

SAURASHTRA UNIVERSITY

RAJKOT – INDIA



Accredited Grade A by NAAC (CGPA 3.05)

CURRICULAM

FOR

M. Sc. (IT & CA)

(2 Years Full Time: 4 Semester Programme)

MASTER OF SCIENCE

(Information Technology & Computer Application)

(Semester 1 & 2)

Effective From June – 2022

M.Sc. (IT & CA)
Saurashtra University
Effective from June - 2022
Master of Science (Information Technology & Computer Application)
M.Sc. (IT & CA)
(2 years Full Time: 4 Semester Programme)

Ordinance:

O. M.Sc.(IT & CA) – 1: Candidate seeking admission to the Master of Science (Information Technology & Computer Application) must have a Bachelor's degree of minimum three years duration with 48% or more in the discipline

1. **B. C. A. with 48% or more**
OR
2. **B. Sc. with 48% or more**
OR
3. **B. E. with 48% or more**
OR
4. **B. Com. (With optional Computer Science) with 48% or more**
OR
5. **B. Pharm. with 48% or more**
OR
6. **B. Arch. with 48% or more**
OR
7. **Any graduate with 48% or more and P.G.D.A.C.A. with 48% or more**
OR
8. **Any graduate with 48% or more and P.G.D.C.A. with 48% or more**

O. M.Sc.(IT & CA) – 2: The duration of the course is full time two academic years. The examination for the Master of Science (Information Technology & Computer Application) course will be conducted under the semester system. For this purpose the academic year is divided into two semesters. No candidate will be allowed to join any other course simultaneously.

O. M.Sc.(IT & CA) – 3: Candidate who have passed an equivalent examination from any other university or examining body and is seeking admission to the M.Sc. (IT & CA) programme shall not be admitted without producing the eligibility certificate from the Saurashtra University.

O. M.Sc.(IT & CA) – 4: No candidate will be admitted to any semester examination for the Master of Science (Information Technology & Computer Application) unless it is certified by the Head of the Department/ Director of institute.

“That candidate has attended the course of study to the satisfaction of the Head of Department/Director of institute)

O. M.Sc.(IT & CA) – 5: Candidate desirous of appearing at any semester examination of the M.Sc.(IT & CA) programme must forward their application in the prescribed form to the Controller of Examination through Head of Department/Director of Institute on or before the date prescribed.

O. M.Sc.(IT & CA) – 6: No candidate will be permitted to reappear at any semester examination, which he/she has already passed.

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O. M.Sc.(IT & CA) – 7: To pass the whole M.Sc.(IT & CA) examination, candidate must clear all the four semester examinations within a period of five years from the date of his/her registration, otherwise candidate has to register him/her self again as a fresh candidate and keep attendance and appear and pass all the four semester examinations .

O. M.Sc.(IT & CA) – 8: There shall be an examination at the end of each four semesters to be known as First semester examination, Second semester examination respectively, at which a student shall appear in the portion of papers practical and Project viva-voce if any, for which he has kept the semester in accordance with the regulations in this behalf.

A candidate whose term is not granted for whatsoever reason shall be required to keep attendance for that semester of terms when the relevant papers are actually taught at the institute.

O. M.Sc.(IT & CA) – 9: A candidate will be permitted to go to the next semester, irrespective he/she is failing in any number of subjects.

O. M.Sc.(IT & CA) – 10: No candidate will be allowed to reappear in examination of any subject which he/she has already passed.

Regulations:

R. M.Sc.(IT & CA) – 1: The standard of passing the M.Sc.(IT & CA) degree examination will be as follows: (i) To pass any semester examination for the M.Sc.(IT & CA) degree, a candidate must obtain at least 40% marks in each subject of theory, practical and project viva-voce in university examination. (ii) Those of the successful candidates who obtain less than 50% marks in the aggregate of all the semester together will be awarded as Pass Class, who obtain 50% or more marks in the aggregate of all the semesters taken together will be declared as Second Class and who obtained 60% or more marks in the aggregate of all semesters taken together will be declared as First Class. The successful candidates who obtain 70% or more marks in the aggregate of all the semesters taken together will be declared to have passed the examination in First Class with Distinction. (iii) A candidate failing in any number of subjects, and pass all these subjects in subsequent examination, marks of all the subjects will be carry forwarded for the award of class in the final semester.

