", Wiley, ISBN: 978-81-265-2179-1 |

### 1.5 Reference Books

| Sr.No | | Reference Books |
|---|---|---|
| **1** | **R1** | Atul Kahate, "Cryptography and Network Security", 3e, McGraw Hill Education |
| **2** | **R2** | V.K. Pachghare, "Cryptography and Information Security", PHI Learning |
| **3** | **R3** | Bernard Menezes, "Network Security and Cryptography", Cengage Learning India, 2014,ISBN No.: 8131513491 |
| **4** | **R4** | JoshephKizza, "Computer Network Security and Cyber Ethics", McFarland & Company,Inc., Publishers , Fourth Edition |
| **5** | **R5** | Michael Whitman and Herbert Matford, "Principles of Information Security", CourseTechnnology Ink, 7th edition |
| **6** | **R6** | Neena Godbole, "Information Systems Security, 2ed: Security Management, Metrics,Frameworks and Best Practices" , Wiley publication, ISBN: 9788126564057 |

# 1.6 Teaching Plan

| Sr. No. | Unit | Broad Topic to be covered | Books Referred | Total Lectures Planned |
|---|---|---|---|---|
| 1 | I | Introduction to Information Security | T1, T2, R3 | 5 |
| 2 | II | Symmetric Key Cryptography | T1, T2, R3 | 7 |
| 3 | III | Asymmetric Key Cryptography | T1, T2, R3 | 7 |
| 4 | IV | Data Integrity Algorithms And Web Security | T2, R3 | 9 |
| 5 | V | Network and System Security | T2, R3 | 7 |
| 6 | VI | Cyber Security and Tools | T2, R3 | 7 |

# 1.7 Assessment Tools Details

| Sr. No. | Assessment Tool | Marks | Marks scale down to |
|---------|-----------------|-------|---------------------|
| 1 | Theory Test 1 | 20 | 20 |
| 2 | Theory Test 2 | 20 | 20 |
| 3 | Theory Test 3 | 20 | 20 |
| | | **Total** | **60** |

**Assessment Tools:**

**Theory  Tests (T1 to T3) each of 20 Marks**

## 1.8 SCHEDULE OF ASSESSMENT TOOL

**Class** – TE A/B
**Course Name** – Information Security
**Course Code** – 310314                                    **Course No.** – 304
**Teaching Scheme**                                           **Marking Scheme**
**Theory** – 4 Hrs/wk                                          Theory Marks
                                                              **ISE** – 30 **ESE** – 70

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**Detail Schedule / Plan of conduction of assessment tool:**

| Units | Co No. | Assessment Tool | Marks | Schedule |
|-------|--------|-----------------|-------|----------|
| Unit 1 & 2 | CO1,CO2 | Test I (MCQ) | 20 | First week of March 22 |
| Unit 3 & 4 | CO3 | Test II (Theory) | 20 | First week of April 22 |
| Unit 5 & 6 | CO4 | Test III (Theory) | 20 | First week of May 22 |

# 1.9 Question Bank

**Unit 1**
1. Define Information Security. Explain CIA triad of IS.
2. Discuss different rolls and responsibilities of IS Foundation
3. Explain passive and active attack with suitable example.
4. What is network security ? what are the different types of n/w security?
5. Enlist various network security tools.
6. discuss basic working principal of N/W security architecture.
7. Explain different entities involves in OS architecture.
8. Describe various network security services and mechanism.

**Unit 2**
1. Define cryptography. Explain process of encryption decryption with suitable example.
2. Discuss process of symmetric key encryption.
3. Differentiate between symmetric and asymmetric key cryptography
4. Explain  advantages and disadvantages of classical cryptography technique.
5. What is stream cipher? Explain it with suitable diagram.
6. Define quantum cryptography? Discuss advantages and disadvantages of quantum cryptography.
7. Discuss on substitution cipher and its types.
8. Explain mono-alphabetic cipher with suitable example.
9. Write short note on play-fair cipher.
10. Explain working of hill cipher.
11. Discuss transposition techniques with suitable examples.
12. Describe working of AES/DES with suitable diagram.

