SARVAJANIK UNIVERSITY
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Faculty of Science

Shree Ramkrishna Institute of Computer Education & Applied Sciences, Surat

B.Sc. Computer Science

SEMESTER- 3

Program Structure	Semester 3						
Course Code	Title	Teaching Hrs. per Week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
	Life Skills/ NSS/ NCC	2		2				
BCS 301	DSC-5 Server Side Programming	4		4		30	70	100
BCS 302	DSC-6 Software Engineering	4		4		30	70	100
BCS 303	SEC-1 Internet Programming & Web Client Technologies	4		4		30	70	100
BCS 304	DSE-3 Electronics for Computer Science	2		2		30	70	100
	Transdisciplinary Open Electives	2		2				
BCS 305	Practical-3		12	6		50	100	150
				24				**650**

	Semester -4						
Course Code	Title	Teaching Hrs. per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
	Life Skills/ NSS/ NCC	2		2				
BCS 401	DSC-7 Fundamentals of Data science with Python	4		4		30	70	100
BCS 402	DSC-8 Computer Networks	4		4		30	70	100
BCS 403	SEC-2 Web Application Development (ASP.Net)	4		4		30	70	100
BCS 404	DSE-4 Data Structure DSE-4 Graph Theory	2		2		30	70	100
	Transdisciplinary Open Electives	2		2				
BCS 405	Practical-4		12	6		50	100	150
				24				**650**

DSC -5: Sever side programming

Course Code	DSC -5
Course Title	Sever Side Programming
Credit	04
Teaching per week	04
Minimum weeks per semester	15 (Including Class work, examination, preparation, holidays etc.)
Purpose of course	The purpose of the course is to make students capable of developing professional applications using latest tools and technologies in PHP.
Course objective	For Students: • To Provide the necessary knowledge to design and develop dynamic, database-driven web applications using PHP • Will learn how to use MYSQL database
Prerequisite	• HTML/XHTML, CSS, JS or equivalent knowledge • Other web programming languages knowledge will be helpful • Knowledge of Database & basic queries is recommended
Course outcome	Students will be able to • Server-side programming using PHP
Course content	**Unit 1 Basic Introduction to PHP** 1.1 Important tools and software requirements (like Web Server, Database, Editors etc.) 1.2 Basic Syntax, PHP variables and constants Types of data in PHP, Expressions, scopes of a variable (local, global) 1.3 PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator. PHP operator Precedence and associativity 1.4 PHP IF Else conditional statements (Nested IF and Else) 1.5. Switch case, while, For and Do While Loop 1.6 Go to , Break ,Continue and exit PHP Functions **Unit 2 Arrays in PHP** 2.1 Introduction to Array, Creating index based and Associative array 2.2 Accessing array Looping with Index based array, with associative array using each() and foreach(). 2.3 Some Useful array functions: implode, explode, count, different sorting functions, array_reverse, array_search, array_push, array_pop, array_keys, key, sizeof. **Unit 3 String Manipulation and Regular Expression in PHP** 3.1 Creating and accessing String 3.2 Searching & Replacing String formatting, joining and splitting String Related Library functions 3.4Use of preg_match(), preg_replace(), preg_split() functions in regular Expression

Unit 4. Handling HTML forms with PHP and Database:

4.1. Web page designing with HTML
- 4.1.1. Basic HTML tags – Formatting, Table, Form
- 4.1.2 HTML - standard and custom attributes, events

4.2 Capturing Form Data GET and POST form methods
- 4.2.1 Dealing with multiple values including array to redirect data on Another page.
- 4.2.2 Image / file upload implementation with php.
- 4.2.3 Dealing with Sessions & Cookies while handling forms (with Database)

4.3 Introduction to MYSQLi and it's datatypes.
- 4.3.1 Creating database, tables, relationships in database.
- 4.3.2 Storing images/files in database.