R. M.Sc.(IT & CA) – 2: Following is the syllabus

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M.Sc. (IT & CA) (Semester – 1)

SR. NO.	SUBJECT	No. of LECT./Lab. PER WEEK	CREDIT
1.	CS – 01 APPLICATION DEVELOPMENT USING ADVANCE JAVA	5	5
2.	CS – 02 ADVANCE WEB DEVELOPMENT IN LARAVEL	5	5
3.	CS – 03 NoSQL DATABASE: MONGODB	5	5
4.	CS – 04 PRACTICAL - 1 (BASED ON CS-01)	5	5
5.	CS – 05 PRACTICAL - 2 (BASED ON CS-02 and CS-03)	5	5
6.	CS – 06 PROJECT DEVELOPMENT (In House)	5	5
Total Credits of Semester – 1			30

Note:

1. Total marks of each **theory paper** are 100 (university examination of 70 marks + internal examination of 30 marks).
2. Total marks of each **practical and project-viva** paper are 100. No internal examination of marks in practical and project-viva papers.

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CS – 01: APPLICATION DEVELOPMENT USING ADVANCE JAVA

Objectives:

- Learn how to download, setup and configure the Spring Framework
- Explore the Spring Container and Modules
- Understand dependency injection
- Learn aspect oriented programming and how it is used to provide cross cutting concerns
- Understand how Spring deals with transaction management and ORM
- Hibernate: Inheritance mapping collection mapping.
- Understand the HQL.

Pre-Requisites: Students must have strong Java programming skills and exposure to J2EE technology.

Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	Basics of Spring, Spring with IDE And IOC container	<ul style="list-style-type: none"> • What is Spring • Spring Modules • Spring Application • Spring in Myeclipse • Spring in Eclipse 	20	12
	Dependency Injection	<ul style="list-style-type: none"> • Constructor Injection • CI Dependent Object • CI with collection • CI with Map • CI Inheriting Bean • Setter Injection • SI Dependent Object • SI with Collection • SI with Map • CI vs SI • Autowiring • Factory Method 		
2	Spring AOP	<ul style="list-style-type: none"> • AOP Terminology • AOP Implementations • Pointcut • Advices 		
	Spring JDBC	<ul style="list-style-type: none"> • JdbcTemplate Example • PreparedStatement • ResultSetExtractor • RowMapper • NamedParameter 		

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		<ul style="list-style-type: none"> • SimpleJdbcTemplate 		
	Spring with ORM And SpEL	<ul style="list-style-type: none"> • Spring with Hibernate • Spring with JPA • SpEL Examples • Operators in SpEL • variable in SpEL 	20	12
	Spring 3 MVC and Remoting with Spring	<ul style="list-style-type: none"> • Spring with RMI • Http Invoker • Hessian • Burlap • Spring with JMS 		
3	OXM Frameworks, Spring Java Mail And Web Integration	<ul style="list-style-type: none"> • Spring with JAXB • Spring with Xstream • Spring with Castor • Spring with Struts2 • Login and Logout Application 		
	Basics of Hibernate And Hibernate with IDE	<ul style="list-style-type: none"> • Hibernate Introduction • Hibernate Architecture • Understanding First Hibernate application • Hibernate in Eclipse • Hibernate in MyEclipse 	20	12
	Hibernate Application And Hibernate Logging	<ul style="list-style-type: none"> • Hibernate with annotation • Hibernate Web application • Hibernate Generator classes • Hibernate Dialects • Hibernate with Log4j 1 • Hibernate with Log4j 2 		
4	Inheritance Mapping	<ul style="list-style-type: none"> • Table Per Hierarchy • Table Per Hierarchy using Annotation • Table Per Concrete • Table Per Concreteusing Annotation • Table Per Subclass • Table Per Subclass using Annotation 	20	12
	Collection Mapping	<ul style="list-style-type: none"> • Mapping List • One-to-many by List using XML • Many to Many by List using XML • One To Many by List using Annotation 		

