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VEER NARMAD SOUTH GUJARAT UNIVERSITY

University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.

વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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ક્રમાંક : એસ/પરિપત્ર/સિલેબસ/૧૪૪૮૩/૨૦૨૩
તા.૧૪/૦૬/૨૦૨૩

પ્રતિ,
વડાશ્રી,
જે.પી.દાવર ઈન્સ્ટીટ્યૂટ ઓફ ઈન્ફોર્મેશન
સાયન્સ એન્ડ ટેકનોલોજી,
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી,
સુરત.

વિષય :- બી.એસ.સી. (આઈ.ટી.) સેમે. -૫ અને ૬ ના (Curriculum & Framework) અને અભ્યાસક્રમ બાબત.

મહાશય,

સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર એમ.એસ.સી. (આઈ.ટી.) પાંચ વર્ષીય ઈન્ટીગ્રેટેડ અભ્યાસક્રમનાં બી.એસ.સી. (આઈ.ટી.) સેમેસ્ટર -૫ અને ૬ નો પેટાસમિતિ ધ્વારા તૈયાર કરવામાં આવેલ પ્રવર્તમાન અભ્યાસક્રમ બાબતે ઈન્ફોર્મેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૭/૦૩/૨૦૨૩ ની સભાનાં ઠરાવ ક્રમાંક : ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૬ અન્વયે કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૧૭ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

ઈન્ફોર્મેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૭/૦૩/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૨ ::

આથી ઠરાવવામાં આવે છે કે, જૂન-૨૦૨૩ થી અમલમાં આવનાર એમ.એસ.સી. (આઈ.ટી.) પાંચ વર્ષીય ઈન્ટીગ્રેટેડ અભ્યાસક્રમનાં બી.એસ.સી. (આઈ.ટી.) સેમેસ્ટર -૫ અને ૬ નો પેટાસમિતિ ધ્વારા તૈયાર કરવામાં આવેલ પ્રવર્તમાન અભ્યાસક્રમ મંજૂર કરી તે મંજૂર કરવા કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

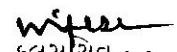
કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૬

:: આથી ઠરાવવામાં આવે છે કે, ઈન્ફોર્મેશન ટેકનોલોજી વિષયની અભ્યાસ સમિતિની તા.૨૭/૦૩/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૨ અન્વયે કરેલ ભલામણ સ્વીકારી શૈક્ષણિક વર્ષ ૨૦૨૩-૨૪ થી અમલમાં આવનાર એમ.એસ.સી. (આઈ.ટી.) પાંચ વર્ષીય ઈન્ટીગ્રેટેડ અભ્યાસક્રમનાં બી.એસ.સી. (આઈ.ટી.) સેમેસ્ટર -૫ અને ૬ નો અભ્યાસક્રમ (Curriculum) અને Frameworkનો યથાવત સ્વીકારી કરી એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૦૭/૦૬/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૧૭

:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ એન્ડ આઈ.ટી. વિદ્યાશાખાની તા.૨૭/૦૫/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંક : ૬ અન્વયે કરેલ ભલામણ સ્વીકારી મંજૂર કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ


કુલસચિવવજી

પ્રતિ,

- ૧) અધ્યક્ષશ્રી, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખા.
- ૨) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

...તરફ જાણ તેમજ અમલ સારૂ.

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अंडेउमलक अडसलव ल. 07/06/2023
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Master of Science (Information Technology)

