B. Tech. (5th Sem) (Computer Science & Engineering)
BCSE-513 (Cloud Computing)

L	T	P
2	0	0

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**2.0**

Course Objectives:

1. To acquire knowledge about Cloud computing and its characteristics.
2. To learn how to identify various Cloud services.
3. To learn various Cloud delivery models.
4. To learn about Cloud security and Multi-Cloud management systems.
5. To learn about future directions of cloud computing.

Unit:-1

Overview of Cloud Computing- Brief history and evolution, History of Cloud Computing, Evolution of Cloud Computing, Traditional Vs. cloud Computing, Why Cloud Computing, Cloud Service Models (IaaS, PaaS & SaaS), Cloud Deployment Models (Public, Private, Hybrid and Community Cloud), Benefits and Challenges of Cloud Computing.

Working with Private Cloud- Basics of Virtualization, Virtualization technologies, Server Virtualization, VM Migration techniques, Role of Virtualization in Cloud Computing, Business cases for the need of Cloud Computing environment, Private Cloud Definition, Characteristics of Private Cloud, Private Cloud Deployment Models, Private Cloud Vendors, Private Cloud Building Blocks namely Physical Layer, Virtualization Layer, Cloud Management Layer, Challenges to private Cloud, Virtual Private Cloud, Implementing Private Cloud (one out of CloudStack, OpenStack, Eucalyptus, IBM or Microsoft).

Unit:-2

Working with Public Clouds- What is Public Cloud, Why Public Cloud, When to opt for Public Cloud, Public Cloud Service Models, and Public Cloud Players, Infrastructure as a Service Offerings, IaaS Vendors, PaaS Offerings, PaaS vendors, Software as a Service, Implementing Public Cloud (one out of AWS, Windows Azure, IBM or Rackspace).

Unit:-3

Overview of Cloud Security- Explain the security concerns in Traditional IT, Introduce challenges in Cloud Computing in terms of Application Security and Network security, Security reference Model, Abuse and Nefarious Use of Cloud Computing, Insecure Interfaces and APIs, Malicious Insiders, Shared Technology Issues, Data loss or Leakage, account or Service Hijacking, Unknown Risk Profile, Introduce the different vendors offering Cloud Security for Public and private clouds.

Overview of Multi-Cloud Management Systems- Explain concept of multi-cloud management, Challenges in managing heterogeneous clouds, benefits and advantages of multi-cloud management systems, Implementing Multi-Cloud Management System (i.e. RightScale Cloud Management System).

Unit:-4

Business Clouds- Cloud Computing in Business, Various Biz Clouds focused on industry domains (Retail, Banking and Financial sector, Life Sciences, Social Networking, Telecom, Education), Cloud Enablers (Business Intelligence on cloud, Big Data Analytics on cloud).

Future directions in Cloud Computing- Future technology trends in Cloud Computing with a focus on Cloud service models, deployment models, cloud applications and cloud security, Migration paths for cloud, Selection criteria for cloud deployment, Current issues in cloud computing leading to future research directions.

Course Outcomes:

1. Understanding the systems, protocols and mechanisms to support cloud computing.
2. Develop applications for cloud computing.
3. Understanding the hardware necessary for cloud computing.
4. Define cloud computing and related concepts.
5. Understand the key dimensions of the challenges of Cloud Computing.
6. Understand the assessment of the economics, financial, and technological implications for selecting cloud computing for an organization.
7. Describe the benefits of cloud computing.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text Books/Reference Books:

1. Raj Kumar Buyya, James Broberg, Andrezei M. Goscinski, “Cloud Computing: Principles and paradigms”.
2. Michael Miller, “Cloud Computing”, 2008.
3. Judith Hurwitz, Robin Bllor, Marcia Kaufman, Fern Halper, “Cloud Computing for dummies”, 2009.
4. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, “Cloud Computing: A Practical Approach”, McGraw Hill.
5. Borko Furht, Armando Escalante (Editors), “Handbook of Cloud Computing”, Springer, 2010.
6. Rittinghouse, John, W, “Cloud Computing: Implementation, management and security”.
7. Barrie Sosinsky, “Cloud Computing Bible”, Wiley, 2011.
8. Rhoton, John, “Cloud Computing Architected: Solution Design Handbook”.
9. Krutz, Ronald L.: Vines, Russell Dean, “Cloud Security, a Comprehensive Guide to Secure Cloud Computing”.