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		<ul style="list-style-type: none"> • Mapping Bag • One-to-many by Bag • Mapping Set • One-to-many by Set • Mapping Map • Many-to-many by Map • Bidirectional • Lazy Collection 		
5	Component Mapping, Association Mapping, Transaction Management, HQL and HCQL	<ul style="list-style-type: none"> • One-to-one using Primary Key • One-to-one using Foreign Key 	20	12
	Named Query, Hibernate Caching and Integration	<ul style="list-style-type: none"> • First Level Cache • Second Level Cache • Hibernate and Struts • Hibernate and Spring 		
		Total	100	60

References Books

1. Spring and Hibernate - Santosh Kumar K. - Tata McGraw-Hill Publishing
2. Spring persistence with Hibernate - Paul Tepper Fisher and Brian D. Murphy - Apress
3. Spring 4 and Hibernate 4: Agile Java Design and Development McGraw-Hill Education, 2015
4. Pro Spring - Chris Schaefer, Clarence Ho, and Rob Harrop Apress

Course Outcome:

After completion of the course students will be able:

- Able to learn how to download, setup and configure the Spring Framework
- Able to explore the Spring Container and Modules
- Able to understand dependency injection
- Able to learn aspect-oriented programming and how it is used to provide cross cutting concerns
- Able to Understand how Spring deals with transaction management and ORM
- Able to Hibernate: Inheritance mapping collection mapping.
- Able to Understand the HQL.

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CS-02: Advance Web Development in Laravel				
Objectives:				
<ul style="list-style-type: none"> ▪ Understand the Actual Implementation of Object-Oriented Programming with Application. ▪ Executing the functions in desired manner which is often supported by in-built functions of the framework. ▪ Creating database structure is smartly built and do not need to re-create or modify DB settings. ▪ Building ability to produce high-quality and customized applications in quick time. ▪ Implementing authentication by Bcrypt hashing algorithm for generating an encrypted representation of a password. 				
Pre-Requisites: Strong background and Knowledge of HTML, CSS, JavaScript and PHP is mandatory.				
Sr. No	Topic	Details	Weightage in %	Approx. Lectures
1	Object Oriented Programming in PHP and Bootstrap Basics	<ul style="list-style-type: none"> ▪ The Basics of PHP and Introduction ▪ Object Oriented Programming in PHP <ul style="list-style-type: none"> ○ Class, Object, Features, Properties, Methods, Constructors, Destructors, Class Constants, Inheritance, Method Overriding, Abstract Class, Interface ○ Access Specifiers (public/private/protected), Scope Resolution Operator(::), Static Keyword, Final Keyword ○ Predefined Variables, Exceptions, Autoloading Classes, Anonymous Classes ○ Object Iteration, Magic Methods, Magic Constants, Object Cloning, Comparing Objects, Type Hinting, Late Static Bindings, Objects and References • Bootstrap Basics <ul style="list-style-type: none"> ○ Introduction: File Structure, Basic HTML Template, Global Styles, Default Grid System, Basic Grid HTML, Offsetting 	20	12

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		<p>Columns, Nesting Columns, Container Layouts, Responsive Design, What Is Responsive Design?</p> <ul style="list-style-type: none"> ○ Implementation: Tables, Forms, Buttons, Images, Glyphicons, Pagination, Label, Badges, Typographic Elements, Thumbnails, Alerts. 		
2	Introduction to Laravel, Artisan, Route and Controller	<ul style="list-style-type: none"> ● What is Laravel, Features, MVC Architecture ● Installation <ul style="list-style-type: none"> ○ Basic Requirements for Laravel, Use of Composer, Laravel Install Using Composer, Finding and installing new Packages. ● Configuration <ul style="list-style-type: none"> ○ Introduction, Environment Configuration, Protecting Sensitive Configuration, Maintenance Mode, Database Configuration. ● Project Structure <ul style="list-style-type: none"> ○ Root Directory structure, App Directory Structure. ● Artisan Console: Artisan Command Line Tool, Generating Commands, Artisan Migration, Command Structure ● Routing in Laravel : Types of Route files, Route Basics, Route Parameters, Named Routes, Route Groups, Route Model Binding, Rate Limiting, Accessing The Current Route, Routing Controllers, Passing Parameters, Advance Routing ● Controllers : Introduction, Basic Controllers, Using View, Request Parameters, Controller Middleware. 	20	12
3	Blade Template, Form and Validation	<ul style="list-style-type: none"> ● Blade Template : Introduction, Components & Slots, Displaying Data, Control Structures, Including Sub-Views, Stacks, Service Injection, Extending Blade, Blade Operators ● Forms: Creating Forms, Adding Labels, 	20	12

