SAURASHTRA UNIVERSITY
RAJKOT- INDIA

**Bachelor of Science (Information Technology)
B.Sc. (I.T.)**

Syllabus of Semester - V & Semester - VI

(Effective from: June – 2021)

SAURASHTRA UNIVERISTY
BECHELOR OF SCIENCE (INFORMATION TECHNOLOGY)
B.Sc. (I.T.)
Syllabus of Semester – V and Semester – VI
Effective from June – 2021

B. Sc.(IT) Semester - V

SR.NO	SUBJECT	NO. OF THEORY PER WEEK	NO. OF PRACTICALS PER WEEK
1	CS-25 PROGRAMMING WITH ASP.NET	5	-
2	CS-26 ADVANCED JAVA PROGRAMMING	5	-
3	CS-27 SEARCH ENGINE TECHNIQUES AND DIGITAL TECHNOLOGY TRENDS	5	-
4	CS-28 PRACTICALS (BASED ON CS- 26)	-	6
5	CS-29 PRACTICALS (BASED ON CS-25 and cs-27)		6
6	CS-30 PROJECT DEVELOPMENT	-	6

Note:
1. Credit of each subject is 5. Total credit of semester is 36.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical and project-viva paper are 100. No internal examination marks in practical and project-viva papers.

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Course Outcomes				
1. Understand the ASP.NET framework and different controls.				
2. Understand form validation, apply form validation control also understand state management.				
3. Understand ADO.Net architecture and developing application with LINQ.				
4. Understand and apply concept of XML and web services.				
5. Understand web configuration with AJAX and web services.				
CS – 25 Programming with ASP.Net				
No	**Topics**	**Details**	**Weigh tage in %**	**Min Lec**
1.	**Framework & Web Contents**	Overview of ASP.NET framework, Understanding ASP.NET Controls, Applications Web servers, installation of IIS. Web forms, web form controls server controls, client controls, web forms & HTML, Adding controls to a web form ,Buttons, Text Box , Labels, Checkbox, Radio Buttons, List Box, etc. Running a web Application, creating a multiform web project.	20	12
2.	**Validation & State Management**	Form Validation Client side validation, server Side validation Validation Control Required Field Comparison Range. Calendar control, Ad rotator Control, Internet Explorer Control. State management View state, Session state, Application state	20	12
3.	**ADO.Net Database & LINQ**	Architecture of ADO.NET Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, DataAdapter Class, Dataset Class. Display data on data bound Controls and Data Grid. Database Accessing on web applications	20	12

		Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls. Language Integrated Query(LINQ)		
4.	**Using XML**	Writing datasets to XML, Reading datasets with XML. Web services Introduction, Remote method call using XML, SOAP, web service description language, building & consuming a web service, Web Application deployment.	**20**	**12**
5.	**Web Application and Configuration**	Overview Asp.net Configuration, Common Configuration , Tracing, Custom Error, Authentication & Authorization, AJAX Web Services	**20**	**12**
			100	**60**

Student Seminar   : 05 Lectures
Expert Talk   : 05 Lectures
Student Test   : 05 Lectures
Total   : 75 Lectures

References
(1) Asp.Net – Unleashed
(2) Asp.Net – Wrox Publication
(3) Pro ASP.NET Core MVC 2 Book by Adam Freeman
(4) Introduction to ASP.NET Web Programming Using the Razor Syntax (C#) by Tom FitzMacken

Course Outcomes				
1. Understand and implements RMI and JDBC applications.				
2. Understand and apply the concept of servlet for developments.				
3. Understand different listeners and interface which used for servlet programming.				
4. Understand and apply the concept of jsp program for developments.				
5. Understand and apply concept of MVC and tag Libraries.				
CS-26 : ADVANCED JAVA PROGRAMMING				
NO	**TOPIC**	**DETAILS**	**Weightage in %**	**APPROX. LECT.**
1	**Distributed Computing using RMI, Database Programming with JDBC**	• Introduction to RMI • RMI Architecture • Stubs and Skeleton	5	3
		• Introduction and Need for JDBC • Database Drivers • JDBC APIs for database Connectivity (Java.sql Package) • Connection • Statement • Prepared statement • Callable statement • Result set • Other JDBC APIs • Database Meta Data • Result Set Meta Data	15	9
2	**Servlet Programming**	• Servlet Basics, Basic Servlet structure, Servlets Generating text/html content, Packaging Servlets, The servlet life-cycle. • Handling Client Request Form Data, Reading Form Data from Servlets, Handling Client Request, Reading Request Headers, Understanding HTTP/1.1 Request Headers, Changing the page according to how the user got there, Accessing the Standard CGI Variables. • Generating the Server Response, HTTP Status Codes, Specifying Status Codes, HTTP / 1.1 Status	20	12

