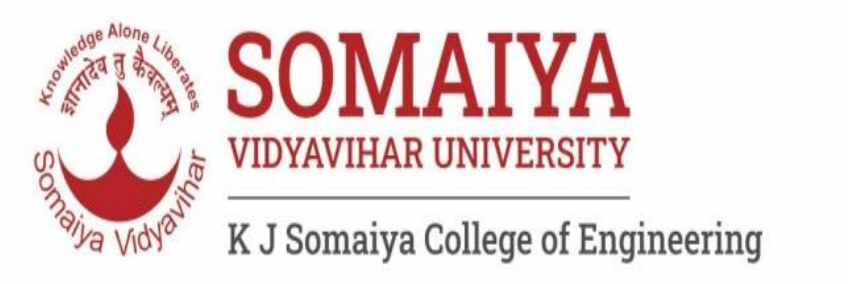

Syllabus

Minor Programme in

Information Technology

Offered by Department of Information Technology

From

Academic Year 2024-25

SVU-KJSCE 2.0

(Approved by BOS dated 25-Apr-24)

Introduction:

Information Technology (IT) is an integral part of almost every medium to large scale industries regardless of the business domain. IT plays an important role in the automation/management of several major business processes such as HR management, finance, and accounting, supply chain management, manufacturing, customer relationship management, and marketing.

The primary motivation behind IT is to give the "right data to the right individuals at the righttime". The knowledge about the IT delivered in this program, will assist with learning the development of IT applications just as it will be helpful for the individuals who will be engaged with the administration exercises to comprehend the overall process.

Objectives:

- This program aims to cover all the essential technical skills such as databases and its advances, mobile and web application development, and application deployment on the cloud that plays a vital role in the development of the above-mentioned business processes.
- This program delivers knowledge about the best practices and optimization techniques required for IT application development such as Competitive Programming.
- This program gives due importance to fundamental concepts which are the basic building blocks of IT such as operating systems, network technologies, and algorithms.
- This program also consists of mini projects based on each of the technical skills to ensure implementation proficiency.
- The knowledge about the IT delivered in this program, will help to learn the development of IT applications as well as will be useful for those who will be involved in the management activities to understand the overall process.

Learning Outcomes:

At the successful completion of this minor program an engineering graduates will be able to

LO1: Recognize the basic building blocks of IT such as operating systems, network technologies, and algorithms.

LO2: Implement all the essential technical skills such as databases, mobile and web applications and application deployment on the cloud.

LO3: Demonstrate the best practices and optimization techniques required for IT application development.

Eligibility Criteria:

Student who has earned all credits of First Year of Engineering in Electronics Engineering / Electronics and Telecommunication Engineering / Mechanical Engineering / Robotics and Artificial Intelligence

Assessment Methods: Tests, Mini projects, Laboratory, Presentation/ Video making, Quiz, study of research papers etc.

Somaiya Vidyavihar University
K. J. Somaiya College of Engineering, Mumbai-77
(A Constituent College of Somaiya Vidyavihar University)
Department of Information Technology

Credit Scheme

Course Code	Course Name	Teaching Scheme (Hrs.) TH – P – TUT	Total (Hrs.)	Credits Assigned TH – P – TUT	Total Credits	Semester of Major Degree
216M11C301	Building Blocks of Information Technology	3 –0– 0	03	3 – 0 – 0	03	III
216M11C401	Algorithms and Competitive Programming	3 – 0 – 0	03	3 – 0 – 0	03	IV
216M11L401	Algorithms and Competitive Programming Laboratory	0 – 2 – 0	02	0– 1 – 0	01	IV
216M11C501	Database Management Systems	3 – 0 – 0	03	3 – 0 – 0	03	V
216M11L501	Database Management Systems Laboratory	0 – 2 – 0	02	0 – 1 – 0	01	V
216M11C601	Web and Mobile Application Development	3 – 0 – 0	03	3 – 0 – 0	03	VI
216M11L601	Web and Mobile Application Development	0 – 2 – 0	02	0 – 1 – 0	01	VI
216M11C701	Application Deployment on Cloud	03 – 0 – 0	03	03 – 0 – 0	03	VII
Total		**15--06-- 0**	**21**	**15 – 3 – 0**	**18**	