4.4 Mysqli various supported database engines.

Unit 5 Crud operation using OOP with PHP

5.1 Introduction to database connection functions.

5.2 various queries functions: mysqli_query, mysqli_fetch_arary / row / object, mysqli_num_rows, mysqli_close, mysqli_select_db, mysqli_debug

5.3 Implementing CRUD operations with OOP or Core PHP.

Unit 6 Introduction to Ajax with PHP, Payment Gateway & Website Performance Evaluation

6.1 Use of Ajax, it's pros and cons
- 6.1.1 Basic function of ajax with php
- 6.1.2 Implementation of ajax with php (with database)

6.2 Paypal Standard

6.3 Page Speed and performance related factors

Unit 7 CMS - Wordpress

7.1 WordPress Introduction
- 7.1.1 Installing WordPress on a Dedicated Server
- 7.1.2 Understanding Directory Permissions

7.2 Basics of the WordPress User Interface
- 7.2.1 Understanding the WordPress Dashboard
- 7.2.2 Pages, Tags, Media and Content Administration
- 7.2.3 Core WordPress Settings

7.3 WordPress Plugins
- 7.3.1 Finding and Installing Plugins Quickly and Easily
- 7.3.2 Upgrading WordPress Plugins
- 7.3.3 Recommended WordPress Plugins

Unit 8 Working with WordPress Themes

8.1 Understanding the Structure of WordPress Themes
- 8.1.1 Finding Themes and Choosing the Right One

	8.1.2 Installing and Configuring Themes 8.1.3 Editing and Customizing Themes 8.1. 4 Using Theme Frameworks and Parent-Child Themes 8.1.5 Theme Best Practices 8.2 WordPress Content Management 8.2.1 Understanding Posts Versus Pages 8.2.2 Organizing Posts with Categories 8.2.3 Connecting Posts Together with Tags 8.2.4 Custom Post Types and Custom Taxonomies 8.2.5 Managing Lists of Links
Reference Books:	1 Core PHP Programming; Leon Atkinson; Pearson publishers 2 The Complete Reference PHY; Stever Holzner; McGraw Hill 3 Beginning PHP 5.0 Database; Christopher Scollo, Harish Rawat, Deepak Thomas; Wrox Press 4 PHP – A beginner; Ashok Appu; Wiley 5 PHP 5.0 and MySql Bible; Tim Converse, Joyce Park, Clark Morgan John; Wiley & Sons 6 MySQL Bible; Steve Suehring John; Wiley &Sons 7 PHP Black Book; Peter Moulding – 8 PHP 5 and Mysql; Tim converse, Joyce Park and Clark Morgan; Bible Wiley 9 Beginning PHP 5.3; Matt Doyle; Wrox Publication
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

DSC-6: Software Engineering

Course Code	
Course Title	**Software Engineering**
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of the course is to make students capable of applying the principles and techniques of computer science, engineering, and mathematical analysis to the design, development, testing, and evaluation of the software and the systems that enables to understand software engineering process.
Course Objective	1. To make students understand how to develop software. 2. To make students understand various components of software process model and their working. 3. To make students understand the importance of requirement analysis. 4. To make students understand various approaches of system design.
Pre-requisite	Only those Students who have completed any one of the following courses 1) Application Development 2) Computer Programming
Course Out come	After completion of this course, the student will be capable to develop models and implement predictive analytics on social media platforms
Course Content	**Unit 1 Introduction to Software Engineering** 1.1 Software, Software characteristics, Software Engineering 1.2 Software engineering approach 1.2.1 Introduction to phased development approach 1.2.2 Introduction to effort distribution 1.3 Software process models - Linear sequential / waterfall model, Prototype model, RAD model, Incremental model, Spiral model. 1.4 Agile Development Models 1.5 Software quality Assurance **Unit 2 Software Requirement Analysis** 2.1 Requirement gathering formal & informal techniques 2.1.1 Introduction to FAST , QFD & JAD 2.2 Requirement modeling 2.2.1 Use case model-identifying & refining actors, scenarios and use cases 2.2.2 Classification- Identifying Classes, Object relationships, attributes And Methods. **Unit 3 Requirement Modelling** 3.1 Class Based Methods 3.1.1 Class Notation-Static Structure 3.1.2 Object Diagram 3.1.3 Class Interface Notation - Incorporating Associations,

Association role, qualifier, multiplicity, Association class, Binary and N-ary Associations, aggregation and Composition Associations, Generalization