Name of Program	Master of Science (Information Technology)
Abbreviation	M.Sc. (I.T.)
Duration	5 Years Integrated Course B.Sc.(I. T.) – 3 years – Semester 1 to 6 M.Sc.(I. T.) – 2 years – Semester 7 to 10
Eligibility Criteria	5 Years (Integrated): H S C / Equivalent Examination from Science Stream (A / B / AB Group) or Vocational Stream or General Stream (Commerce) with English as one of the subject.
Objective of Program	The objective of the program is to transform students into professionals by indoctrinating advanced technical knowledge, enhancing technical skills, communication skills and provide outstanding placement in reputed I.T. companies.
Program Outcome	<p>PO1 : Fundamental Knowledge Enrichment Program trains students with the core computer science and Information Technology (IT) knowledge domains. It also makes students capable of using core concepts in the conceptualization of domain specific application development.</p> <p>PO2 : Critical Thinking Development The program develops the skills of critical thinking, problem solving, evaluative learning of various techniques, and understanding the essence of the problem.</p> <p>PO3 : Advanced Emerging Technology Awareness The program trains students with the latest technologies that are being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and makes them ready to face challenging demands of the industry.</p> <p>PO4 : Advanced Tools Usage The program teaches the students to apply advanced tools to solve real world problems.</p> <p>PO5 : Nurturing Project Planning and Management Capabilities The program trains students for designing and conceptualizing the software architecture, planning and managing the product development process of complex and live software projects. It also makes students understand the decision making for selection of appropriate project management capabilities.</p> <p>PO6 : Real World Problem / Project Development Real world projects provide the candidates exposure to work in the challenging and demanding environment of the industry. The project development training makes students employable and industry ready.</p> <p>PO7 : Teamwork and Leadership Development Trains students to work in a team and also to take leadership of the project management team.</p>
Program Specific Outcomes	<p>PSO1 : Students will learn to develop and strengthen the fundamental concepts that are required to solve complex programming problems.</p> <p>PSO2 : Students will develop the ability to identify, formulate and design solutions to face computational challenges.</p>

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		<p>PSO3 : Students will be able to apply software engineering concepts to solve real world problems.</p> <p>PSO4 : Students will be able to learn emerging technologies and apply them for the development of Web applications, Mobile application, Desktop application, etc.</p> <p>PSO5: Students will develop necessary Entrepreneur and Technical skills to start their own business in I.T domain.</p>						
Mapping between POs and PSOs								
			PSO1	PSO2	PSO3	PSO4	PSO5	
		PO1						
		PO2						
		PO3						
		PO4						
		PO5						
		PO6						
Medium of Instruction		English						
Last Review / Revision		June 2023						
Program Structure		B.Sc. (I.T.) – Semester 5 (M.Sc. (I.T.) 5 years Integrated Course)						
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
501	Web Development-II	4	0	4	3 Hrs	70	30	100
502	Relational Database Management System-II	4	0	4	3 Hrs	70	30	100
503	Mobile Application Development	4	0	4	3 Hrs	70	30	100
504	System Analysis and Design	4	0	4	3 Hrs	70	30	100
505	Financial Accounting and Taxation	4	0	4	3 Hrs	70	30	100
506	Practical 10	0	4	2	2 Hrs	70	30	100
507	Practical 11	0	4	2	2 Hrs	70	30	100
508	Practical 12	0	2	1	2 Hrs	70	30	100
Total		20	10	25	-	560	240	800
Program Structure		B.Sc. (I.T.) – Semester 6 (M.Sc. (I.T.) 5 years Integrated Course)						
Course Code	Title	Teaching per week		Course Credits	University Examination		Internal Marks	Total Marks
		Theory	Practical		Duration	Marks		
601	Java	4	0	4	3 Hrs	70	30	100
602	ASP .NET Core MVC using C#	4	0	4	3 Hrs	70	30	100
603	Operating System	4	0	4	3 Hrs	70	30	100
604	Fundamentals of Cloud Computing	4	0	4	3 Hrs	70	30	100
605	Practical 13	0	6	3	2 Hrs	70	30	100
606	Practical 14	0	4	2	2 Hrs	70	30	100
607	Project	0	4	4	-	140	60	200
Total		16	14	25	-	560	240	800