		Codes, Using Redirections, HTTP Response Headers, Setting Response Headers from Servlets, Understanding HTTP / 1.1 Response Headers, Using Servlets to Generate JPEG Images. • Handling Cookies, Remembering Usernames and Passwords, Deleting Cookies, Sending and Receiving Cookies, Using Cookie Attributes, Differentiating Session Cookies from Persistent Cookies, Using Cookies to Remember User Preferences, Session Tracking, Need for Session Tracking, Session Tracking API, Encoding URLs Sent to the Client, Accumulating a List of User Data		
3	**Listeners and Filters**	• Listeners and Filters Using ServletContextListener, • HttpSessionListener, Understanding of all the other Listeners viz. • ServletRequestListener, ServletContextAttributeListener, ServletRequestAttributeListener, HttpSessionAttributeListener • Using Filters for pre and post processing of request.	20	12
4	**JSP Programming**	JSP Basic Syntax, HTML Text, HTML comments, Template Text, JSP Comment, JSPExpression, JSP Scriptlet, JSP Declaration, JSP Directives, JSP Action, JSP Expression Language Element, Custom Tag (Custom Action), Escaped Template Text, Using JSP Scripting 08 Elements, Using Predefined Variables, XML syntax for Expressions, Scriptlets, Declarations and Directives, Using Scriptlets, Using Declarations, Using Page Directive, Using Standard Actions Tags – , , , Using JavaBeans in JSP pages – , , , Sharing Beans, Use of Scopes and their Attributes	20	12
5	**MVC, Tag**	• Integrating Servlets and JSP in a	20	12

Library	Web Application (MVC Architecture for Web Applications), Implementing MVC with Request Dispatcher, Understanding Data Sharing Between Servlets and JSP, JSP Expression Language, Accessing Scoped Variables, Bean Properties, Collections and Implicit Objects Using EL, Using EL Operators • Tag Library– Basics; Using JSTL – c:out, c:forEach, c:forTokens, c:if, c:choose, c:set, c:remove, c:import, c:url, c:param, c:redirect and c:catch Tags		
	Total	**100**	**60**

Student Seminar   : 05 Lectures
Expert Talk   : 05 Lectures
Student Test   : 05 Lectures
Total   : 75 Lectures
References Books
1. Complete reference J2EE
2. Professional Java Server Programming J2EE 1.3 Edition Apress Publication
3. Beginning Java J2EE 5 from Novice to Professional   Apress Publication

Course Outcomes
1. Understand basic of search engines and reflecting
2. Understand SEO objectives and defining site audience.
3. Apply and Implement SEO friendly website with all SEO concept.
4. Understand keyword research and apply it for website developments.
5. Understand the new trends of digital technologies.

CS-27 Search Engine Techniques and Digital Technology Trends

Sr. No	Topic	Detail	Weightage In %	Approx. Lectures
1	**The Search Engines: Reflecting Consciousness and Connecting Commerce Search Engine Basics**	• The Mission of Search Engines • The Market Share of Search Engines • The Human Goals of Searching • Determining Searcher Intent: A Challenge for Both Marketers and Search Engines • How People Search? • How Search Engines Drive Commerce on the Web? • Eye Tracking: How Users Scan Results Pages? • Click Tracking: How Users Click on Results? Natural Versus Paid • Understanding Search Engine Results • Algorithm-Based Ranking Systems: Crawling, Indexing, and Ranking • Determining Searcher Intent and Delivering Relevant • Fresh Content • Analyzing Ranking Factors • Using Advanced Search Techniques • Vertical Search Engines • Country-Specific Search Engines	20	12