**Unit 3**
1. Discuss two properties of prime numbers.
2. Differentiate between ElGamal and RSA Technique.
3. Write short note on diffie- Hellman algorithm with example.
4. Discuss in brief on Elliptic curve Cryptography (ECC).
5. Discuss generation of RSA Key pair.
6. Explain public key encryptions.

**Unit 4**
1. Explain MD4 Algorithm with suitable example.
2. Write Short note on:
    a. Digital signature
    b. Hash function
    c. MCA
3. Explain SHA-3 with suitable diagram.
4. Discuss applications of cryptographic hash functions
5. Discuss requirements of MCA.
6. Write short note on :
    a. PGP
    b. S/MIME
    c. IPSec.
7. Enlist different web security issues.

**Unit 5.**
1. Discuss on different flooding attack.
2. Describe Host based and network based honeypots.

3. Explain principle and elements of OSI Security architecture.
4. Which versions of IP can use IPSec.
5. Differentiate between IPS and IDS.
6. What is DoS attack? Describe DDoS attack.
7. What are different characteristics of firewalls.
8. Explain firewall architecture.

**Unit 6**
1. Discuss Different types of cyber attacks
2. List out cyber attack that india has witnessed.
3. Define cyber security. Who are the cyber attacker?
4. Write short note on internet governance challenges.
5. Define cybercrime with examples

# Curriculum

## Name of the Course: Cloud Computing

| Weekly        Work Load(in Hrs) | Lecture | Tutorial | Practical |
|---|---|---|---|
| | 0 3 | 00 | 0 0 |

| In-Sem | Theory | Total Marks | Credit |
|---|---|---|---|
| 30 | 70 | 100 | 3 |

## 1.1 Course Objectives

1. To study fundamental concepts of cloud computing
2. To learn various data storage methods on cloud
3. To understand the implementation of Virtualization in Cloud Computing
4. To learn the application and security on cloud computing
5. To study risk management in cloud computing
6. To understand the advanced technologies in cloud computing

## 1.2 Course Outcomes

CO1: Understand the different Cloud Computing environment
CO2: Use appropriate data storage technique on Cloud, based on Cloud application
CO3: Analyze virtualization technology and install virtualization software
CO4: Develop and deploy applications on Cloud
CO5: Apply security in cloud applications
CO6: Use advance techniques in Cloud Computing

## 1.3 Syllabus

| Unit | Course Contents | Hours |
|---|---|---|
| **I** | **Introduction to Cloud Computing** | **07** |
| | Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage. Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Deployment Models. | |
| **II** | **Data Storage and Cloud Computing** | **07** |
| | Data Storage: Introduction to Enterprise Data Storage, Direct Attached Storage, Storage Area Network, Network Attached Storage, Data Storage Management, File System, Cloud Data Stores, Using Grids for Data Storage. Cloud Storage: Data Management, Provisioning Cloud storage, Data Intensive Technologies for Cloud Computing. Cloud Storage from LANs to WANs: Cloud Characteristics, Distributed Data Storage. | |