3.2 Use case Diagrams

3.2.1 Scope, Benefits and Elements

3.2.2 Identifying Actors, Scenarios and Use cases

3.3 Software Requirement Specification

3.4 Case Study - Payroll System, Inventory System

Unit 4 Software Designing

4.1 Introduction to Design - Importance of design, Relationship between analysis & design, Design Principals

4.2 Design Concepts

4.2.1 System level design concepts – Abstraction, Refinement, Modularity, Information hiding, Polymorphism and reusability

4.2.2 Module level design concepts – Coupling, Cohesion

4.3.2 Overview of Designing software architecture

4.3.3 UI / UX Design, Web App Design, Mobile App Design

Unit 5 Design Modelling

5.1 Sequence Diagram - Elements and Guidelines

5.2 Collaboration Diagram - Elements and Guidelines

5.3 Activity Diagram - Elements and Guidelines

5.4 State Chart Diagram - Elements and Guidelines

5.5 Case Study - Payroll System, Inventory System

Unit 6 Software Testing

6.1 Overview of Software Testing

6.2 Testing practices

6.2.1 Overview of testing types - Ad-hoc testing, Gorilla testing, random testing and Systematic testing, Static testing and dynamic Testing, Functional, Non functional and Behavioral Testing, Usability Testing, Configuration Testing and Compatibility Testing

6.3 White box testing - Data and code coverage testing techniques

6.4 Black box testing - Equivalence partitioning, Boundary value

6.5 Levels of testing - Unit, Integration, System and Acceptance testing

6.6 Automation of various testing activities and related test tools – Win runner, JMETER, Test director, IBM Rational, Load runner

Unit 7 Software implementation and Project management

7.1 Project management

7.1.1 Software estimation - COCOMO Model – II

7.1.2 Project scheduling and tracking - Time line charts and project table.

7.1.3 Software team management - CC, CD, DD team structure

7.1.4 Software project maintenance

	Unit 8 DevOps and Advanced Practices 8.1 What is Devops? 8.2 Devops Principle and Practices 8.3 C's of DevOps Lifecycle 8.3.1 Continuous Planning 8.3.2 Continuous Development 8.3.3 Continuous Integration 8.3.4 Continuous Deployment 8.3.5 Continuous Testing 8.4 Overview of DevOps Tools

Text and Reference Literature	1. Software Engineering: A Practitioner's Approach 4e/5e, Roger S. Pressmann McGrawHill Publication. 2. Integrated Approach to Software Engineering Pankaj Jalote Narosa Publication. 3 Workbook on System Analysis and Design 1e/2e, Garg, Srinivasan, PHI. 4 Software Engineering K. K. Aggrawal, Yogesh Singh New Age International Publishers. 5 Fundamentals of Software Engineering Carlo Ghezzi, Mehdi Jazayeri, Dino, Mendrilo PHI. 6 Software Engineering Ian Summwerville Addison Wesley-Pearson Education. 7 Software Engineering K. L. James PHI. 8 System Analysis and Design Elias M. Awad Galgotia Publication. 9 System Analysis and Design in a changing world John W. Stazinger, Robert B.Jacobson, Stephen D Burd, Thomson Learning. 10. Effective DevOps: Building a Culture of Collaboration, Affinity, and Tooling at Scale, Jennifer Davis, Katherine Daniels and O'relly
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

SEC-1: Internet Programming & Web Client Technologies

Course Code	
Course Title	**SEC-1 Internet Programming & Web Client Technologies**
Credit	4
Teaching per Week	4 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The course gives students an idea about how to use Java in developing web application and to make students capable of developing effective and interactive web client part of web applications.
Course Objective	• To develop programming ability of students to create dynamic web applications using server-side technology with Java Database Connectivity. • To provide fundamental knowledge of Web page design with javascript, jquery and Bootstrap
Pre-requisite	Basic Understanding of HTTP, HTML, Programming in Core Java, OOPS concept.
Course Out come	After completion of this subject, student will be able to • Gain the knowledge of J2EE architecture • Gain the knowledge of Server-Side programing by implementing Servlet and JSP. • The student will be capable of designing effective and interactive web applications using javascript, jquery and Bootstrap • Design and develop various applications by integrating any of Servlets, JSPs by analyzing requirements and evaluating existing system. (Analysis, Synthesis, Evaluation)
Course Description	Advanced Java is everything that goes beyond Core Java – most importantly the APIs defined in Java Enterprise Edition includes Servlet programming, JDBC connectivity, JSP, etc. It is a Web application development platform for designing effective and interactive web applications.
Course Content	**Unit 1 JavaScript** 1.1 Structure of JavaScript 1.2 Data Types and Variables in JavaScript 1.3 Operators: Arithmetic Operator, Assignment Operator, Comparison Operator, Logical Operator, Conditional Operator in JavaScript 1.4 Control Structure: If…Else, While, Do…While, For and Functions in JavaScript 1.5 Handling events in JavaScript-Windows event, Event object