Examination Scheme

Course Code	Course Name	Examination Scheme				
		Marks				
		CA		ESE	LAB/TUT CA	Total
		ISE	IA			
216M11C301	Building Blocks of Information Technology	30	20	50	--	100
216M11C401	Algorithms and Competitive Programming	30	20	50	--	100
216M11L401	Algorithms and Competitive Programming Laboratory	-	-	-	50	50
216M11C501	Database Management Systems	30	20	50	--	100
216M11L501	Database Management Systems Laboratory	-	-	-	50	50
216M11C601	Web and Mobile Application Development	30	20	50	--	100
216M11L601	Web and Mobile Application Development	-	-	-	50	50
216M11C701	Application Deployment on Cloud	30	20	50	--	100
Total		**150**	**100**	**250**	**150**	**650**

Course Code	Course Title				
216M11C301	Building Blocks of Information Technology				
	TH		P	TUT	Total
Teaching Scheme(Hrs.)	03		-	-	03
Credits Assigned	03		-	-	03
Examination Scheme	Marks				
	CA		ESE	LAB/TUT CA	Total
	ISE	IA			
	30	20	50	--	100

Course Prerequisites: Basic knowledge of computers

Course Objectives:

The main objective of the course is to impart knowledge about the basic building blocks of information technology. The course highlights the functions of the operating system, computer network, and analysis of algorithms that will be useful in the field of information technology.

Course Outcomes:

At the end of successful completion of the course, the student will be able to

CO1: Apply basic searching and sorting algorithms.
CO2: Comprehend the use of computer networks.
CO3: Understand the functions of the operating system.
CO4: Realize the fundamental concepts/processes involved in Software Engineering.

Module No	Unit No	Details	Hrs.	CO
1	**Introduction to basic algorithms and Complexities**		**08**	**CO1**
	1.1	History and Motivation behind the analysis of algorithms, A Scientific Approach to handling algorithms		
	1.2	Example Algorithms: Selection sort, Quick sort, Linear search, Binary search, and their complexities.		
	1.3	• Applications of sorting and searching algorithms		
2	**Computer Networks**		**12**	**CO2**
	2.1	Introduction to Data Communications, Networks, The Internet, Protocols and Standards, Uses of Computer Networks, Network configuration		
	2.2	Network Models: Layered tasks, OSI Model, Layers in the OSI Model, TCP/IP Protocol Suite		
	2.3	Introduction to LAN, WAN configuration, IP addressing, subnetting, Introduction to wireless networks, Introduction to client server architecture, types of architectures, Introduction to Wireless LAN, Introduction to cellular network, Evolution of cellular networks, Introduction to CDMA and GSM		
3	**Basics of Operating Systems**		**10**	**CO3**
	3.1	Introduction to OS, Interaction of OS and I/O devices, Goals of OS, Basic functions of OS, Structures of OS: Monolithic, Layered, Virtualization-Virtual Machines, Microkernels		
	3.2	OS Services, System Calls, Types of system calls, Types of OS like Batch, Multiprogramming, Time sharing, Parallel, Distributed and Real-time OS.		
	3.3	Introduction to Process and Threads, Memory management: Page Replacement Algorithms, Scheduling algorithms: SJF, FCFS, Round robin		
4	**Introduction to Software Engineering**		**08**	**CO4**
	4.1	Introduction to Software Engineering		
	4.2	Software Development Process and its phases, Software Development Process Models: Waterfall, Sequential, Incremental, Evolutionary.		
	4.3	Introduction to Software Requirement Specification and Software Architecture		
5	**Introduction to UML Concepts and Software Testing**		**07**	**CO4**
	5.1	Introduction to UML diagrams- Use case, sequence and class diagram		
	5.2	Introduction to software testing, Types of testing: System, Functional and Structural Testing, Unit, Integration, White-box and Black-box testing, Test case and test case writing.		