B.Sc. (I.T.) 5th Semester

Course : 501 : Web Development – II

Course Code	501					
Course Title	Web Development – II					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)					
Last Review / Revision	June 2023					
Purpose of Course	This course provides practical approach for web application development using open source web technologies PHP, MySQL, Apache and frameworks.					
Course Objective	To make student understand significance of open source technology, MVC architecture, and develop web applications using open source language and framework.					
Pre-requisite	Object Oriented Fundamentals, Web Technology Fundamentals					
Course Out come	CO1 : Students will be able to learn about Open Source Technology. CO2 : Students will be able to design and develop dynamic , database driven web applications using PHP. CO3 : Students will be able to learn about MVC architecture and Web Application Frameworks.					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Course Content	<p>Unit : 1 : Open Source Web Technology and PHP Language Basics</p> <ol style="list-style-type: none"> 1.1 PHP Language Characteristics, Features and Extensions 1.2 Language Constructs, Variables, Declarations and Types, Constants 1.3 Use of Operators and Control Structures 1.4 Arrays, Functions and References 1.5 PHP Configuration Directives of php.ini file 1.6 Super Global Arrays 1.7 Handling Session, Cookies, Form Data, File Uploads, Server Data, Server Environment 1.8 Handling Form Data Using JavaScript <p>Unit : 2 : Object Oriented and Advanced Features of PHP</p> <ol style="list-style-type: none"> 2.1 Classes and Objects 2.2 Use Of Constructors, Destructors, Inheritance 2.3 Serialization, Magic Methods 2.4 Built-In Library Functions and Library Classes: String, Array, Mathematics, Graphics Library, File System, Date and Time, Files and Directory, XML, PDF, HTTP, Network, PHP Options and Information, ZIP File 2.5 Introduction to AJAX with PHP and handling JSON data <p>Unit : 3 : Security Threats and Remedies</p> <ol style="list-style-type: none"> 3.1 Securing Request Data 3.2 Using CAPTCHA 					

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	<p>3.3 Session Fixation Attack and Remedy</p> <p>3.4 SQL Injection Attack and Prevention</p> <p>Unit : 4 : PHP Integration with Databases</p> <p>4.1 MySQL Server and MySQL Client, Databases, Tables</p> <p>4.2 Working with PhpMyAdmin</p> <p>4.3 Develop REST API for CRUD operations</p> <p>Unit : 5 : Web Development Add-ons</p> <p>5.1 Introduction to PHP based web application frameworks and Libraries</p> <p>5.2 Installing and managing packages using composer</p> <p>5.3 JavaScript Frameworks and Libraries</p> <p>5.4 Plug-ins</p>
Reference Book	<ol style="list-style-type: none"> 1. Programming PHP - Rasmus Lerdorf, Kevin Tatroe - O'Reilly 2. PHP Cookbook - David Sklar, Adam Trachtenberg - O'Reilly 3. Learning PHP, MySQL & JavaScript: With jQuery, CSS & HTML5 (Learning Php, Mysql, Javascript, Css & Html5) 4th Edition by Robin Nixon Publisher: O'Reilly Media; 4 edition (December 14, 2014) 4. PHP and MySQL Web Development (5th Edition) (Developer's Library) 5th Edition by Luke Welling Publisher: Addison-Wesley Professional; 5 edition (September 30, 2016) 5. Modern PHP: New Features and Good Practices 1st Edition by Josh Lockhart O'Reilly Media; 1 edition (March 1, 2015) 6. PHP Cookbook: Solutions & Examples for PHP Programmers 3rd Edition by David Sklar (Author), Adam Trachtenberg (Author) Publisher: O'Reilly Media; 3 edition (July 25, 2014) 7. NoSQL For Dummies 1st Edition by Adam Fowler Publisher: For Dummies; 1 edition (February 24, 2015) 8. Learning from jQuery Paperback – 19 Mar 2013 by Callum Macrae Publisher: Shroff/O'Reilly; First edition (19 March 2013) 9. Mastering jQuery Paperback – Import, 30 May 2015 by Alex Libby Publisher: Packt Publishing Limited (30 May 2015) 10. PHP, MySQL, & JavaScript All-in-One For Dummies by Richard Blum, John Wiley & Sons, 10-Apr-2018 11. PHP Programming The Complete Guide 2022 Paperback – 1 January 2022 by A. Adams (Author)
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