	1.6 Basic concept of ECMAScript **Unit 2 Type Script** 2.1 Type Script Components 2.2 Type Script Types, 2.3 Control and Looping Statements **Unit 3 Fundamentals of JQuery** 3.1 Introduction to JQuery, features 3.2 JQuery Structure 3.3 JQuery Attributes, Traversing, DOM methods, Events 3.4 JQuery Utilities 3.5 JQuery with CSS 3.6 Overview of JQuery UI widgets **Unit 4 Introduction to Design Framework** 4.1 Bootstrap Basics, Need, Advantages and Disadvantages 4.2 Bootstrap Grid System Structure 4.3 Bootstrap Basic Classes – Tables, Forms, Buttons, Images, Helper classes, Responsive Utilities, Bootstrap Layout Components-Dropdowns, Button Groups, Dropdown Button Pagination, Alerts 4.4 Overview of Bootstrap design framework **Unit 5 Fundamentals of J2EE** 5.1 Java Platform, 5.2 J2EE Architecture Types, 5.3 Explore Java EE Containers, 5.4 Types of Servers in J2EE Application **Unit 6 JDBC Programming** 6.1 JDBC Architecture 6.2 Types of JDBC Drivers, 6.3 Introduction to major JDBC class and Interface, Creating simple JDBC Application, 6.4 Types of Statement (Statement Interface, PreparedStatement, CallableStatement) 6.5 Exploring ResultSet Operation 6.6 Creating CRUD Application **Unit 7 Servlet** 7.1 Servlet Introduction, 7.2 Servlet Life Cycle, 7.3 Working with ServletContext and ServletConfig Object, 7.4 Response and Redirection using Request Dispatcher and using sendRedirect Method, HTTPSession

	Unit 8 Java Server Pages 8.1 Introduction to JSP 8.2 Comparison with Servlet 8.3 JSP Architecture 8.4 JSP Life Cycle 8.5 JSP Scripting Elements, JSP Directives, JSP Action, JSP Implicit Objects, JSP Session Management, 8.6 JSP CRUD application.
Reference Books	1. HTML5 Black Book: Covers CSS3, Javascript, XML, XHTML, Ajax, PHP and Jquery, Dreamtech Press 2. WEB TECHNOLOGIES: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML AND AJAX, BLACK BOOK: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book, Dreamtech Press 3. HTML5 and CSS3 made Simple, Ivan Byross, BPB 4. Pro HTML5 and CSS3 Design Patterns, Dionysios Synodinos, Michael Bowers and Victor Sumner, Pearson 5. HTML5 in easy steps, Mike McGrath, McGrawHill 6. Programming in HTML5 with JavaSript and CSS3 Training Guide, Johnson G, PHI 7. JavaScript in easy Steps, Mike McGrath, McGrawHill. 8. jQuery, jQuery UI and jQuery Mobile, Adriaan de Jonge, Pearson 9. Jquery and Jquery UI, Jay Balchand, Pearson 10. Jquery in Action, Dreamtech Press 11. Jumpstart Bootstrap, Syed Fazle Rahman , SPD 12. Extending Bootstrap, Christoffer Niska, Packt Publishing 13. Learning Web Development with React and Bootstrap by Harmeet Singh 14. Black Book “Java server programming” J2EE, 1st ed., Dream Tech Publishers, 2008. 3.Kathy walrath” 15. Complete Reference J2EE by James Keogh mcgraw publication 16. Professional Java Server Programming by Subrahmanyam Allamaraju, Cedric BuestWiley Publication 17. Core Java, Volume II: Advanced Features by Cay Horstmann and Gary CornellPearson Publication 18. Java Persistence with Hibernate by Christian Bauer, Gavin King 19. JDBC™ API Tutorial and Reference, Third Edition, Maydene Fisher, Jon Ellis, JonathanBruce, Addison Wesley 20. Beginning JSP, JSF andTomcat, Giulio Zambon, Apress Web Links:https://react-bootstrap.github.io/
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