| III | **Virtualization in Cloud Computing** | 07 |
|---|---|---|
| | Introduction: Definition of Virtualization, Adopting Virtualization, Types of Virtualization, Virtualization Architecture and Software, Virtual Clustering, Virtualization Application, Pitfalls of Virtualization. Grid, Cloud and Virtualization: Virtualization in Grid, Virtualization in Cloud, Virtualization and Cloud Security. Virtualization and Cloud Computing: Anatomy of Cloud Infrastructure, Virtual infrastructures, CPU Virtualization, Network and Storage Virtualization. | |
| IV | **Cloud Platforms and Cloud Applications** | 07 |
| | Amazon Web Services (AWS): Amazon Web Services and Components, Amazon Simple DB, Elastic Cloud Computing (EC2), Amazon Storage System, Amazon Database services (Dynamo DB). Microsoft Cloud Services: Azure core concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Computing Applications: Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Geosciences: Satellite Image Processing, Business and Consumer Applications: CRM and ERP, Social Networking, Google Cloud Application: Google App Engine. Overview of OpenStack architecture. | |
| V | **Security in Cloud Computing** | 07 |
| | Risks in Cloud Computing: Risk Management, Enterprise-Wide Risk Management, Types of Risks in Cloud Computing. Data Security in Cloud: Security Issues, Challenges, advantages, Disadvantages, Cloud Digital persona and Data security, Content Level Security. Cloud Security Services: Confidentiality, Integrity and Availability, Security Authorization Challenges in the Cloud, Secure Cloud Software Requirements, Secure Cloud Software Testing. | |
| VI | **Advanced Techniques in Cloud Computing** | 07 |
| | Future Tends in cloud Computing, Mobile Cloud, Automatic Cloud Computing: Comet Cloud. Multimedia Cloud: IPTV, Energy Aware Cloud Computing, Jungle Computing, Distributed Cloud Computing Vs Edge Computing, Containers, Docker, and Kubernetes, Introduction to DevOps. IOT and Cloud Convergence: The Cloud and IoT in your Home, The IOT and cloud in your Automobile, PERSONAL: IoT in Healthcare. | |

## 1.4 TEXT Books

1. A. Srinivasan, J. Suresh, "Cloud Computing: A Practical Approach for Learning and Implementation", Pearson, ISBN: 978-81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, ISBN-13:978-1-25-902995-0

## 1.5 Reference Books

1. James Bond ,"The Enterprise Cloud", O'Reilly Media, Inc. ISBN: 9781491907627

2. Dr. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more", Wiley Publications, ISBN: 978-0-470-97389-9

3. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", 2010, The McGraw-Hill.

4. Gautam Shrof, "ENTERPRISE CLOUD COMPUTING Technology Architecture, Applications", Cambridge University Press, ISBN: 9780511778476

5. Tim Mather, Subra K, Shahid L.,"Cloud Security and Privacy", Oreilly, ISBN-13 978-81- 8404-815-5

## 1.6 Teaching Plan

| Sr. No. | Unit | Broad Topic to be covered | Books Referred | Total Lectures Planned | Mode of Delivery |
|---------|------|---------------------------|----------------|------------------------|------------------|
| 1 | I | Introduction to Cloud Computing | T1,T2,R1 | 7 | PPT |
| 2 | II | Data Storage and Cloud Computing | T1,R1 | 7 | PPT |
| 3 | III | Virtualization in Cloud Computing | T1,R1 | 7 | Board Activity |
| 4 | IV | Cloud Platforms and Cloud Applications | T1,R1 | 7 | Think Pair share, |
| 5 | V | Security in Cloud Computing | T1,R1 | 7 | Discussin |
| 6 | VI | Advanced Techniques in Cloud Computing | T1,R1 | 7 | Think Pair share, |

## 1.7 Assessment Tools Details

| Sr. No. | Assessment Tool | Total in number | Marks scale down to |
|---------|-----------------|-----------------|---------------------|
| 1 | Assignment (A1-A2) | Each 20 Marks | 40 |
| 2 | Class Tests (T1 to T2) | Each 20 Marks | 40 |
| 3 | **Online Quiz (Q1)** | 10 Marks | 10 |
| 4 | **Case Study (C1)** | 10 Marks | 10 |
| | | Total | 100 |

Assessment tools:

- A1 and A2 – Assignment
- T1 and T2 – Class Tests
- Q1 – Online Quiz
- C1 – Case Study

# 1.8 Questions Bank

## Unit I

1. Define the term cloud computing and explain in brief what it is about.
2. Explain the various goals of Cloud Computing.
3. List the cloud security risks and briefly explain each of them.
4. Write short note on On-Demand Self-Service with respect to cloud characteristics.
5. Explain the term Rapid Elasticity.
6. Compare the various cloud delivery models based on their characteristics.
7. Define hybrid cloud and list its advantages and disadvantages.
8. Explain the various Identity and Access Management Challenges in the cloud.

## Unit II

1. Write a short note on cloud file system.
2. Explain the architecture of GFS and its characteristics.
3. Explain the architecture of HDFS and its characteristics.
4. Explain the Bigtable and HBase.
5. Write note a Dynamo.
6. Explain the type of backup with suitable examples.