Total	**45**	

Recommended Books:

Sr. No.	Name/s of Author/s	Title of Book	Name of Publisher with Country	Edition and Year of Publication
1.	William Stallings	*Data and Computer Communications*	Pearson education	13 September 2013
2.	Silberschatz, Galvin, and Gagne	*Operating System Concepts*	Wiley and Sons	8th Edition
3.	Behrouz A Forouzan	*Computer Networks*	McGraw-Hill	4th Edition
4.	Thomas Cormen	*Introduction to Algorithms*	MIT Press	3rd Edition
5.	Richard Taylor, Nenad Medvidovic, Eric Dashofy	*Software Architecture - Foundations, Theory and Practice*	Wiley- India	Jan 2009

- The Instructor needs to provide additional resources to students for in-depth understandingand practical applicability of the indicated topic/topics.

Course Code	Course Title				
216M11C401	Algorithms and Competitive Programming				
	TH		P	TUT	Total
Teaching Scheme(Hrs.)	03		--	--	3
Credits Assigned	03		--	--	3
Examination Scheme	Marks				
	CA		ESE	LAB/TUT CA	Total
	ISE	IA			
	30	20	50	--	100

Course prerequisites:

- Knowledge about any programming language

Course Objectives:

The major objective of the course is to develop the programmer with the comprehensive capabilities required for the efficient software development. It covers best practices required for the quick development of the most frequently used operations and algorithms from different application domains.

Course Outcomes

At the end of successful completion of the course the student will be able to

CO1: Understand the fundamentals of competitive programming

CO2: Analyze the time and space complexity of solution and optimize the solution

CO3: Apply appropriate problem solving technique to optimize the solution

CO4: Demonstrate use of appropriate data structure such as stack, queue, linked list, set, hashtable, graph and tree to optimize the solution

Module No.	Unit No.	Details	Hrs.	CO
1	**Overview of Competitive Programming**		**04**	**CO1**
	1.1	Overview of programming contests, competitive programming platforms, problems and their specifics given on competitive programming platforms such as input format, output format, constraints, sample test cases, time limit and memory limit, Benefits of competitive programming, Input/output for competitive programming platforms		
	1.2	Testing, sample tests, min/max tests, test case based evaluation on competitive programming platforms		
2	**Complexity Analysis and Optimization of Solution**		**10**	**CO2**
	2.1	Performance analysis of solution, Worst Cases, Big-O notation, time complexity and space complexity, optimizing solutions		
	2.2	Brute force approach and its optimization		
	2.3	String Representation-Character Codes, String Handling, String Manipulation and its optimization, String Searching – Naïve approach, Knutt Morris Pratt Algorithm		
3	**Optimization using Data Structures**		**10**	**CO4**
	3.1	Abstract Data Type, Array, Dynamic Array, Stack, Queue		
	3.2	Single Linklist, Double Linklist, Set, HashTable		
	3.3	Optimization of solution using appropriate data structures		
4	**Problem Solving Techniques and Optimization**		**12**	**CO3**
	4.1	Greedy Technique – coin problem, knapsack problem, Huffman coding		
	4.2	Dynamic Programming Technique- knapsack problem, longest increasing subsequence		
	4.3	Recursion, Backtracking – N Queens problem, k-partition problem, subsets of set		
	4.4	Optimization of solution using appropriate problem solving technique		
5	• **Graphs and Trees**		**09**	**CO4**
	5.1	Introduction to Graph Theory – Graph Representation, Depth First Search, Breadth First Search		
	5.2	Weighted Graphs – single source shortest path –Dijkstra, all pairs shortest path – Floyd-Warshall		
	5.3	Introduction to trees, types of trees, Binary Tree-Representation, traversal, Binary Search Tree, Optimized Binary Search Tree		
		Total	**45**	

Recommended Books:

Sr. No.	Name/s of Author/s	Title of Book	Name of Publisher with country	Edition and Year of Publication
1.	Antti Laaksonen	*Guide to Competitive*	Springer	2018
2.	Steven S. Skiena Miguel A. Revilla	*Programming challenges The Programming Contest Training Manual*	Springer	2006
3.	Antti Laaksonen	*Competitive Programmer's Handbook*	--	Hand book, 2018
4.	Steven Halim and Felix Halim	*Competitive Programming 3: The Lower Bounds of Programming Contests*	--	Handbook for ACM ICPC And IOI CONTESTANTS 2013
5.	Gayle Laakmann McDowell	*Cracking the Coding Interview*	CareerCup, LLC	2015

- The Instructor needs to provide additional resources to students for in-depth understanding and practical applicability of the indicated topic/topics.