B. Tech. (5thSem) (Computer Science & Engineering)
BCSE- 513L (Cloud Computing Lab)

L	T	P
0	0	4

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**2.0**

Course Objectives:

1. Understand fundamental of cloud computing.
2. Understand the architecture and models of cloud computing.
3. Understand different cloud computing platforms.
4. Understand how to Select appropriate AWS services to design and deploy an application based on given requirement.
5. Understand how to Implement cost-control strategies in Amazon web services.

List of Practical

1. Write the steps to install VirtualBox / VMware in a machine
2. Write the installation process of operating system in virtual machine.
3. Write the process of creating AWS account.
4. Write a program for Web feed using PHP and HTML
5 Case study on Amazon EC2/Microsoft Azure/Google Cloud Platform
6. User Management in Cloud.
7. Write the process to configure Elastic Beanstalk in AWS.
8. Write the process to create EC2 resources and launch the EC2 resources.
9. Write the process to install Xamp server and host a webpage on your remote desktop.
10. Write the process to create S3 bucket in AWS.
11. Write the process of creating MS Azure account.
12. Write the process of creating IBM SmartCloud account.
13 Write the process of setting up a private cloud for University.

Course Outcomes:

1. Student achieve proficiency in concepts of cloud computing.
2. Students demonstrate ability to design, implement cloud based architecture for shifting the application from on premise to cloud.
3. Students demonstrate ability in applying their major knowledge to practical applications of companies.
4. Students demonstrate ability in designing architecture for cloud.

B. Tech. (5thSem) (Common for CSE, CSE with Specialization in Data Science)
BCSE-514 (Big Data & Analytics)

L	T	P
2	0	0

Continuous evaluation	40
End semester exam	60
Total marks	100
Credits	2.0

Course Objectives:

1. To study the basic technologies that forms the foundations of Big Data.
2. To study the programming aspects of cloud computing with a view to rapid prototyping of complex applications.
3. To understand the specialized aspects of big data including big data application, and big data analytics.
4. To study different types Case studies on the current research and applications of the Hadoop and big data in industry.

Unit:-1
Big Data: Introduction to Big Data Platform, Challenges of Conventional Systems, Data Types (Structured, Semi-Structured and Unstructured), Traditional BI vs Big Data Environment, Big Data (Descriptive, Predictive and Prescriptive), Big Data Technology Landscape (SQL, NoSQL, NoSQL Databases, New SQL), CAP Theorem, Hadoop installation (standalone modes and fully distributed mode).

Unit:-2
Hadoop: Introduction, key advantages of Apache Hadoop, Hadoop vs. RDBMS, Hadoop Architecture, Hadoop components, HDFS Design and goals, anatomy of file read and write in HDFS, Replica placement strategy, Working with HDFS Commands, Hadoop file system interfaces, Hadoop 1.0 vsHadoop 2.0, Hadoop Echo System.
Data Streaming: Data streaming, Data Flow, Models, Flumes (Features, Architecture).

Unit:-3
Map Reduce: Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features, SQL vs. Map Reduce, Stream Data Model and Architecture.

Unit:-4
PIG: Introduction, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators.
Hive: Hive Shell, Hive Services, Hive Metastore, Comparison with Traditional Databases, HiveQL, Tables, Querying Data and User Defined Functions.
Hbase:HBasics, Concepts, Clients, Example, Zookeeper, Hbase vs. RDBMS. Big SQL.
Sqoop: Sqoop Architecture, Installation, connectors & drivers, importing and exporting data from HDFS, HIVE, Hbase.

Course Outcomes:
1. Understand and explain the building blocks of Big Data.
2. Articulate the programming aspects of cloud computing (map Reduce etc).
3. Explain about recent research trends related to Hadoop File System, MapReduce and Google File System etc.
4. Explain the specialized aspects of big data with the help of different big data applications.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text Books:
1. Tom White, “Hadoop: The Definitive Guide”, 3rd ed., O’reilly Media, 2012.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, “Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data”, McGraw-Hill Publishing, 2012.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley.

Reference Books:
1. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons.
2. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.

B. Tech. (5thSem) (Common for CSE, CSE with Specialization in Data Science)
BCSE-541L (Big Data & Analytics Lab)

L	T	P
0	0	4

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**2.0**

Course Objectives:

1. To acquire knowledge about Big Data and its characteristics.
2. To learn about Hadoop& its installation.
3. To learn about file streaming techniques.
4. To learn about various data processing tools such as PIG, Hive, Hbase & Sqoop.