## Unit III

1. Write a short note on hypervisor and Virtual Machines (VMs).
2. Briefly outline various implementation levels of virtualization.
3. Write a short note on Memory Virtualization.
4. Write a short note on OpenNebula.
5. Explain the types of Virtualization

## Unit IV

1. Write short note on AWS
2. What is Amazon EC2? Describe its characteristics and features.
3. Write a short note on Amazon Vertical Private Cloud (VPC).
4. Write a short note on Amazon S3.
5. Write short note on load balancers. Why it is used?
6. With a block diagram, explain how load balancer works.
7. Explain the types of Amazon ELB

# Subject – Data Science and Big Data Analytics Laboratory

## COURSE DETAILS DOCUMENT

**Class** – TE
**Course Name** – Data Science and Big Data Analytics Laboratory
**Course Code** – 310256       **Course No.** – 316
**Teaching Scheme**       **Marking Scheme**
**Practical** – 4 Hrs/wk       **Term work**-50, **Practical**-25

-------------------------------------------------------------------------------------------------------------

**Companion Course**
Data Science and Big Data Analytics (310251)

**Course Objectives**
1. To understands principles of data science for analysis of real time problems
2. To develop in depth understanding and implementations of the key technologies in data science and big data analytics.
3. To analyze and demonstrate knowledge of statistical data analysis techniques for decision-making.
4. To gain practical hands-on experience with statistics programming languages and big data tools.

**Course Outcomes**
●      At the end of the Course, Students will be able to,

| CO No. | Year of study 2021-22 | Mapping to POs/PSOs | | |
|--------|----------------------|------------|----------|-----|
| | | Substantial | Moderate | Low |
| C316.1 | Apply principles of data science for the analysis of real time problems | 3,12 | 1,2,15 | 4,5,11,13,14 |
| C316.2 | Implement data representation using statistical method | 3,12 | 1,2,5 | 4,9,13,14 |
| C316.3 | Implement and evaluate data analytics algorithm | 3,12 | 1,2,4,5,6,9, 13,15 | 11,14 |
| C316.4 | Perform Text processing | 12 | 1,2,3,4,5 | 13,15 |
| C316.5 | Implement data visualization techniques | 3,4,5,12 | 1,2,9,11 | 6,13,14,15 |
| C316.6 | Use cutting edge tools and technologies to analyze big data | 5 | 1,2,6,9,11 | 3,4,7,12,15 |

**List of Assignments**

| Course No. | Sr. No. | Title | Bloom's Level |
|------------|---------|-------|---------------|
| C316 | LA1 | Data Wrangling I<br>Perform the following operations using Python on any open source dataset (e.g., data.csv)<br>   1. Import all the required Python Libraries.<br>   2. Locate an open source data from the web (e.g. https://www.kaggle.com). Provide a clear description of the data and its source (i.e., URL of the web site).<br>   3. Load the Dataset into pandas data frame. | L3 |