<table>
<tr><th>Course Code</th><th colspan="5">Course Title</th></tr>
<tr><td>216M11L401</td><td colspan="5">Algorithms and Competitive Programming Laboratory</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td>Total</td></tr>
<tr><td>Teaching Scheme(Hrs.)</td><td colspan="2">--</td><td>02</td><td>--</td><td>02</td></tr>
<tr><td>Credits Assigned</td><td colspan="2">--</td><td>01</td><td>--</td><td>01</td></tr>
<tr><td rowspan="3">Examination Scheme</td><td colspan="5">Marks</td></tr>
<tr><td colspan="2">CA</td><td rowspan="2">ESE</td><td rowspan="2">LAB/TUT CA</td><td rowspan="2">Total</td></tr>
<tr><td>ISE</td><td>IA</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>50</td><td>50</td></tr>
</table>

LAB/TUT CA will consist of Experiments performed, written record of experiments, Quiz(s), assignment(s) etc., based on laboratory work and the entire theory syllabus of “Algorithms and Competitive Programming”.

<table>
<tr><th>Course Code</th><th colspan="5">Course Title</th></tr>
<tr><td>216M11C501</td><td colspan="5">Database Management Systems</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td>Total</td></tr>
<tr><td>Teaching Scheme(Hrs.)</td><td colspan="2">03</td><td>-</td><td>-</td><td>03</td></tr>
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<tr><td colspan="2">CA</td><td rowspan="2">ESE</td><td rowspan="2">LAB/TUT CA</td><td rowspan="2">Total</td></tr>
<tr><td>ISE</td><td>IA</td></tr>
<tr><td>30</td><td>20</td><td>50</td><td>--</td><td>100</td></tr>
</table>

Course Prerequisites: Nil

Course Objectives:

This course is imparting knowledge of the database management system and its use in enterprise business. It enables students to perform entity-relationship modeling and relational database design. The course will further cover Structured Query Language (SQL) for interacting with the database management system. Along with it, students are also introduced to the concept of transaction and query processing. It also introduces students to advanced databases and helps them to select appropriate models depending upon the application requirement.

Course Outcomes:

At the end of successful completion of the course, the student will be able to

CO1: Realize the features of Relational database management systems.
CO2: Apply data models to real-world scenarios.
CO3: Use SQL to interact with database management systems.
CO4: Apply fundamental concepts of data integrity and security.
CO5: Apply normalization and integration on RDBMS to develop an application

Module No.	Unit No.	Details	Hrs.	CO
1	**Database Concepts and Systems**		**8**	**CO1**
	1.1	Introduction- Purpose of Database Systems, Three Level Architecture of DBMS, Data independence, Data Models		
	1.2	Database languages, Database Users and Administrator, Advantages and Disadvantages of Database Management System		
2	**Database Models and Relational Algebra**		**10**	**CO2**
	2.1	Database design phases, E-R Model- Constraints, E-R Diagrams, E-R design issues, Weak Entity Set, Extended E-R features		
	2.2	Relational Model- Relational model concepts, Constraints**,** Mapping of EER model to the relational model		
	2.3	**Relational Algebra-** Unary, Binary, and Set theory relational operations		
3	**Structured Query Language(SQL)**		**10**	**CO3**
	3.1	Creating and altering tables in SQL: Data definition commands, defining attribute and constraints		
	3.2	Data manipulation commands in SQL: Insert, Update, Joining relations		
	3.3	Querying relational database: simple queries, nested sub-queries, complex queries, and creating views in SQL.		
4	**Integrity and Security**		**08**	**CO4**
	4.1	Ensuring Data Accuracy and Consistency in RDBMS using different constraints on data: domain, key, referential integrity, null, not null, check		
	4.2	Security Measures and Access Control in RDBMS using Security and Authorization in SQL, Data control commands in SQL grant and revoke, roles.		
5	**Relational Database Design and Development**		**09**	**CO5**
	5.1	Introduction to different normal forms: 1NF, 2NF, 3NF and BCNF		
	5.2	Decomposition using Functional Dependencies		
	5.3	Case Studies: Database design and integration in Engineering Systems		
		Total	**45**	