List of Practical

1. Installation of java on Unix/Linux machine.
2. Installation of Hadoop VM on single node.
3. Implement the following file management tasks in Hadoop:
   - Adding files and directories.
   - Retrieving files from HDFS to local file system.
   - Deleting Files from HDFS.
4. Run a java program based on parallel programming to implement the concept of Map Reduce Paradigm.
5. Implement the following file management tasks in Sqoop over Hadoop.
   - Create a Database
   - Create Table
   - Insert Some Records
6. Install and Run Hive, then use Hive to Create, alter and drop databases, tables, views, functions and Indexes.
7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project and filter the data.
8. Write a program to analyze the Web server log stream data using Apache Flume Framework.
9. Implement the following file management tasks of Hbase NOSQL over Hadoop.
   - Operating on Table.
   - Insert Some Records.
   - Display Table Data.
10. Implement the following file management tasks in Spark over Hadoop environment.
    - RDD using in memory data set.
    - RDD using file.
    - Using Map Function.
    - Using Reduce Function.

Project: Recruitment for Big Data job profiles

Recruitment is a challenging job responsibility of the HR department of any company. Here, we'll create a Big Data project that can analyze vast amounts of data gathered from real-world job posts published online. The project involves three steps:

- Identify four Big Data job families in the given dataset.
- Identify nine homogeneous groups of Big Data skills that are highly valued by companies.
- Characterize each Big Data job family according to the level of competence required for each Big Data skill set.

The goal of this project is to help the HR department find better recruitments for Big Data job roles.

Course Outcomes:

i) Understand & explain the installation of VMWare.
ii) Understand & explain Map Reduce Paradigm.
iii) Perform the installation of PIG.
iv) Apply Hive to create, alter, and drop databases, tables, views, functions, and indexes.

B. Tech. (5th Sem)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-532 (Java & its Framework)

L	T	P
3	0	0

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**3.0**

Course Objectives: By the end of the course, the students will:

1. Gain knowledge about the architecture and technology behind the Spring Boot Framework.
2. Learn to develop and auto configure microservices using Spring Boot in java.
3. Learn to connect data repositories in Spring Boot and use them in web applications.
4. Learn to create and process web applications using the Thymeleaf library in Spring Boot.

Unit-1:

Introduction to Microservices and Spring Boot: Evolution of Software Architectures, Microservices, Detailed MicroService Architecture (App Layer, Business Layer, Enteprise Layer (Infra Layer)), Principles and Characteristics of Microservices, Advantages of Microservices, Relationship of Microservices with SOA and Monolith Architecture, Need of Spring Boot, Difference between Spring & Spring Boot, MVC (Model View Controller Architecture).

Unit-2:

Building Microservices with Spring Boot: Developing Spring Boot microservice using CLI, Developing Spring Boot Java microservice using STS, Maven Overview, Spring Initializer, Eclipse with STS Plugin, Spring Boot auto configuration, Conditional Flow, Built in and Customized Conditional Annotations, Spring Boot Security, Messaging, Common Design Decisions and Communication Styles.

Unit-3:

Spring Boot Data Repositories: Integration of Repositories with Spring Boot Applications, Crud Repository, Inserting, Updating and Deleting Using SQL Clauses, JPA repository, JPA Query Concepts, Named Queries, Query Annotation, Pagination and Sorting Repository, NoSQL data access in Spring Boot.

Unit-4:

Thymeleaf with Spring Boot: Overview and Setting up of Thymeleaf with Spring Boot project, Connecting to a Thymeleaf template, Basic properties in a template th:text, th:each, th:unless, th:if, Forms in Thymeleaf and their elements, Reusable Code Fragments, URL's in Thymeleaf, Pagination and Sorting, Validations in Web Applications.

Course Outcome:

The students gain skills to become an enterprise java developer.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text / Reference Books:

1. Spring Mircoservices by Rajesh SV, Packt Publishing.
2. Spring Data by Mark Pollack, O'Rielly.

Reference Web Sites / Downloads:

1. spring.io.
2. Thymeleaf With SpringBoot by Michael C. Good (https://michaelcgood.com/wp-content/uploads/2018/01/Thymeleaf-spring-boot.pdf).
3. https://riptutorial.com/Download/spring-boot.pdf.

B. Tech. (5th Sem)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-533 (Python & its Framework)

L	T	P
3	0	0

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**3.0**

Course Objectives:

1. To demonstrate how to install and configure Python and Django framework in a development and production environment.
2. To provide an understanding of Django features, and develop web-based applications using basic and advanced concepts of Django.
3. To encourage students to design and develop forms (both ad-hoc and from Models and Data Models) and automate the validation and verification of data in those forms.
4. Understand the essentials of database connectivity and deployment of developed web application.