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B.Sc. (I.T.) 5th Semester

Course : 502 : Relational Database Management System -II

Course Code	502																								
Course Title	Relational Database Management System - II																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	To impart knowledge of Database Architecture and PL/SQL programming.																								
Course Objective	This course provides knowledge about Oracle Database Architecture and Oracle PL/SQL programming concepts.																								
Course Outcomes	<p>CO1 : Students will be able to learn about Oracle Database Architecture.</p> <p>CO2 : Students will be able to write code using PL/SQL programming concepts using cursors, triggers, packages, procedures, functions and transactions.</p> <p>CO3 : Students will be able to learn about indexes, sequences, data integrity, creating and maintaining tables and user privileges.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	DBMS, SQL																								

Course Content	<p>Unit : 1 : Overview of Oracle Architecture</p> <p>1.1 Oracle Physical Architecture</p> <p style="margin-left: 20px;">1.1.1 Data Files</p> <p style="margin-left: 20px;">1.1.2 Control Files</p> <p style="margin-left: 20px;">1.1.3 Redo log Files</p> <p style="margin-left: 20px;">1.1.4 Archive Files</p> <p>1.2 Oracle Instance Architecture</p> <p style="margin-left: 20px;">1.2.1 SGA</p> <p style="margin-left: 20px;">1.2.2 Database buffer</p> <p style="margin-left: 20px;">1.2.3 Redo log buffer</p> <p style="margin-left: 20px;">1.2.4 Shared Pool</p> <p style="margin-left: 20px;">1.2.5 Library Cache</p> <p style="margin-left: 20px;">1.2.6 PGA</p> <p style="margin-left: 20px;">1.2.7 Processes</p> <p>1.3 Oracle Logical Architecture</p> <p style="margin-left: 20px;">1.3.1 Tablespace</p> <p style="margin-left: 20px;">1.3.2 Segment</p> <p style="margin-left: 20px;">1.3.3 Extent</p> <p style="margin-left: 20px;">1.3.4 Oracle Data Block</p>
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Unit : 2 : Oracle PL/SQL

- 2.1 The PL/SQL Block
- 2.2 Lexical Units: Identifiers, Delimiters, Literals, Comments
- 2.3 Variables, PL/SQL Types
- 2.4 Expression, Operators and Control Structures
- 2.5 Records
- 2.6 Cursors
 - 2.6.1 Definition of Cursor
 - 2.6.2 Explicit & Implicit Cursors
 - 2.6.3 Cursor for loops
 - 2.6.4 Cursor Variables
 - 2.6.5 Parameterized Cursor
- 2.7 Sub Program
 - 2.7.1 Procedures
 - 2.7.2 Functions
 - 2.7.3 Subprogram Creation, Parameter Modes
 - 2.7.4 Procedure Versus Functions
- 2.8 Packages
 - 2.8.1 Package Specification
 - 2.8.2 Package Body
 - 2.8.3 Packages and Scope, Package Objects
- 2.9 Database Triggers
 - 2.9.1 Use of Database Triggers
 - 2.9.2 Types of Triggers
 - 2.9.3 Creating Triggers
 - 2.9.4 Deleting a Trigger
- 2.10 Error Handling
 - 2.10.1 Declaring Exception
 - 2.10.2 Raising Exception, Handling Exception
 - 2.10.3 Exception Propagation, Scope of Exception
- 2.11 Sequences & Pseudo columns
 - 2.11.1 CURRVAL & NEXTVAL
 - 2.11.2 ROWID
 - 2.11.3 ROWNUM

Unit : 3 : Transaction Control and Locks

- 3.1 Transaction Control Statements
 - 3.1.1 Commit
 - 3.1.2 Save point
 - 3.1.3 Rollback
- 3.2 Locks
 - 3.2.1 Types of Locks
 - 3.2.2 Levels of Locks

Unit : 4 : Index, User, Role and Profile

- 4.1 Indexes
 - 4.1.1 Simple Index, Composite Index
 - 4.1.2 Bitmap Index, Function Based Index
 - 4.1.3 Key Compressed Index