| | | |
|---|---|---|
| | 4. Data Preprocessing: check for missing values in the data using pandas insult(), describe() function to get some initial statistics. Provide variable descriptions. Types of variables etc. Check the dimensions of the data frame.<br>5. Data Formatting and Data Normalization: Summarize the types of variables by checking the data types (i.e., character, numeric, integer, factor, and logical) of the variables in the data set. If variables are not in the correct data type, apply proper type conversions.<br>6. Turn categorical variables into quantitative variables in Python.<br>In addition to the codes and outputs, explain every operation that you do in the above steps and explain everything that you do to import/read/scrape the data set. | |
| LA2 | Data Wrangling II<br>Create an "Academic Performance" dataset of students and perform the following operations using Python.<br>1. Scan all variables for missing values and inconsistencies. If there are missing values and/or inconsistencies, use any of the suitable techniques to deal with them.<br>2. Scan all numeric variables for outliers. If there are outliers, use any of the suitable techniques to deal with them.<br>3. Apply data transformations on at least one of the variables. The purpose of this transformation should be one of the following reasons:<br>to change the scale for better understanding of the variable,<br>to convert a non-linear relation into a linear one, or<br>to decrease the skewness and convert the distribution into a normal distribution.<br>Reason and document your approach properly. | L3 |
| LA3 | Descriptive Statistics - Measures of Central Tendency and variability<br>Perform the following operations on any open source dataset (e.g., data.csv)<br>1. Provide summary statistics (mean, median, minimum, maximum, standard deviation) for a dataset (age, income etc.) with numeric variables grouped by one of the qualitative (categorical) variable. For example, if your categorical variable is age groups and quantitative variable is income, then provide summary statistics of income grouped by the age groups. Create a list that contains a numeric value for each response to the categorical variable.<br>2. Write a Python program to display some basic statistical details like percentile, mean, standard deviation etc. of the species of 'Iris-setosa' , 'Iris-versicolor', and 'Iris-virginica' of iris.csv dataset.<br>Provide the codes with outputs and explain everything that you do in this step. | L3 |
| LA4 | Data Analytics I<br>Create a Linear Regression Model using Python/R to predict home prices using Boston Housing Dataset (https://www.kaggle.com/c/boston-housing). The Boston Housing dataset contains information about various houses in | L3 |

| | | | |
|---|---|---|---|
| | | Boston through different parameters. There are 506 samples and 14 feature variables in this dataset. The objective is to predict the value of prices of the house using the given features. | |
| | LA5 | Data Analytics II 1. Implement logistic regression using Python/R to perform classification on Social_Network_Ads.csv dataset. 2. Compute Confusion matrix to find TP, FP, TN, FN, Accuracy, Error rate, Precision, Recall on the given dataset. | L3 |
| | LA6 | Data Analytics III 1. Implement Simple Naïve Bayes classification algorithm using Python/R on iris.csv dataset. 2. Compute Confusion matrix to find TP, FP, TN, FN, Accuracy, Error rate, Precision, Recall on the given dataset. | L3 |
| | LA7 | Text Analytics 1. Extract Sample document and apply following document preprocessing methods: Tokenization, POS Tagging, stop words removal, Stemming and Lemmatization. 2. Create representation of document by calculating Term Frequency and Inverse Document Frequency. | L3 |
| | LA8 | Data Visualization I 1. Use the inbuilt dataset 'titanic'. The dataset contains 891 rows and contains information about the passengers who boarded the unfortunate Titanic ship. Use the Seaborn library to see if we can find any patterns in the data. 2. Write a code to check how the price of the ticket (column name: 'fare') for each passenger is distributed by plotting a histogram. | L3 |
| | LA9 | Data Visualization II 1. Use the inbuilt dataset 'titanic' as used in the above problem. Plot a box plot for distribution of age with respect to each gender along with the information about whether they survived or not. (Column names : 'sex' and 'age') 2. Write observations on the inference from the above statistics. | L3 |
| | LA10 | Data Visualization III Download the Iris flower dataset or any other dataset into a DataFrame. (e.g., https://archive.ics.uci.edu/ml/datasets/Iris). Scan the dataset and give the inference as: 1. List down the features and their types (e.g., numeric, nominal) available in the dataset. 2. Create a histogram for each feature in the dataset to illustrate the feature distributions. 3. Create a box plot for each feature in the dataset. 4. Compare distributions and identify outliers. | L3 |
| | LA11 | WordCount using Hadoop Map-reduce Write a code in JAVA for a simple Word Count application that counts the number of occurrences of each word in a given input set using the Hadoop Map-Reduce framework. | L3 |
| | LA12 | Log file processing using Map-Reduce Design a distributed application using Map-Reduce which processes a log file of a system. | L3 |

| | | | |
|---|---|---|---|
| LA13 | Weather data Analysis using Hadoop<br>Locate dataset (e.g., sample_weather.txt) for working on weather data Which reads the text input files and finds average for temperature, dew point and wind speed. | | L3 |
| LA14 | Movie recommendation model<br>Develop a movie recommendation model using the scikit-learn library in python.<br>Refer dataset https://github.com/rashida048/Some-NLP-Projects/blob/master/movie_dataset.csv<br>OR<br>Project Covid Dataset Analysis<br>Use the following covid vaccine statewise.csv dataset and perform following analytics on given dataset<br>https://www.kaggle.com/datasets/sudalairajkumar/covid19-in-india?select=covid_vaccine_statewise.csv | | L3 |
| LA15 | Case Study of Digital Marketing/Health case system using Hadoop Ecosystem. | | L3 |