Unit:-1

Introduction: The Python Language, Why Use Python?, Development Environments: Text Editors and IDEs, Shells, Terminal multiplexers, Environment configuration, Source Control; Essential Python Libraries: NumPy, Pandas, MatPlot,IPython and Jupyter, SciPy, scikit-learn, Visualization of Data; Web Frameworks: Django, Flask, Bottle, Pyramid, TurboGears, Falcon, Morepath, Sanic, Other web frameworks

Unit:-2

Django – Basic Concepts: What is Django framework?, Why Django Framework?, Who's Using Django?, Installation: Python, Virtual Environment, Django; Starting a New Project, Django – the Project Structure, Model-View-Template (MVT) architecture, Django - Apps, Django Models, Views, Template and Static Files, Introduction to Django Admin

Unit:-3

Django – Advanced Concepts: URLs, URL Mapping, Reusable Templates, Django Forms**:** Render HTML Forms (Get & Post) in Django, Form Field and Custom Widgets, ModelForm – Create form from Models, Django Formsets, ModelFormSets, Authentication and Permissions,

Unit:-4

Database Connectivity: Django CRUD (Create, Retrieve, Update, Delete), Django-ORM, Function based views, Class-based generic views

Deployment: Version Control, Project Settings, Tracking Requirements, Deployment and Configuring Strategy

Course Outcome: After completion of this course, students will have a fundamental understanding of how to:

1. Understand Django Architecture and its take on MVC (Models, Views & Templates).
2. Connect templates with models to serve data dynamically.
3. Handle and validate forms in Django.
4. Create Relative URLs with templates and how to check out Template and Custom Filters.
5. Build and deploy Django web apps.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text Books:

1. Lightweight Django by Julia Elman, Mark Lavin.
2. Python Web Development with Django (Developer's Library) by by Jeff Forcier, Paul Bissex and Wesley J Chun.
3. Django for APIs: Build web APIs with Python & Django by William S. Vincent.

Reference Books:

1. Django Design Patterns and Best Practices by by Arun Ravindran.
2. Django for Professionals: Production websites with Python & Django by William S. Vincent.

B. Tech. (5th Semester)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-534 (JavaScript & its Framework)

L	T	P
3	0	0

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**3.0**

Course Objectives:

1. Introduction to what is React and its basic concepts.
2. Learn what JSX is and how it works behind the scenes.
3. Learn what are the stateful and stateless components and when to use them.
4. Working with function based and class based components.
5. Working with React Modules, importing and exporting the modules.
6. Learn in detail about how the render method works.
7. React component lifecycle and different lifecycle methods.
8. Creating dynamic websites with help of re-usable components.
9. Creating a proper working structure for a project from scratch which will help maintaining the project for long term.

Unit:-1 **(9 Hours)**

Introduction to Javascript: Variables, Control Statements, Functions, Arrays, Objects, Strings & Manipulations – Handling Events. **Emerging JavaScript**: Declaring Variables in ES6 - Const, Let. Template Strings, Default Parameters. Arrow Functions, Transpiling ES6, ES6 Objects and Arrays - Destructuring Assignment, Object Literal Enhancement, and Spread Operator. ES6 Modules, Promises, Classes.

Unit:-2 **(9 Hours)**

Introduction to Node.js: Setting up Node.js and NPM, **Introduction to React**: Virtual DOM, React element, ReactDOM, React Components – createClass, ES6 Class, Stateless functional Components, DOM Rendering, React element as JSX, Props – Default props, component states. **React Lifecycle Methods**: Mounting, Updating and Unmounting, Forms, Handling Events, Refs, Lists and Keys.

Unit:-3 **(9 Hours)**

Hooks: State Hook, Effect Hook, Rules of Hooks and Building your own Hooks. **React Strap**: Link, Nav, and Card. **React Route**: BrowserRouter, Routes, Route and Link, **React Flux**: Basic concepts, Flux architecture. **React Redux:** Redux Concepts and Data Flow, State, Actions, and Reducers, Store, Integrating Redux with a UI.

Unit:-4 **(9 Hours)**

JSON Server with Reactjs: Networking concepts – Client and Server, HTTP. JSON – Creating the JSON file, Setting up REST API using JSON Server, JavaScript library integration, Making requests with Fetch.