| 2 | **Determining SEO Objectives and Defining Site's Audience First Stages of SEO** | • Setting SEO Goals and Objectives
• Developing an SEO Plan Prior to Site Development
• Understanding Audience and Finding Niche
• SEO for Raw Traffic
• SEO for E-Commerce Sales
• SEO for Mindshare/Branding
• SEO for Lead Generation and Direct Marketing
• SEO for Reputation Management
• SEO for Ideological Influence
• The Major Elements of Planning
• Identifying the Site Development Process and Players
• Defining Site's Information Architecture
• Auditing an Existing Site to Identify SEO Problems
• Identifying Current Server Statistics Software and Gaining Access
• Determining Top Competitors
• Assessing Historical Progress
• Benchmarking Current Indexing Status
• Benchmarking Current Rankings
• Benchmarking Current Traffic Sources and Volume
• Leveraging Business Assets for SEO
• Combining Business Assets and Historical Data to Conduct SEO/Website SWOT Analysis | 20 | 12 |

3	**Developing an SEO-Friendly Website**	• Making Site Accessible to Search Engines • Creating an Optimal Information Architecture • Root Domains, Subdomains, and Microsites • Optimization of Domain Names/URLs • Keyword Targeting • Content Optimization • Duplicate Content Issues Controlling Content with Cookies and Session IDs • Content Delivery and Search Spider Control • Redirects, Content Management System (CMS) Issues • Optimizing Flash • Best Practices for Multilanguage/Country Targeting	**20**	**12**
4	**Keyword Research, Optimizing for Vertical Search**	• The Theory Behind Keyword Research • Traditional Approaches: Domain Expertise • Site Content Analysis • Keyword Research Tools • Determining Keyword Value/Potential ROI, Leveraging the Long Tail of Keyword Demand, Trending, Seasonality, and Seasonal Fluctuations in Keyword Demand • The Opportunities in Vertical Search • Optimizing for Local Search • Optimizing for Image Search • Optimizing for Product Search • Optimizing for News, Blog, and Feed Search • Others: Mobile, Video/Multimedia Search	**20**	**12**

5	Digital Technology Trends	• Digital Business o Introduction to digital business, o difference between digital business and ecommerce, o digital business opportunities, o Risk and barriers to digital business adoption • Block Chain Technology o Tracing blockchain origin, o Blockchain feature, o How BlockChain Work? • Virtual Reality, Augmented Reality(AR): o Introduction to Virtual Reality (VR), o Needs of VR o Introduction and brief history of AR o Difference between AR and VR o opportunities for augmented reality	20	12
		Total	**100**	**60**

Student Seminar : 05 Lectures
Expert Talk   : 05 Lectures
Student Test   : 05 Lectures
Total   : 75 Lectures

Reference book :
(1) The Art of SEO : Mastering Search Engine Optimization By Eric Enge, Stephan Spencer, Rand Fishkin, Jessie C Stricchiola, O'Reilly Media, 3rd Edition October, 2015
(2) Google SEO Bible, Beginner's Guide to SEO, ISBN-978-1700098733, moaml mohmmed, 2019
(3) SEO: Search Engine Optimization Bible, By Jerri L. Ledford, 2nd Edition, Wiley India, April, 2009
(4) SEO Warrior: Essential Techniques for Increasing Web Visibility By John I Jerkovic, O'Reilly Media, November, 2009

References:
(5) http://www.gartner.com/technology/research/digital-business/
(6) https://blockchain.info/
(7) Virtual Reality, Steven M. LaValle,University of Illinoise, Cammbridge University Press. http://vr.cs.uiuc.edu/
(8) Augmented Reality: Ebok http://libro.eb20.net/Reader/rdr.aspx?b=1073012 Greg Kipper, Joseph Rampolia, Elsevier Science

CS-28: Practical and Viva Based on CS – 26	
Topics	Marks
CS – 26	100

CS-29: Practical and Viva Based on CS – 25 and CS-27	
Topics	Marks
CS – 25 and CS - 27	100

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

CS-30: Project Viva   Total Marks: 100
Project must be developed **in** the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of previous semester or current semester. **(At the time of Project-Viva examination student must show all the Workouts, SDLC, Documentation, Program codes and project in running mode)**

Note:
- Project must be submitted before two weeks 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.