**Activities planned / assessment tools to be used to achieve Course Outcomes**
**Internal Assessment Tools (20% Weightage)**

| Sr. No. | Assessment Tool | Total in number | Marks scale down to |
|---|---|---|---|
| 1 | Lab Assignments (LA1 to LA15) Implementation | 10 (each of 10 marks) | 150 |
| 2 | Mock Practical | 50 Marks | 50 |
| | | **Total** | **200** |

**External Assessment Tools (80% Weightage)**

| Sr. No. | Assessment Tool | Marks scale down to |
|---|---|---|
| 1 | Practical | 25 |
| 2 | TermWork | 50 |
| | **Total** | **75** |

**Internal Assessment tools to CO mapping**

| CO No. | ASSESSMENT TOOLS USED | Total Weightage |
|---|---|---|
| C316.1 | LA1, LA2,MP | 30 |
| C316.2 | LA3,MP | 20 |
| C316.3 | LA4,LA5,LA6,LA14,MP | 50 |
| C316.4 | LA7,MP | 20 |
| C316.5 | LA8,LA9,LA10,MP | 40 |
| C316.6 | LA11.LA12,LA13,LA15,MP | 50 |
| | **TOTAL** | **210** |

**External Assessment tools to CO mapping**

| CO No. | ASSESSMENT TOOLS USED | |
|---|---|---|
| C316.1 | PRACTICAL (25) | TERMWORK (50) |
| C316.2 | | |
| C316.3 | | |
| C316.4 | | |
| C316.5 | | |
| C316.6 | | |
| **Marks** | **25** | **50** |
| **Total Marks** | **75** | |

# Subject – Web Technology Lab

## COURSE DETAILS DOCUMENT

**Class** – TE
**Course Name** – Web Technology Lab

**Course Code** – 310256                                  **Course No.** – 316

**Teaching Scheme**                                        **Marking Scheme**
**Practical-** 02 Hour/Week

                                                          **TW**: 25 marks
                                                          **PR**: 50 marks

----------------------------------------------------------------------------------------------------------------

**Course Objectives**
   1. To use current client side and server side web technologies.
   2. To implement communication among the computing nodes using current client side andserver side technologies.
   3. To design and implement web services with content management.


**Course Outcomes**

| CO No. | Year of study 2017-18 | Bloom's taxonomy | Bloom's Level |
|--------|------------------------|-------------------|----------------|
| At the end of the course students will be able to - | | | |
| C316.1 | **Apply** the concepts of web server installation, configuration and **Design**&**Develop** a web application using Front End Tools. | Apply, Create | L3,L6 |
| C316.2 | **Design & Develop**aweb application using suitable client side and server side web technologies. | Create | L6 |
| C316.3 | **Develop**a web application using Client and Server Side Frameworks. | Create | L6 |
| C316.4 | **Design & Develop** a web application using Web Services or Content Management System. | Create | L6 |

**List of Assignments**

| Sr. No. | Title | Bloom's Level |
|---|---|---|
| LA1 | A. Installation and Configuration of Web Application Servers Tomcat, Apache, WebSphere, JBoss, GlassFish.<br>B. Design and develop any suitable web application using HTML, CSS and XML in consultation of course instructor | L3<br><br>L6 |
| LA2 | Perform validation of all fields in LA1 by using Java script/JQuery. | L6 |
| LA3 | Add dynamic web application essence in LA2 using Servlet, JSP and backend | L6 |
| LA4 | Add dynamic web application essence in LA2 using PHP, MySQL database connectivity and AJAX controls. | L6 |
| LA5 | A. Re-Design, develop and deploy LA3 using Strut.<br>B. Re-Design, develop and deploy LA4 using Angular JS. | L6 |
| LA6 | Design, Develop and Deploy separate web application using EJB/CMS/JSF/Spring/Bootstrap. | L6 |