Course Outcomes:

1. Be familiar with client-side Javascript application development and the React library.
2. Be able to implement single page applications in React.
3. Be able to use various React features including components and forms.
4. Be able to implement a functional front-end web application using React.
5. Be able to set-up a JSON Server and Fetch data into the webpage.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text Books:

1. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013.
2. DT Editorial Services, “HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery”, Dreamtech Press, 2 editions, October 2016.
3. Alex Banks and Eve Porcello, “Learning React: Functional Web development with React and Redux”, Published by O’Reilly, 1st Edition, 2017.
4. Brown, Ethan, “Web Development with Node and Express: Leveraging the JavaScript Stack”, O'Reilly Media, 2019.

Reference Books:

1. David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O'Reilly Media, 2011.
2. Lionel Lopez, “React: Quickstart Step-By-Step Guide To Learning React JavaScript Library (React.js, Reactjs, Learning React JS, React Javascript, React Programming)”, Kindle Edition.
3. Krishna Rungta, “Learn NodeJS in 1 Day: Complete Node JS Guide with Examples”, Kindle Edition.

B. Tech. (5th Sem)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-532L (Java & its Framework Lab)

L	T	P
0	0	4

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**2.0**

Course Objectives: By the end of the course, the students will:

1. Learn to develop and auto configure microservice applications using Spring Boot in java
2. Learn to connect data repositories in Spring Boot and use them in applications
3. Learn to create and process web applications using the Thymeleaf library in Spring Boot

List of Practical

1. Install the Eclipse and the Spring Tool Suite (STS) plugin on your systems. Create a Spring Starter project using the Spring Initializer and run it using Eclipse IDE. Examine the main class and pom.xml files.
2. Create REST end points and add Maven dependencies in the project for building the Social Networking API.
3. Declare the Business service classes as well as REST controller classes for users, posts and locations.
4. Write GET methods to return the lists of users, posts and locations.
5. Create the definitions of Users, Posts and Locations in the service classes.
6. Create methods to get a single user, single post and single location by ID in the service and controller classes.
7. Create methods to add, delete and update the users, posts and locations in the service and controller classes.
8. Add the Spring Data JPA dependencies to the pom.xml file in order to use the JPA repository.
9. Perform the JPA CRUD operations for users, locations and posts.
10. Add the entity relationships using spring annotations for the users, posts and location classes.
11. Add the functionalities to search users by first name, last name and search posts by date.
12. Setup the user interface of your application by using the thymeleaf concepts.

Project: Develop a Social Networking REST API using the Spring Boot Framework in Java containing the following classes:

- list of users
- list of locations
- list of posts

Following are the entity-relationships that should be supported:

- a user has a location
- each location could have 1 or more users
- a user could create a post. Hence each user can have one or more posts

Following operations should be supported:

- add, delete and update user details
- add, delete and update location details
- add, delete and update post details
- get a list of users or locations
- get user or location by id
- get list of posts for a particular user

Course Outcome:
The students gain skills to become an enterprise java developer.

B. Tech. (5th Sem)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-533L (Python & its Framework Lab)

L	T	P
0	0	4

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**2.0**

Course Objectives:

1. To demonstrate how to install and configure Python and Django framework in a development and production environment.
2. To provide an understanding of Django features, and develop web-based applications using basic and advanced concepts of Django.
3. To encourage students to design and develop forms (both ad-hoc and from Models and Data Models) and automate the validation and verification of data in those forms.
4. Understand the essentials of database connectivity and deployment of developed web application.

List of Practical

1. Tool Installation (Python, Virtual Environment, Django) and Building a simple app from scratch.
2. Demonstrate how to create a basic project using MVT in Django.
3. Demonstrate how to activate & use Django's Admin module (interface) and to perform admin related tasks.
4. Develop a program to add Site Header, Site Title, Index Title in a Django Project.
5. Develop program to demonstrate adding tags using Django-Taggit.
6. Develop program to create a simple view for a web browser.
7. Create a Python module called a URLconf and design URLs for an application. Like a table of contents for your app, it contains a simple mapping between URL patterns and your views.
8. Develop program to generate forms from existing models and use those forms to perform CRUD operations on data.
9. Develop program to send simple emails to the registered users of your Django application.
10. Demonstrate how to integrate Django with Reactjs using Django REST Framework.

Course Projects: Apart from the mentioned list of experiments, the student will have to develop the following projects.

Project Title: Virtual Community

Project Overview: "Virtual Community" is a fully functional and user interactive web-based application. The purpose of this application is to reduce the communication gap between the employees/or other stakeholders of an organization and to create a convenient and easy-to-use application for their side activities except from official work. Moreover, this community also helps users to develop connections and expand their business vacancies.

Project Title: Blog Application

Project Overview: This Blog Application is a complete blogging site for the users where users can add, edit and delete their blogs and share to everyone on the world. It contains all the features of a Blog site like login/register into the system, CRUD operation like add blog post with title, description and image and edit or delete the blog post.