Recommended Books:

Sr. No.	Name/s of Author/s	Title of Book	Name of Publisher with country	Edition and Year of Publication
1.	Elmasri and Navathe	*Fundamentals of Database Systems*	Pearson Education	7th Edition 2015
2.	Korth, Slberchatz, Sudarshan	*Database System Concepts*	McGraw – Hil	6th Edition 2010
3.	Raghu Ramakrishnan and Johannes Gehrke	*Database Management Systems*	McGraw Hill	3rd Edition 2002
4.	McCreary, D., and Kelly	*Making sense of NoSQL*	Manning Press	2014
5.	Richard Stones, Neil Matthew	*Beginning Databases with PostgreSQL: From Novice to Professional*	Apress	2nd Edition 2005

- The instructor needs to provide additional resources to students for in-depth understandingand practical applicability of the indicated topic/topics.

<table>
<tr><th>Course Code</th><th colspan="6">Course Title</th></tr>
<tr><td>216M11L501</td><td colspan="6">Database Management Systems Laboratory</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td colspan="2">Total</td></tr>
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<tr><td>Credits Assigned</td><td colspan="2">--</td><td>01</td><td>--</td><td colspan="2">01</td></tr>
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<tr><td colspan="2">CA</td><td rowspan="2">ESE</td><td rowspan="2">LAB/TUT CA</td><td rowspan="2">Total</td></tr>
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</table>

LAB/TUT CA will consist of Experiments performed, written record of experiments, Oral, Onscreen Test, Quiz(s), Presentation(s), assignment(s) etc., based on laboratory work and entire theory syllabus of “Database Management Systems”.

<table>
<tr><th>Course Code</th><th colspan="5">Course Title</th></tr>
<tr><td>216M11C601</td><td colspan="5">Web and Mobile Application Development</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td>Total</td></tr>
<tr><td>Teaching Scheme(Hrs.)</td><td colspan="2">03</td><td>-</td><td>-</td><td>03</td></tr>
<tr><td>Credits Assigned</td><td colspan="2">03</td><td>-</td><td>-</td><td>03</td></tr>
<tr><td rowspan="3">Examination Scheme</td><td colspan="5">Marks</td></tr>
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<tr><td>ISE</td><td>IA</td></tr>
<tr><td>30</td><td>20</td><td>50</td><td>--</td><td>100</td></tr>
</table>

Course Prerequisites: Nil

Course Objectives:

The objective of this project-driven course is to understand the necessary technologies for developing client/server applications. Along with web page creation, the course will introduce the concept of grid layout and responsive web pages. Students will be familiarizing with the Document Object Model to learn how browsers represent web pages. Server-side programming will be covered along with database connectivity. The course provides details of Native (Android Programming) and Hybrid Mobile Application development.

Course Outcomes:

At the end of successful completion of the course, the student will be able to

CO1: Create client-side web pages
CO2: Develop server-side web pages
CO3: Understand the handling of web applications API
CO4: Implement native and hybrid mobile applications