**COURSE ASSESMENT**

| Sr. No. | Type | Weightage |
|---|---|---|
| 1 | Direct Assessment (Internal + External) | 80% |
| 2 | Indirect Assessment (Course Exit Survey) | 20% |
| | **TOTAL** | 100% |

**DIRECT ASSESMENT (80% Weightage)**
**Activities planned / assessment tools to be used to achieve Course Outcomes**

**Internal Assessment Tools (20% Weightage)**

| Sr. No. | Assessment Tool | Total in number | Marks scale down to |
|---|---|---|---|
| 1 | Lab Assignments (LA1 to LA6) | Each of 10 marks | 60 |
| 2 | Mock Practical (MP) | 01 | 50 |
| 3 | Mini Project(MPR) | 01 | 20 |
| | | **Total** | **130** |

| Rubrics for evaluation of Practical Assignment of10Marks  Each . | | | |
|---|---|---|---|
| Problem Solving Ability and logic | Basic Concept: Knowledge | Execution of assignment  & | On time Submission |
| 3 | 2 | 3 | 2 |

**External Assessment Tools (80% Weightage)**

| Sr. No. | Assessment Tool | Marks scale down to |
|---|---|---|
| 1 | TW | 25 |
| 2 | Practical | 50 |
| | **Total** | **75** |

**Internal Assessment tools to CO mapping**

| CO No. | ASSESSMENT TOOLS USED | Total Weightage |
|---|---|---|
| C316.1 | LA1,MP | 10 |
| C316.2 | LA2, LA3, LA4, MP | 30 |
| C316.3 | LA5, MP | 10 |
| C316.4 | LA6, MP,MPR | 30 |
| | **TOTAL** | **80(Except mock)** |

**External Assessment tools to CO mapping**

| CO No. | ASSESSMENT TOOLS USED | |
|---|---|---|
| C316.1 | | |
| C316.2 | TW (25) | PR (50) |
| C316.3 | | |
| C316.4 | | |
| **Marks** | **25** | **50** |
| **Total Marks** | **75** | |

**INDIRECT ASSESMENT (20% Weightage)**
- **Course Exit Survey (to be submitted at the end of the course )**

# Subject – Laboratory Practice-II

## COURSE DETAILS DOCUMENT

**Class** – TE
**Course Name** – Laboratory Practice-II
**Course Code** – 310258                    **Course No.** – 318
**Teaching Scheme**                          **Marking Scheme**
**Theory** – 4 Hrs/wk                        TW: 50 Marks
                                             PR: 25Marks

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**DIRECT ASSESMENT (100%)**
**Activities planned / assessment tools to be used to achieve Course Outcomes**

**Internal Assessment Tools (20% Weightage)**

**Prerequisites for the course**
1. Engineering Mathematics.
2. Discrete Mathematics.
3. Computer Networks.
4. Python.
5. Java.

**Companion Course:** Artificial Intelligence (310253), Elective II (310254)

1. Information Security
2. Artificial Intelligence
3. Cloud Computing

**Course Objectives:**
- To learn and apply various search strategies for AI
- To Formalize and implement constraints in search problems
  To understand the concepts of Information Security / AugmentedReality/Cloud
Computing/Software      Modeling and Architecture

**Course Outcome**
- **At the end of the course, students will be able to,**

| CO No. | Year of study 2021-22 | Mapping to POs/PSOs | | |
|--------|----------------------|---------------------|--------|-----|
| | | Substantial | Moderate | Low |
| C318.1 | Design a system using different informed search / uninformed search or heuristic approaches | 5 | 1,3,8,9,10, 12 | 11 |

| C318.2 | Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning | 5 | 3,4,6,8,9,10,12 | 1,11 |
|---|---|---|---|---|
| C318.3 | Design and develop an interactive AI application | 5 | 3,4,6,8,9,10,11,12 | 1 |
| C318.4 | Use tools and techniques in the area of Information Security/Cloud Security. | 5 | 3,8,9,10,11,12 | 1 |
| C318.5 | Use the cryptographic/Cloud Computing techniques for problem solving | 5 | 3,8,9,10,11,12 | 1 |
| C318.6 | Design and develop security solution and develop application on Cloud | 5 | 3,8,9,10,11,12 | 1 |