Course Outcome: After completion of this course, students will have a fundamental understanding of how to:

1. Understand Django Architecture and its take on MVC (Models, Views & Templates)
2. Connect templates with models to serve data dynamically.
3. Handle and validate forms in Django.
4. Create Relative URLs with templates and how to check out Template and Custom Filters.
5. Build and deploy Django web apps

B. Tech. (5th Semester)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
BCSE-534L (Javascript & its Framework Lab)

L	T	P
0	0	4

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**2.0**

Course Objectives:

i) Use a JavaScript package manager (npm).
ii) Understand the new JavaScript language features, including classes, modules, and arrow functions.
iii) Articulate what React is and why it is useful.
iv) Explore the basic architecture of a React application.
v) Gain a deep understanding of JSX and the Virtual DOM.

LIST OF PRACTICAL:

1. Create a web page with JS to validate age (onblur event) greater than 18 and count the no of words in the description field (onclick event).
2. Build simple React components that implement a render () method, which takes input data and returns data to display. Use an XML-like syntax called JSX. Input data, passed into the component can be accessed by render () via this.props.
3. Create a simple counter app in React with stateful Component.
4. Create a Todo List app with React components that allows users to add, edit, view and delete tasks.
5. Create a JSON file, which has students details such as register number, name, department and display the same in react Component using the map function.
6. Create an Event Registration form with React Strap components.
7. Create a online shopping page with React components that will consist in a Navigation Bar at the top of the page, a Main section in the middle that will contain all the shopping item's information, and a Footer at the bottom of the page with a little information about the page, like social network icons and the copyright information.
8. Create a simple web page, with navigation links for AboutUs page and ContactUs page. Implement the same using React Route concepts.
9. Create a react application, using which the details of "Restaurant: - Dish ID, Image of the Dish, Comments of the dish and Description" are fetched from the JSON server and displayed on the web page.

Project Topics: The following applications has to develop using the ReactJS library

1. Personal Blog

Objective(s): To create a simple blog website that allows users to add new articles and edit and delete articles.

Project Overview:

At the front-end of the blog, users should add new articles and view, edit, and delete articles. You will also have to develop the backend for the app that will handle all the blog data. You can use Node.js to develop the backend of the blog.

2. Social Media App

Objective(s): To build a social media app with several basic features common among the leading social media platforms like Facebook and Twitter.

Project Overview:

This project requires you to build a social media app inspired by the leading social media platforms, namely Facebook and Twitter. Your social media app should have some of the basic features that should have include user authentication, user profiles, feeds, notifications, and post interactions.

You need to build several components to make your social media app work. You can also use a database to store all the data, including username & passwords, image uploads, and profile data.

Course Outcomes: Upon completion of this course, the students will be able:

1. To build dynamic websites with help of re-usable components.
2. To create a proper working structure for a project from scratch this will help maintaining the project for long term.

B. Tech. (5th Sem) (Computer Science & Engineering)
BCSE-541 (Data Warehousing and Data Mining)

L	T	P
3	0	0

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**3.0**

Course Objectives:

1. To acquire the knowledge about Data Warehousing.
2. To learn about Data Mining concepts.
3. To learn about various Data Mining techniques.
4. To acquire knowledge about mining complex data objects.

Unit-1:Data Warehousing

Definition, usage and trends, DBMS Vs Data warehouse, data marts, metadata, Multidimensional data mode, data cubes, Schemas for Multidimensional database: stars, snowflakes and fact constellations, Data warehouse process & architecture, OLTP Vs OLAP, ROLAP Vs MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, Distributed and virtual data warehouses, data warehouse manager.

Unit-2: Data Mining

Definition & task, KDD versus Data mining, Data mining techniques, Tools and applications, Data mining query languages, Data specification, specifying knowledge, Hierarchy specification, pattern presentation & visualization specification.

Unit-3: Data Mining Techniques

Association rules, Clustering techniques, Decision tree knowledge discovery through Neural Networks & Generic Algorithm, Rough Sets, Support Victor Machines and Fuzzy techniques.

Unit-4: Mining Complex Data Objects

Spatial databases, Multimedia databases, Time series and sequence data, mining text Databases and mining World Wide Web.