B. Sc. (IT) Semester - VI

SR.NO	SUBJECT	NO. OF THEORY PER WEEK	NO. OF PRACTICALS PER WEEK
1	CS-31 Mobile Application Development in Android using Kotlin	5	-
2	CS-32 Data Warehousing with SQL Server 2012	5	-
3	CS-33 Internet of Things (IOT)	5	-
4	CS-34 PRACTICALS (BASED ON CS-31	-	6
5	CS-35 PRACTICALS (BASED ON CS-32 and CS-33)	-	6
6	CS – 36 Project Development	-	6

Note:
1. Credit of each subject is 5. Total credit of semester is 36.
2. Total marks of each theory paper are 100 (university examination 70 marks + internal examination 30 marks).
3. Total marks of each practical and project-viva paper are 100. No internal examination marks in practical and project-viva papers.

Course Outcomes
1. Understand basic of kotlin programming.
2. Understand the basic of android and android application design.
3. Understand the different user interface elements and develop application with those widgets.
4. Understand, apply and develop application with SQLite and Content Providers.
5. Understand, apply and develop application with Location based services, notification services.

CS-31 Mobile Application Development in Android using Kotlin

Sr. No	Topic	Detail	Weight age In %	Approx. Lectures
1	**Introduction to Kotlin Programming**	• Basics of Kotlin, Operations and Priorities, • Decision Making • Loop Control, Data Structures(Collections), • Functions • Object Oriented Programming: Inheritance abstract, interface, super and this, visibility modifiers.	20	12
2	**Introduction to Android & Android Application Design**	• The Open Handset Alliance • The Android Platform, Android SDK • Building a sample Android application • Anatomy of an Android applications • Android terminologies • Application Context, Activities, Services, Intents • Receiving and Broadcasting Intents • Android Manifest File and its common settings • Using Intent Filter, Permissions • Managing Application resources in a hierarchy Working with different types of resources	20	12

3	**Android User Interface Design**	• User Interface Screen elements
		   o Button, EditText, TextView, DatePicker, TimePicker, ProgressBar, ListView, GridView, RadioGroup, ImageButton, Fragement
		 • Designing User Interfaces with Layouts
		   o Relative Layout, Linear Layout, Table Layout etc
		 • Dialogs
		 • Drawing and Working with Animation
		   o Frame By Frame Animation
		 • Twined Animation
			20	12

4	Database Connectivity Using SQLite and Content Provider	• Using Android Data and Storage APIs • Managing data using SQLite • Sharing Data Between Applications with Content Providers	20	12
5	Location Based Services (LBS), Common Android API, Notifications, Services, Deployment of applications	• Using Global Positioning Services (GPS) • Geocoding Locations • Mapping Locations • Many more with location based services • Android networking API • Android web API • Android telephony API • Notifying the user, Notifying with the status bar • Vibrating the phone • Blinking the lights • Customizing the notifications Services • Application development using JSON in MySQL • Publish android application	20	12
		TOTAL	**100**	**60**

Student Seminar : 05 Lectures
Expert Talk : 05 Lectures
Student Test : 05 Lectures
Total : 75 Lectures

Notes: Android application must be developed using ANDROID STUDIO.

Reference Books:
(1) Learn Android Studio 3 with Kotlin – Teg Hagos – Apress – 2019
(2) Headfirst Kotlin, A Brain Friendly Guide – Dawn Griffiths, David Griffiths – Orilly – 2019
(3) Professional Android 2 Application Development Reto Meier, Wiley India Pvt Ltd (2011)
(4) Beginning Android Mark L Murphy, Wiley India Pvt Ltd
(5) Android Developer Fundamental Course – Practical Book – 2018

Course Outcomes
1. Understand basic of data warehousing.
2. Understand and apply the concept of data warehousing designing and implements.
3. Understand and creating ETL Solutions with SSIS, Implementing Control Flow in SSIS
4. Understand and apply Enforcing Data Quality, Extending SQL Server Integration Services concept.
5. Understand and deploying and Configuring SSIS Packages, Consuming Data in Data Warehouse

