SPRING BOOT

[As per Choice Based Credit System (CBCS) scheme]

SEMESTER – V

Course Code	:		Credits	:	02
Hours / Week	:	02 Hours	Total Hours	:	13(L)+26(P) Hours
L–T–P–J	:	1–0–2–0			

Course Learning Objectives:

This Course will enable students to:

1. **Understand** the concepts of Spring Boot, setting up a project, building RESTful APIs, data persistence with JPA, security integration, testing, deploying applications, and advanced features like microservices and Spring Cloud.
2. **Develop** and manage scalable Java-based web applications with Spring Boot, covering core concepts, RESTful APIs, data access, security, testing, and deployment.
3. **Explain** the role of spring boot and Extreme framework.
4. **Recognize** the importance of developing APIs.
5. **Identify** the features based on real world scenario.

Teaching-Learning Process (General Instructions)

These are sample new pedagogical methods, where teacher can use to accelerate the attainment of the various course outcomes.

1. ***Lecture method*** means it includes not only traditional lecture method, but different *type of teaching methods* may be adopted to develop the course outcomes.
2. ***Interactive Teaching:*** *Adopt the* ***Active learning*** that includes brainstorming, discussing, group work, focused listening, formulating questions, notetaking, annotating, and roleplaying.
3. Show ***Video/animation*** films to explain functioning of various concepts.
4. Encourage ***Collaborative*** (Group Learning) Learning in the class.
5. Discuss how every ***concept can be applied to the real world*** - and when that's possible, it helps improve the students' understanding.

UNIT – I	04 Hours

Introduction to Spring Boot: Overview of Spring Framework and Spring Boot- History and evolution of Spring Boot, Benefits of using Spring Boot, Comparison with traditional Spring framework, Setting Up the Development Environment- Installation and setup of Java, Maven/Gradle, and IDE (IntelliJ/Eclipse), Creating a basic Spring Boot application Understanding Spring Boot starters and dependencies.

Spring Boot Project Structure: Explanation of key project files (pom.xml/build. Gradle, application. Properties/application),Main application class and @SpringBootApplication annotation.

Textbook 1: Chapter 1: 1.1 to 1.4

UNIT – II	06 Hours

Spring Boot Application Development: Overview of Dependency Injection and Inversion of Control , Spring Boot Configuration - Configuration properties and profiles, Externalizing configurations , Spring Boot Auto-Configuration- Understanding and Customizing auto-configuration.

Creating RESTful Web Services : REST principles and concepts, Building REST controllers with RestController , Request mapping with RequestMapping and GetMapping, PostMapping.
Consuming REST services-Consuming REST endpoints with RestTemplate(GETting resources, PUTting resources, DELETEing resources, POSTing resource data), Navigating REST APIs with Traverson.

Textbook 1: Chapter 2: 2.1 ,Chapter 5: 5.1 to 5.3

Textbook 1: Chapter 6: 6.1 to 6.3 ,Chapter 7: 7.1 to 7.2

UNIT – III	06 Hours

Advanced Data Access with Spring Data JPA: Spring Data JPA- Introduction to Spring Data JPA, Configuring JPA and connecting to databases, Creating repositories and CRUD operations. Advanced JPA- JPQL and native queries, Pagination and sorting, Relationships (One-to-One Relationships, One-to-Many Relationships, Many-to-Many Relationships).

Securing Spring: Enabling Spring Security, Configuring Spring Security (In-memory user store, JDBC-based user store, LDAP-backed user store, Customizing user, authentication), Securing web requests (Securing requests, Creating a custom login page, Logging out, Preventing cross-site request forgery), Knowing your user.Transaction Management- Understanding and managing transactions.

Textbook 1: Chapter 3:3.1 and 3.2

Textbook 1: Chapter 4:4.1 to 4.4

UNIT – IV	06 Hours

Features of Spring Boot : Spring Boot security, Spring Boot testing , Spring boot actuator , Spring boot microservices, Spring cloud overview.

Developing reactive APIs: Working with Spring WebFlux (Introducing Spring WebFlux, Writing reactive controllers), Defining functional request handlers, Testing reactive controllers (Testing GET requests, Testing POST requests, Testing with a live server), Consuming REST APIs reactively (GETting resources, Sending resources, Deleting resources, Handling errors, Exchanging requests), Securing reactive web APIs (Configuring reactive web security, Configuring a reactive, user details service).

Textbook 1: Chapter 11:11.1 to 11.5

UNIT – V	04 Hours

Persisting data reactively: Understanding Spring Data's reactive story (Spring Data reactive distilled, Converting between reactive and non-reactive types, Developing reactive repositories), Working with reactive Cassandra repositories, Enabling Spring Data Cassandra, Understanding Cassandra data modeling, Mapping domain types for Cassandra persistence, Writing reactive Cassandra repositories, Writing reactive MongoDB repositories (Enabling Spring Data MongoDB, Mapping domain types to documents, Writing reactive MongoDB repository interfaces).

Textbook 1: Chapter 12:12.1 to 12.3

Course Outcome	Description	Bloom's Taxonomy Level
At the end of the course the student will be able to:		
1	**Understand** the activities involved in spring boot and analyze the framework.	L1 & L2
2	**Apply** spring boot application development to develop restfull webservices.	L3
3	**Describe** Data access with spring data JPA and implement transaction management to ensure secure and consistent Spring applications.	L2
4	**Develop**, test, and secure reactive APIs using Spring WebFlux.	L2 & L3
5	**Build** and manage reactive data persistence using Spring Data for Cassandra and MongoDB.	L3

Table: Mapping Levels of COs to POs / PSOs

COs	Program Outcomes (POs)												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3												1	
CO2	3								1	1	1		1	
CO3	3								1	1	1		1	
CO4	3				2				1	1	1		1	
CO5	3		1		2				1	1	1		1	

3: Substantial (High) **2: Moderate (Medium)** **1: Poor (Low)**

TEXT BOOKS:

1. Craig Walls, "Spring in Action", Fifth Edition, Manning, ISBN 9781617294945

REFERENCE BOOKS:

1. Santosh Kumar K., "Spring and Hibernate", Tata McGraw-Hill Publishing,2009,ISBN 978-0070680111
2. Paul Tepper Fisher and Brian D. Murphy, "Spring persistence with Hibernate",Apress,2010, ISBN 978-1-4302-2632-1
3. Amritendu De, "Spring 4 and Hibernate 4: Agile Java Design and Development",McGraw-Hill Education,2015, ISBN: 9780071845113

4. Chris Schaefer, Clarence Ho, and Rob Harrop ,Pro Spring. Apress

E-Resources:

1. https://www.udemy.com/course/spring-5-with-spring-boot-2/
2. https://www.youtube.com/playlist?list=PLYZhppjPNiP8u76RFIpN3oNtSIobuIF0Q

Activity Based Learning (Suggested Activities in Class)

- Setting up a project based on a real-world scenario
- Implementing features learned in previous modules
- Best practices in Spring Boot development

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