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		<p>Generating Inputs, Generating Buttons, Secret Inputs, CSRF Token, Form Macros</p> <ul style="list-style-type: none"> • Validation : Defining The Routes, Creating The Controller, Writing The Validation Logic, Displaying The Validation Errors, Array Validations, Creating New Validators, Error Messages & Custom Errors • Available Validators : Accepted, After(Date), Alpha, AlphaDash, Alpha Numeric, Array, Before(Date), Between, Boolean, Date, DateFormat, Different, Digits, Digits Between, E-Mail, Exists (Database), Image(File), In, Integer, Max, Min, Not In, Numeric, Regular Expression, Required, String Custom Validation Rules. 		
4	Migrations, SQL Interaction and Query Builder	<ul style="list-style-type: none"> • Migrations: Database Connections, Generating Migrations, Migration Structure, Creating Tables & Columns, Rolling Back Migrations, Column Modifiers, Writing Seeders • SQL Interaction: Introduction, Running Raw SQL Queries, Database Transactions • Query Builder: Retrieving Results, Chunking Results, Aggregates, Selects, Raw Expressions, Joins, Sub-Query Joins, Where Clauses 	20	12
5	Eloquent ORM and API	<ul style="list-style-type: none"> • Eloquent ORM Models: Defining Models, Table Name & Primary Keys, Timestamps, Retrieving Models, Inserting, Updating Models & Deleting Models, Relationships, Collections, Mutators • API Resources: Introduction, Generating Resources, Writing Resources • API Authentication: Passport Tokens 	20	12
Total			100	60

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References Books

1. Online Laravel 5.2 Documentation (<https://laravel.com/docs/5.2>)
2. Laravel 5 Essentials, Martin Bean, Packet Publishing, ISBN 978-1-78528-301-7
3. Bootstrap, Jake Spurlock, O'reilly, ISBN: 978-1-449-34391-0
4. Matula,T,(2013),*Laravel Application Development Cookbook*.Packt Publishing
5. Pecoraro, C. J. (2015),*Mastering Laravel*.Packt Publishing
6. McCool,S(2012), *Laravel Starter*. Packt Publishing.
7. White,L(2015), *Practical Laravel 5: Build a Laravel 5 Application Step by Step*. Apress
8. Bean,M,(2015), *Laravel 5 Essentials*.Packt Publishing.
9. Rees,D(2012), *Laravel: Code Happy*.Packt Publishing
10. HasinH,(2007), *Object-Oriented Programming with PHP5*.Packt Publishing.
11. Malatesta, F,(2015),*Learning Laravel's Eloquent*. Packt Publishing
12. Pecoraro,C. J. (2015),*Mastering Laravel Book*.Packt Publishing

Course Outcome:

After completion of the course students will be able:

- Able to Learn Laravel Framework at an ease and build their application.
- Able to Implement Customize User Interface.
- Able to perform OOP within PHP and Understand the basic components of an object-oriented program.
- Able to Implement security system in web application
- Able to Design ORM Model using Relational Database Management System, Responsive Design
- Able to meet current modern market requirement and create fruitful products
- Able to Simulate the real-world application with all desired aspects for web application