CS –32 Data Warehousing with SQL Server 2012

No.	Topic	Detail	Weightage in %	Min. Lect.
1	Introduction to Data Warehousing	- What Is a Data Warehouse? - Data Warehousing Today - Future Trends in Data Warehousing. - Data Warehouse Architecture - Data Flow Architecture	20	12
2	Designing and Implementation of Data Warehousing	- Logical Design for data warehouse - Physical Design for data warehouse - Design dimension table, fact table for data warehouse - Design and implement effective physical data structure for data warehouse	20	12
3	Creating ETL Solutions with SSIS, Implementing Control Flow in SSIS	- Introduction to ETL with SSIS - Exploring data sources - Implementing data flow using SSIS - Introduction to Control Flow - Creating Dynamic Packages - Using Containers	20	12

4	Enforcing Data Quality, Extending SQL Server Integration Services	• Introduction to Data Quality • Using Data Quality Service to Cleanse data • Using Data Quality Service to match data • Using Scripts in SSIS • Using Custom components in SSIS	20	12
5	Deploying and Configuring SSIS Packages, Consuming Data in Data Warehouse	• Overview of SSIS Development • Deploying SSIS Projects • Planning SSIS Package Execution • Introduction to Business Intelligence • Introduction to Reporting • Introduction to Data Analysis	20	12
			100	**60**

Student Seminar   : 05 Lectures
Expert Talk   : 05 Lectures
Student Test   : 05 Lectures
Total   : 75 Lectures

Notes: For Lab Practice : Microsoft SQL Server 2012 or Higher version

Reference Books:
(1) Implementing a Data Warehouse with Microsoft® SQL Server® 2012 Dejan Sarka Matija Lah Grega Jerkič
(2) Building a Data Warehouse: With Examples in SQL Server – Vincent Rainardi-Apress (2014)
(3) Data mining Explained A manager's guide to customer centric business intelligence by
(4) Data mining by Pieter Adriaans, Dolf Zantinge
(5) Data warehousing in the real world A practical guide for business DSS by Sam Anahory,

Course Outcomes				
1. Understand basic of IoT.				
2. Understand the reference architecture of IoT.				
3. Understand data link layer and network layer protocols.				
4. Understand transport and session layer protocols.				
5. Understand service layer protocols and security concept.				
CS- 33 INTERNET OF THINGS (IOT)				
No	Topics	Details	Weight age in %	Min Lec
1.	**IOT AN OVERVIEW**	Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management	20	12
2	**REFERENCE ARCHITECTURE**	IoT Architecture-State of the Art – Introduction, State of the art, Reference Model and architecture, IoT reference Model - IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.	20	12
3	**IOT DATA LINK LAYER & NETWORK LAYER PROTOCOLS**	PHY/MAC Layer(3GPP MTC, IEEE 802.11, IEEE 802.15), Wireless HART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 - Network Layer-IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP	20	12
4	**TRANSPORT & SESSION LAYER PROTOCOLS**	Transport Layer (TCP, MPTCP, UDP, DCCP, SCTP)-(TLS, DTLS) – Session Layer-HTTP, CoAP, XMPP, AMQP, MQTT	20	12

5	**SERVICE LAYER PROTOCOLS & SECURITY**	Service Layer -oneM2M, ETSI M2M, OMA, BBF – Security in IoT Protocols – MAC 802.15.4 , 6LoWPAN, RPL, Application Layer	20	12
			100	**60**

Student Seminar : 05 Lectures
Expert Talk : 05 Lectures
Student Test : 05 Lectures
Total : 75 Lectures

References
1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
2. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
3. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1 st Edition, VPT, 2014.
4. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer.
5. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013
6. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
7. http://www.cse.wustl.edu/~jain/cse570-15/ftp/iot_prot/index.html

CS-34: Practical and Viva Based on CS – 31	
Topics	Marks
CS – 31	100

CS-35: Practical and Viva Based on CS – 32 and CS-33	
Topics	Marks
CS – 32 and CS – 33	100

Note:

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

CS-36: Project Viva   **Total Marks: 100**
Project must be developed in the computer laboratory of concern institute under the supervision of faculties of concern institute on any subject of semester-V or semester-VI. **(At the time of Project-Viva examination student must show all the Workouts, SDLC, Documentation, Program codes and project in running mode)**

Note:

- Project must be submitted before two weeks 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.