GUJARAT TECHNOLOGICAL UNIVERSITY

Syllabus for Master of Computer Applications, 5ᵗʰ Semester
Subject Name: Application Development using SPRING (ADS)
Subject Code: 4659305

1. Learning Objectives:

- To understand the Spring framework.
- To understand Spring container, Modules, Dependency Injection and aspect oriented programming.
- To understand how to design and develop application using Spring.

2. Prerequisites: Basics of JAVA Programming, Exposure to J2EE Technology.

3. Course Contents:

Unit	Course Content	Weightage Percentage
Unit I	**Introduction to Spring:** What is Spring?, Initializing a Spring application (Initializing a Spring project with Spring Tool Suite, Examining the Spring project structure), Writing a Spring application (Handling web requests, Defining the view, Testing the controller, Building and running the application, Getting to know Spring Boot DevTools), The core Spring Framework (Spring Boot, Spring Data, Spring Security, Spring Integration and Spring Batch, Spring Cloud) **Developing Application:** Displaying information(Establishing the domain, Creating a controller class, Designing the view), Processing form submission, Validating form input (Declaring validation rules, Performing validation at form binding, Displaying validation errors), Working with view controllers, Choosing a view template library	10%
Unit II	**Working with Data:** Reading and writing data with JDBC (Adapting the domain for persistence, Working with JdbcTemplate, Defining a schema and preloading data, Inserting data), Persisting data with Spring Data JPA(Adding Spring Data JPA to the project, Annotating the domain as entities, Declaring JPA repositories, Customizing JPA repositories)	15%
Unit III	**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 Fine-tuning autoconfiguration (Understanding Spring's environment abstraction, Configuring a data source, Configuring	15%

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		the embedded server, Configuring logging, Using special property values), Creating your own configuration properties(Defining configuration properties holder , Declaring configuration property metadata), Configuring with profiles(Defining profile-specific properties, Activating profiles, Conditionally creating beans with profiles)	
Unit IV	**Advanced Spring**	Creating REST services:Writing RESTful controllers(Retrieving data from the server,Sending data to the server, Updating data on the server,Deleting data from the server),Enabling hypermedia (Adding hyperlinks,Creating resource assemblers, Naming embedded relationships), Enabling data-backed services (Adjusting resource paths and relation names,Paging and sorting, Adding custom endpoints, Adding custom hyperlinks to Spring Data endpoints) Consuming REST services: Consuming REST endpoints with RestTemplate(GETting resources, PUTting resources, DELETEing resources, POSTing resource data), Navigating REST APIs with Traverson Sending messages with JMS (Setting up JMS, Sending messages with JmsTemplate, Receiving JMS messages), Working with RabbitMQ and AMQP (Adding RabbitMQ to Spring, Sending messages with RabbitTemplate,Receiving message from RabbitMQ), Messaging with Kafka(Setting up Spring for Kafka messaging, Sending messages with KafkaTemplate, Writing Kafka listeners) Declaring a simple integration flow(Defining integration flows with XML,Configuring integration flows in Java, Using Spring Integration's DSL configuration), Surveying the Spring Integration landscape(Message channels, Filters, Transformers, Routers, Splitters, Service activators,Gateways , Channel adapters, Endpoint Modules), Creating an email integration flow	30%
Unit V	**Reactive Spring**	**Understanding reactive programming**: Defining Reactive Streams, Getting started with Reactor(Diagramming reactive flows, Adding Reactor Dependencies), Applying common reactive operations(Creating reactive types, Combining reactive types, Transforming and filtering reactive streams, Performing logic operations on reactive types) **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	30%

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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) **Persisting data reactively**: Understanding Spring Data's reactive story (Spring Data reactive distilled, Converting between reactive and non-reactive types, Developing reactiverepositories), 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)	

4. **Text Book:**

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

5. **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

6. **Chapter wise Coverage from Text Book(s):**

Unit No.	Text Books	Topics/Subtopics
I	Book-1	Chapter : 1,2
II	Book-1	Chapter : 3
III	Book-1	Chapter : 4,5
IV	Book-1	Chapter : 6,7,8,9
V	Book-1	Chapter : 10,11,12

7. **Accomplishments of the student after completing the course:**

- Students will understand Spring framework.
- Student will understand how to design and develop web application using Spring.

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8. Laboratory Exercises

A. General Guidelines
- Group: 2-3 Person.
- The project should be free from plagiarism of any kind.
- It is mandatory that the project should be developed using Spring 3 or later version on Linux or Windows Platform.
- This may not be a live project

B. Expected Outcome

- The objective of the Web Application Development using Spring is to make students aware about the industry based process and workings. As a result, Project must meet with the industry standards.
- There will not be any compulsion to prepare a project report for the students but an application should be demonstrated, so that evaluator may get the detail about the Project developed and can evaluate the students as per the evaluation criteria.

C. Evaluation

Sr. No.	Particulars	Weightage
1	Project	40%
2	Code Changes	40%
3	VIVA	20%