Course Outcomes:

1. Understand operational database, warehousing and multidimensional need of data base to meet industrial needs.
2. Identify and understand the components of warehousing.
3. Identify and understand the data extraction and transformation techniques.
4. Identify and understand the Business analysis, query tools and application, OLAP etc.
5. Introduce with and gain knowledge about data mining, decision tree, neural networks and clustering.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text/Reference Books:

1. Sam Anahory & Dennis Murray, “Data warehousing in Real World”, Pearson.
2. Jiawei Han & Micheline Kamber, Morgan Kaufmann, “Data Mining-Concepts & Techniques”.
3. Arun Pujar, “Data Mining Techniques”, University Press, Hyderabad.
4. Pieter Adriaans & Dolf Zantinge, “Data Mining”, Pearson Education.
5. Alex Berson, “Data Warehousing, Data Mining and OLAP”, McGraw Hill.
6. Mallach, “Data Warehousing System”, McGraw Hill.
7. W.H. Longhman, C.Klelly, “Building the Data Warehouses”, John Wiley & Sons.
8. W.H. Longhman, C.Klelly, “Developing the Data Warehouses”, John Wiley & Sons.
9. W.H. Longhman, C.Klelly, “Managing the Data Warehouses”, John Wiley & Sons.

B. Tech. (Computer Science & Engineering)
BCSE-542 (UI / UX Design)

L	T	P
3	0	0

Continuous evaluation	**40**
End semester exam	**60**
Total marks	**100**
Credits	**3.0**

Course Objectives: To provide students with the knowledge of :

i) User- centered design.
ii) User -centered methods in design.
iii) Usability testing methods, interface technologies and user centered design in corporate perspective.
iv) Wireframing and Prototyping software in the various UI/UX Design tools.

Unit:-1 Introduction to UI

Overview of UI & UX Design, Overview of the UX Design Process, Difference between User Interface (UI) vs User Experience (UX), The Relationship Between UI and UX , Roles in UI / UX, A Brief Historical Overview of Interface Design, Interface Conventions, Approaches to Screen Based UI, Template vs Content, Formal Elements of Interface Design, Active Elements of Interface Design, Composing the Elements of Interface Design, UI Design Process, Visual Communication design component in Interface Design.

Unit-2: Introduction to UX

UX Basics - Foundation of UX design, Good and poor design, Understanding Your Users, Designing the Experience - Elements of user Experience, Visual Design Principles, Functional Layout, Interaction design, Introduction to the Interface, Navigation Design, User Testing, Developing and Releasing Your Design.

Unit-3: UI Design Process:

Visual Design Principles, Information Design and Data Visualization, Interaction Design, Information Architecture, Wire framing & Storyboarding, Elements and Widgets, Screen Design and Layouts.
User Research: What is Research in User Experience Design?, Tools and Method used for Research, User Needs and its Goals, Know about Business Goals, How to deliver a research and it phases.

Unit-4: UI/ UX Design Tools

User Study- Interviews, writing personas: user and device personas, User Context, Building Low Fidelity Wireframe and High-Fidelity Polished Wireframe Using wireframing Tools, Creating the working Prototype using Prototyping tools, Sharing and Exporting Design.

Course Outcome: After completion of this course, students will be able to:

i) Understand iterative user-centered design of graphical user interfaces.
ii) Apply the user Interfaces to different devices and requirements.
iii) Create high quality professional documents and artifacts related to the design process.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text Books / Reference Books:

1. A Project Guide to UX Design: For user experience designers in the field or in the making, 2nd Edition, by Russ Unger and Carolyn Chandler, New Riders Publishing, USA, 2012.
2. The Elements of User Experience: User-Centered Design for the Web and Beyond, 2nd Edition by Jesse James Garrett, Pearson Education, 2011.
3. The Essential Guide to User Interface Design: An Introduction to GUI Design Principles and Techniques, 3rd Edition Wilbert O. Galitz, Wiley Publishing, 2007.
4. The UX Book Process and Guidelines for Ensuring a Quality User Experience, Rex Hartson and Pardha S. Pyla, Elsevier, 2012.

B. Tech. (5th Sem) (Computer Science & Engineering)
BCSE-543 (Software Project Management)

L	T	P		
3	0	0	Continuous evaluation	40
			End semester exam	60
			Total marks	100
			Credits	3.0

Course Objectives:

1. To acquire the knowledge about the basic conventional software management process.
2. To learn about various attributes of software management process.
3. To learn about disciplines of software management.
4. To learn about project control and process instrumentation.

Unit:-1

Conventional Software Management: Evolution of software economics, improving software economics, Reducing product size, Software processes, Team effectiveness, Automation through software environments, Principles of modern software management.