Module No.	Unit No.	Details	Hrs.	CO
1	**Introduction to web technologies**		**08**	**CO1**
	1.1	**Introduction:** Web system architecture- 1,2,3 and n tier architecture, URL, domain name system, overview of HTTP , Web Site Design Issues and Introduction to role ofSEO (Search Engine Optimization) on web page development. **#Self-learning topic:Basics of WWW and protocols**		
	1.2	**UI Design with HTML 5 and CSS3**: Basics of HTML – Hyperlinks, Images, Lists, Tables. HTML5 New Element, Forms, Audio and Video, HTML5 Canvas, SVG in HTML5, Google Map, Geolocation, Web Storage, Web Worker, Application cache. Basic CSS: The need for CSS, Basic syntax and structure using CSS, Positioning using CSS, Apply styles to Box Model, Class, and ID, Working with CSS3 **#Self-learning topic: Creation of a flexible content layout.**		
2	**Working with JavaScript**		**16**	**CO2**
	2.1	Introduction to JavaScript: Variables, Types, operators, conditions, functions, JavaScript Object, Array, Regular Expression, Event handling, The DOM and the Web browser Environment, DOM manipulation.		
	2.2	Introduction to JavaScript framework – AngularJS – Overview, Life Cycle, Environmental Setup, Features, Single page web application with AngularJS, Introduction to Angular 9.0, App Module, Routing, components, Services, dependency Ingestion.		
	2.3	Introduction to AJAX, Data handling with JSON – Data types, Objects, Arrays, JSON Parse. Dynamic Form in AJAX		
3	**Server-side programming**		**07**	**CO1**
	3.1	Introduction to server-side programming, PHP variables, data types, functions, arrays, conditional constructs, looping constructs, PHP form handling.		
	3.2	Database operations using PHP : Querying Database in MySQL, using prepared statements, Retrieving Query results, disconnecting from database.		
4	**Introduction to Web and Mobile Development Framework**		**08**	**CO3**
	4.1	Introduction to framework, App Module, Routing, Components, Services, dependency Ingestion. React JS 2.3,React – Jquery (HTML),Services,Modules.		
	4.2	Introduction to Hybrid Application Framework React Native, Ionic, Flutter		
5	**Development of Mobile Application**		**06**	**CO4**
	5.1	History and Version, Architecture and Applications, Android Studio Overview and Installation, The Main Activity file, Manifest file, intent and its types, Strings file, R file, The Layout file, Running the Application.		
	5.2	Android Layout Types, UI Widgets, and Menus, Bluetooth		

	5.3	Event listeners and Event Handling		
	5.4	Introduction to android database SQLite.		
		Total	**45**	

Recommended Books:

Sr. No.	Name/s of Author/s	Title of Book	Name of Publisher with country	Edition and Year of Publication
1.	Kogent Learning Solutions Inc.,	*HTML 5 Black Book: Covers CSS3, Javascript, XML, XHTML, AJAX, PHP and jQuery*	DreamTech Press, India	2001
2.	Jonathan Simon;;2012	*Head First Android Development*	O'Reilly publication	6th Edition, 2018
3.	Flanagan, David	*JavaScript: the definitive guide*	O'Reilly Media, Inc	6th Edition, 2006
4.	Kogent Learning Solutions Inc.,	*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, India	2013
5.	Luke Welling, Laura Thomson	*PHP and MySQL Web Development*	Addison-Wesley Professional	5th Edition 2016

- The instructor needs to provide additional resources to students for in-depth understandingand practical applicability of the indicated topic/topics

<table>
<tr><th>Course Code</th><th colspan="5">Course Title</th></tr>
<tr><td>216M11L601</td><td colspan="5">Web and Mobile Application Development Laboratory</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td>Total</td></tr>
<tr><td>Teaching Scheme(Hrs.)</td><td colspan="2">--</td><td>02</td><td>--</td><td>02</td></tr>
<tr><td>Credits Assigned</td><td colspan="2">--</td><td>01</td><td>--</td><td>01</td></tr>
<tr><td rowspan="3">Examination Scheme</td><td colspan="5">Marks</td></tr>
<tr><td colspan="2">CA</td><td rowspan="2">ESE</td><td rowspan="2">LAB/TUT CA</td><td rowspan="2">Total</td></tr>
<tr><td>ISE</td><td>IA</td></tr>
<tr><td>--</td><td>--</td><td>--</td><td>--</td><td>--</td><td>50</td></tr>
</table>

LAB/TUT CA will consist of Experiments performed, written record of experiments, Oral, Onscreen Test, Quiz(s), Presentation(s), assignment(s) etc., based on laboratory work and entire theory syllabus of “Web and Mobile Application Development”