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CS – 03: NoSQL DATABASE: MongoDB				
Objectives:				
<ul style="list-style-type: none"> ▪ To develop proficiency in the specification, representation and various other types in MongoDB using PHP. ▪ To be able to perform various Analytical as well as to increase the programming skills in PHP using MongoDB. ▪ To get a good understanding regarding various styles in Programming. ▪ To develop a good base for No-SQL queries. 				
Pre-Requisites: Knowledge of PHP				
Sr. No	Topics	Details	Weightage in %	Approx Lectures
1	Introduction to NoSQL Database	<ul style="list-style-type: none"> • Define NoSQL, its characteristics and history, and the primary benefits for using NoSQL databases. • Define the major types of NoSQL databases including a primary use case and advantages/disadvantages of each type. • Describe the factors affecting return on investment for using locally hosted database vs. database-as-a-service. 	20	12
	Introduction to MongoDB	<ul style="list-style-type: none"> • MongoDB concepts – Databases, collections, and documents • Downloading Installing and running MongoDB, Installing PHP Driver for MongoDB on various OS Platforms • The Data Model and Working with Data 		
2	Learning MongoDB by implementing web Application	<ul style="list-style-type: none"> • Inserting documents in MongoDB, Querying documents in collection. • Doing advance queries in MongoDB, Updating documents MongoDB, • Deleting documents in MongoDB, Managing relationships between documents 	20	12
	Session Management	<ul style="list-style-type: none"> • Understanding HTTP sessions. • Understanding PHP native session handling, • Implementing session handling with MongoDB. • Putting Session Manager. • Building user authentication module, creating login, logout and user profile. 		
3	Queries &	<ul style="list-style-type: none"> • Querying using find(), sort(), skip(), limit() 		

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	Aggregation Queries	<ul style="list-style-type: none"> • Update, Delete, Aggregation • Generating Sample Data. • Understanding MapReduce, • Performing MapReduce in MongoDB and PHP, Aggregation using group() • Listing distinct values for field • counting documents with count() 	20	12
4	Web Analytics using MongoDB	<ul style="list-style-type: none"> • Logging with MongoDB, • Extracting analytics data with MapReduce • Real-time analytics using MongoDB 	20	12
	Using MongoDB with relational Databases	<ul style="list-style-type: none"> • MongoDB and RDBMS together • Defining the relational model 		
5	Handling Files with GridFS	<ul style="list-style-type: none"> • What is Grid? • Storing files in GridFS • Serving files from GridFS • Reading files in chunks 	20	12
	Database Management	<ul style="list-style-type: none"> • Database Administration • Optimization • Replication • Sharding 		
		Total	100	60

References Books

1. MongoDB the definitive guide - O'Reilly Kristina Chodorow & Michal Dirolf
2. MongoDB in Action - Kyle Banker Manning Sheltar Island.
3. The definitive guide to MongoDB - NoSQL Database for cloud and desktop computing. - Apress - Eelco Plugge, Peter membrey and Tim Hawkins
4. PHP and MongoDB Web Development Beginners guide - Rubayeet Islam - Open Source

Course Outcome:

After completion of the course students will be able:

- Able to explore and define specification, representation and various other types in MongoDB using PHP.
- Able to implement concept of Replication and Sharding in MongoDB practically.
- Able to perform various Analytical as well as to increase the programming skills in PHP using MongoDB.
- Able to get a good understanding regarding various styles in Programming.
- Able to execute No-SQL queries.

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CS – 04: PRACTICAL - 1 (BASED ON CS-01)	
Topics	Marks
APPLICATION DEVELOPMENT USING ADVANCE JAVA	100

CS – 05: PRACTICAL - 2 (BASED ON CS-02 and CS-03)	
Topics	Marks
<ul style="list-style-type: none">• ADVANCE WEB DEVELOPMENT IN Laravel• NoSQL DATABASE: MongoDB	100

Note:

- Practical examination may be arranged before or after theory exam.

CS – 06: PROJECT DEVELOPMENT (In House)	Marks: 100
<p>Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of current semester. <u>(At the time of Project-Viva examination student must show Project Report along with all the Workouts in workbook, implementation of project in SDLC, Documentation, Program codes and project in running mode)</u></p>	

Note :

- Project must be submitted before two week of commencement of theory exam.
- Project viva examination may be arranged before or after theory exam.
- During the project viva examination project must be run.