**List Of Assignments**

| Course Co No | Assignment No | Title | Blooms Level |
|---|---|---|---|
| C318.1 | LA 1 | Implement depth first search algorithm and Breadth First Search algorithm, Use an undirected graph and develop a recursive algorithm for searching all the vertices of a graph. | L3, L4 |
| C318.2 | LA 2 | Implement A star Algorithm for any game search problem | L3 L4 |
| C318.3 | LA 3 | Implement Greedy search algorithm for Job Scheduling Problem Algorithm | L3 L4 |
| C318.4 | LA 4 | Implement a solution for a Constraint Satisfaction Problem using Branch and Bound a n d Backtracking for n-queens problem. | L3 L4 |
| C318.5 | LA 5 | Develop an elementary chatbot for any suitable customer interaction application. | L3, L4 |
| | | **Information Security** | |
| C318.6 | LA 6 | Write a Java/C/C++/Python program that contains a string (char pointer) with a value \Hello World'. The program should | L3, L4 |

| | | AND or and XOR each character in this string with 127 and display the result. | |
|---|---|---|---|
| C318.7 | LA 7 | Write a Java/C/C++/Python program to perform encryption and decryption using the method of Transposition technique. | L3, L4 |
| C318.8 | LA 8 | Write a Java/C/C++/Python program to implement DES algorithm. | L3, L4 |
| C318.9 | LA 9 | Write a Java/C/C++/Python program to implement AES Algorithm. | L3, L4 |
| C318.10 | LA 10 | Write a Java/C/C++/Python program to implement RSA algorithm. | L3, L4 |
| C318.11 | LA 11 | **Cloud Computing** (All assignments are compulsory) | |
| C318.12 | LA 12 | Case study on Microsoft azure to learn about Microsoft Azure is a cloud computing platform and infrastructure, created by Microsoft, for building, deploying and managing applications and services through a global network of Microsoft-managed data centers. OR Case study on Amazon EC2 and learn about Amazon EC2 web services. | L3, L4 |
| C318.13 | LA 13 | Installation and configure Google App Engine. OR Installation and Configuration of virtualization using KVM. | L3, L4 |
| C318.14 | LA 14 | Creating an Application i SalesForce.com using Apex programming Language | L3, L4 |
| | Mini project | Design and develop custom Application (Mini Project) using Sales force Cloud. | L3, L4 |
| | Mini project | Mini-Project Setup your own cloud for Software as a Service (SaaS) over the existing LAN in your laboratory. In this assignment you have to write your own code for cloud controller using open- source technologies to implement with HDFS. Implement the basic operations may be like to divide the file in segments/blocks and upload/ download file on/from cloud in encrypted form. | L4, L5 |

**Internal Assessment Tools (20% Weightage)**

| Sr. No. | Assessment Tool | Total in number | Marks scale down to |
|---|---|---|---|
| 1 | Lab Assignments (LA1 to LA14) | 15 (each of 5 marks) | 75 |
| 2 | Mini Project | 2 ( each 20 marks) | 25 |
| | | **Total** | **100** |

**Rubrics for Lab Assignments (LA)**

| Implementation | Level of Understanding | On time Submission | Write Up |
|---|---|---|---|
| 2 | 1 | 1 | 1 |

**Rubrics for Mini Project (MP)**

| Implementation | Presentation | On time Submission |
|---|---|---|
| 15 | 5 | 5 |

**External Assessment Tools (80% Weightage)**

| Sr. No. | Assessment Tool | Marks scale down to |
|---|---|---|
| 1 | Practical | 25 |
| 2 | Term work | 50 |
| | **Total** | **75** |