Unit:-2

Software Management Process: Framework, Life cycle phases (Inception, Elaboration, construction and training phase), Artifacts of the process (artifact sets, management artifacts, engineering artifacts, and Pragmatics artifacts), Model based software architectures, Workflows of the process, Checkpoints of the process.

Unit:-3

Software Management Disciplines: Iterative process planning, Project organizations and responsibilities, Process Automation.

Unit:-4

Project Control and Process Instrumentation: Core metrics, Management indicators, Life cycle expectations, Process Discriminants.

Course Outcomes: After completion of this course, student will be able to

1. Understand the concept of software process, team effectiveness.
2. Understand software architecture.
3. Understand various types of software management disciplines.
4. Understand the process of controlling a project.

Instructions for paper setter: All Questions are compulsory. The Question paper is divided in to four sections A, B, C and D. Section A is compulsory and comprises of 12 questions of one mark each, 3 from each unit. The questions shall be asked in such a manner that there are no direct answers including one word answer, fill in the blanks or multiple choice questions. Section B comprises of 4 questions of 2 marks each, one from each unit. Section C Comprises of 4 questions of 4 marks each, one from each unit. Section D Comprises of 4 questions of 6 marks each, one from each unit. There is no overall choice, however internal choice may be provided in section C and D, if paper setter so desires.

Text/Reference Books:

1. Walker Royce, “Software Project management”, Addison Wesley, 1998.
2. Project management, 2nd edition, Maylor.
3. Humphrey, “Managing the Software Process”.
4. Ramesh, “Managing global software Projects”, TMH.

B. Tech. (5th Sem)
(Common for CSE, CSE with Specialization in Data Science, CSE with specialization in Cloud Technology & Information Security)
IIOT-3 (Industrial Connectivity for IIOT)

L	T	P
0	0	4

Continuous evaluation	**60**
End semester exam	**40**
Total marks	**100**
Credits	**2.0**

Course Objectives:

1. To gain knowledge of different industrial protocols.
2. To learn designing of user interface using ThingWorx platform.
3. To learn how to use intents to broadcast data within and between applications.
4. To use content providers and handle database using SQLite.
5. To identify anomalies in data patterns.
6. To discuss various security issues with Thingworx Platform.

WK 1-WK 2: Project Presentation, **Interfacing Raspberry Pi & GSM Module with Python-** Python Basic Programming, GPIO Pins Interfacing, Python Coding

WK 3-WK 4: Battery Voltage Monitoring, Motor Temperature & Vibration Monitoring -GSM Module Introduction, Interfacing GSM Module to Raspberry Pi

WK 5: Sensor Description, Python Coding, Interfacing with Raspberry Pi

WK 6: Voltage Data on ThingWorx, Real Time patterns and anomaly detection

WK 7: Keyless start with RFID - RFID Description, Python Coding

WK 8: Interfacing with Raspberry Pi, RFID Data on Thingworx

WK 9: Interfacing with Raspberry Pi - GPS Description, Python Coding

WK 10: RFID Data on Thingworx - Interfacing with Raspberry Pi, API Integration - Google MAPs, GPS data on Thingworx Real Time patterns and anomaly detection of GPS data

WK 11: Air Pressure Monitoring of Tyres with Bluetooth - Sensor Description, Python Coding - Air Pressure Sensor, Air Pressure Interfacing with Raspberry Pi, Air pressure data on Thingworx

WK 12: Bluetooth Introduction, Python Coding – Bluetooth, Raspberry Pi - Bluetooth Interface, Real Time patterns and anomaly detection of Air pressure

WK 13: ThingWorx- creating a stream, configuring a stream, persistence provider extension, viewing data stream, creating data tags, Logging data streams,

WK 14: Value streams, data tables, data binding to remote thing, viewing data stream

WK 15: Creating data tags, Logging data streams, value streams, data tables, data binding to remote thing

Note: The student has to submit at least one project (depicting the real life scenario) using the technology and concepts learnt in this subject.

Course Outcomes: After completion of this course, students are able to:

1. Study the Raspberry Pi with Linux operating system.
2. Implementing industrial protocols like GSM, GPS, and RFID etc.
3. Use intents to activity and broadcasting data in Thingworx using REST full API, EMS, KEPWARE.
4. Study the web services and properties.
5. Design and implement database application and content providers.
6. Real Time Health monitoring of Electrical vehicles.
7. Develop Thingworx App with various security features.

Recommended Textbooks:

1. Antonio Capasso and GiacomoVeneri, "Hands-On Industrial Internet of Things: Create a Powerful Industrial IoT Infrastructure Using Industry 4.0".
2. Adrian McEwen, Hakim Cassimally “Designing the Internet of Things”.