<table>
<tr><th>Course Code</th><th colspan="5">Course Title</th></tr>
<tr><td>216M11C701</td><td colspan="5">Application Deployment on Cloud</td></tr>
<tr><td></td><td colspan="2">TH</td><td>P</td><td>TUT</td><td>Total</td></tr>
<tr><td>Teaching Scheme(Hrs.)</td><td colspan="2">03</td><td>-</td><td>-</td><td>03</td></tr>
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<tr><td>ISE</td><td>IA</td></tr>
<tr><td>30</td><td>20</td><td>50</td><td>--</td><td>100</td></tr>
</table>

Course Prerequisites: Building blocks of Information Technology, Web and Mobile Development.

Course Objectives:

The objective of course is to make students understand Cloud Computing Models, Virtualization, SLA's, configuring Application Servers and how to host web applications on Cloud.

Course Outcomes:

At the end of successful completion of the course, the student will be able to

CO1: Comprehend Cloud Computing, Cloud Models, Virtualization and SLA.
CO2: Manifesting Application Server
CO3: Demonstrate the Application Deployment on Cloud

Module No.	Unit No.	Details	Hrs.	CO
1	**Introduction to Cloud Computing and Virtualization**		**14**	**CO1**
	1.1	Trends in Computing: Distributed computing Vs Centralized computing, Cloud Computing Definition, characteristics, advantages and disadvantages of cloud		
	1.2	Service Models in Cloud: SaaS, PaaS, Iaas , Deployment models in cloud: Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud		
	1.3	Virtualization concepts, virtual machines, types and advantages of virtualization, Hypervisors		
	1.4	Service Level Agreements (SLA): Concept of SLA, contents of SLA, web service Vs Cloud SLA, types of SLA, SLA Parameters, KPIs		
2	● **Server Configuration**		**08**	**CO2**
	2.1	Roles of Server, Types of Server- Web server, Application server, Database Server, Proxy server with examples		
	2.2	Creating Virtual Machine, Setting up web server on virtual machine, Running the Web Server, Putting Up Your Web Pages		
3	● **Cloud Cluster**		**07**	**CO3**
	3.1	A Simple Two-Tier Architecture, Replicating a Node, Setting Up Private Network, Setting Up a Web Server		
	3.2	Setting Up the Load Balancer, Measuring Scalability, Improving Scalability with Caching		
4	**Database Connectivity with cloud**		**08**	**CO3**
	4.1	Database cloud services, Creating database on Cloud, Integrating database with application and web hosting		
	4.2	Database Replication, Types of Database Replication, Replicating the Database, Setting Up the Application to Utilize Master/Replica Replication		
5	● **Web Application Hosting**		**08**	**CO3**
	5.1	Introduction to Content Delivery Network(CDN), Setting Up a Simple CDN, Using CDN, Caching with CDN		
	5.2	Cloud storage services, Deploying web application on storage services		
	5.3	Web Hosting Services, Using cloud web hosting services		
		Total	**45**	

Recommended Books:

Sr. No.	Name/s of Author/s	Title of Book	Name of Publisher with Country	Edition and Year of Publication
1.	Jonathan Bartlett	*Building Scalable PHP Web Applications Using the Cloud*	Apress	First Edition, 2019
2.	Kailash Jayaswal, Jagannath Kallakurchi, Donald J. Houde, Dr. Deven Shah	*KLSI Cloud computing Black Book*	Kogent Learning Solutions, Dreamtech Publication	Second Edition,2014
3.	Rajkumar Buyya, James Broberg, Andrzej M. Goscinski	*Cloud Computing: Principles and Paradigms*	Wiley,India	First Edition, 2011
4.	Barrie Sosinsky	*Cloud Computing Bible*	Wiley-India	First Edition, 2010
5.	Gautam Shroff	*Enterprise Cloud Computing - Technology, Architecture, Applications*	Cambridge University Press	First Edition, 2010

- The Instructor needs to provide additional resources to students for in-depth understandingand practical applicability of the indicated topic/topics.