DSE-3 Electronics for Computer Science

Course code	DSE-3
Course Title	Electronics for Computer Science
Credits	2
Teaching Per Week	2 Hrs
Course Objective	This course provides an idea of Electronics- its meaning and its domain in today's technology. It provides the electronic component types detail understanding of semiconductor devices. It also provides the algorithm of digital word and basics of optical fiber communication.
Course Out come	Students will develop the skill to deal with active and passive components and their biasing mechanism. Students will understand the working of different semiconductor devices and get the importance of their uses in daily life. Students will understand the basics of sensors, storage devices and electromechanical systems.
Course Content	**Unit: 1: Introduction to Electronics and solid state Physics :** 1.1. Fundamental electronic component: Active and Passive. Series and parallel connections of resistors and capacitors, 1.2. Structure of solids- Bonding in solids, Energy bands, Conductors, semiconductors and Insulators. 1.3. Semiconductors- semiconductor materials, intrinsic semiconductors, extrinsic semiconductors. **Unit: 2: Semiconductor diodes:** 2.1. P-N Junction diode: Forward and Reverse biasing mechanism, characteristics. 2.2. Zener diode: Working principal, breakdown mechanism and characteristics. **Unit: 3: Optoelectronic Devices:** 3.1. Introduction: wavelength and frequency, spectral response of Human eye. 3.2. Working mechanism of Light Emitting Diode, photo diodes, liquid crystal display (LCD), Solar cell. **Unit: 4: DC power supplies:** 4.1. Introduction: Unregulated Power supply, Regulated Power supply. Block diagram of Regulated Power supply, Rectifies (Half wave, Full wave and bridge) 4.2. Filters (series inductor, shunt capacitor, L-type and ¶- type),

	Use of Zener diode as voltage regulator, Block diagram and explanation of SMPS and UPS. **Unit: 5: Bipolar Junction Transistor:** 5.1. Bipolar Junction Transistor (BJT) Symbol, Types, construction of BJT. Transistor biasing rule, Transistor currents, 5.2. Circuit configurations (CB, CE, CC concept only), relation between α and β. **Unit: 6: Digital Electronics:** 6.1. Introduction to decimal, binary, octal and hexadecimal number system and their interconversion. 6.2. Logic gates (AND, OR, NAND, NOR, NOT, XOR) with their symbol, Boolean equation and truth table. 6.3. Universal gates. **Unit:7: Some useful devices and systems:** 7.1.Sensors, Detectors and Transducers(Types and applications), Data storage devices, 7.2.Electromechanical and Micro electromechanical systems(MEMS), 7.3.Analog and Digital communication systems (introduction and differences). **Unit: 8: Fiber Optics:** 8.1. Introduction, 8.2. Structure of optical fiber, Classification of optical fibers, Optical fiber cables, 8.3. Advantages and Disadvantages, 8.4. Application of fiber optic communication.
Reference Book	1. Basic Electronics - B.L. Theraja, S.Chand & Co.,New Delhi, Multicolour Edition-2010 2. Principles of Electronics – V.K.Mehta, S.Chand & Co. 3. Electricity and Magnetism – R. Murugeshan, S.Chand & Co. 4. Physics, Vol. II- Resnick, Halliday & Krane,fifth edition, John Willey & Sons, Inc,. 5. Digital Electronics – Jain R.P., Tata MCgraw Hill.
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination

Course Code	
Course Title	**Practical-3**
Credit	10
Teaching per Week	12 Hours
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	---
Purpose of Course	The purpose of course is to make students aware with practical implementation of concept learnt in theory subjects.
Course Objective	To provide Fundamental knowledge of practical implementation based on DSC5, DSC4 and SEC -1
Pre-requisite	---
Course Out come	Student should be able to demonstrate skills mentioned in DSC5, DSC6 and SEC-1 practically.
Course Content	As per theory subject content of relative subject
Reference Book	
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	70% Internal assessment is based on class attendance, participation, class test, quiz, assignment, seminar, internal examination etc. 30% assessment is based on semester end written examination