P. V. Desai

	<p>4.2 User</p> <p>4.2.1 Creating User</p> <p>4.2.2 Types of Users</p> <p>4.2.3 Privileges</p> <p>4.2.4 Types of Privileges</p> <p>4.3 Role</p> <p>4.3.1 Types of Roles</p> <p>4.3.2 Role Management</p> <p>4.4 Profile</p> <p>4.4.1 Creating Profile</p> <p>4.4.2 Built in Profile</p> <p>Unit : 5 : Programming with Collections</p> <p>5.1 Nested Tables</p> <p>5.2 Varying Array</p> <p>5.3 Record</p>
Reference Book	<p>1. SQL, PL/SQL THE PROGRAMMING LANGUAGE OF ORACLE - 4TH REVISED EDITION - Ivan Bayross - BPB Publications</p> <p>2. Oracle Database 12c The Complete Reference (Oracle Press) (1st Edition) - Bob Bryla, Kevin Loney - McGraw-Hill Education</p> <p>3. Oracle Database 12c PL/SQL Programming(Oracle Press) 1st Edition - Michael McLaughlin - McGraw-Hill Education</p> <p>4. Oracle PL/SQL Language Pocket Reference, 5E - Steven Feuerstein, Bill Pribyl, Chip Dawes - O'Reilly</p> <p>5. Oracle PL/SQL Programming: Covers Versions Through Oracle Database 12c 6th Edition - Steven Feuerstein - O'Reilly Media</p> <p>6. SQL and PL/SQL for Oracle 11g Black Book, - Dr. P.S. Deshpande - Dreamtech Press</p> <p>7. Oracle for Beginners - Sharanam Shah & Vaishali Shah - SPD</p>
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. S. Deshpande

B.Sc.(I.T.) 5th Semester

Course : 503 : Mobile Application Development

Course Code	IT 503																												
Course Title	Mobile Application Development																												
Credit	4																												
Teaching per Week	4 Hrs																												
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																												
Last Review / Revision	June 2023																												
Purpose of Course	This course helps students to understand android based smart device application development. The course also gives students an idea about various components of Android application development tools.																												
Course Objective	The objective of the course is to provide a thorough introduction to the Android environment, Tools for creating Android applications, The Android approach to structuring applications, Basic user interfaces, and Application life cycles.																												
Course Outcomes	<p>CO1 : Students will be able to understand android based smart device application development</p> <p>CO2 : Students will be able to learn about various components of Android application development tools</p> <p>CO3 : Students will be able to publish Android application on Google play store.</p>																												
Mapping between COs with PSOs	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO3</th> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																								
CO1																													
CO2																													
CO3																													
Pre-requisite	Object Oriented Programming knowledge.																												
Course Content	<p>Unit : 1 : Introduction to Kotlin</p> <p>1.1 Kotlin Overview</p> <p>1.2 Environment setup in Android Studio</p> <p>1.3 Variables, Data types, Arrays, Array list in Kotlin</p> <p>1.4 Operators in Kotlin</p> <p>1.5 Control flow statements in Kotlin</p> <p>1.6 Loops in Kotlin</p> <p>1.7 Functions and Lambda Expressions in Kotlin</p> <p>1.8 Object Oriented Programming in Kotlin</p> <p>Unit : 2 : Android Application development</p> <p>2.1 Android Application architecture</p> <p>2.2 AVD, Gradle, Manifest, Resources</p> <p>2.3 Android Activity and Activity lifecycle</p> <p>2.4 Android Views and Layouts</p> <p>2.5 Button, TextView, ImageButton, EditText, CheckBox, ToggleButton, RadioButton, Spinne, etc...</p>																												

P. V. Dasari

	<p>2.6 Event Handling</p> <p>2.7 AutoCompleteTextView</p> <p>2.8 User Interactions - Toast, Dialog, Menus - Types of Menus</p> <p>2.9 List & Views(RecyclerView, Card View, etc...)</p> <p>2.10 Intents& Intent Life Cycle - Types of Intentts</p> <p>2.11 Navigation between screens</p> <p>2.12 Tabs and Fragments</p> <p>Unit : 3 : Working with Data and Background Services</p> <p>3.1 Shared preferences</p> <p>3.2 Internal and External storage</p> <p>3.3 Android Database Design considerations</p> <p>3.4 Working with SQLite database</p> <p>3.5 CRUD operations on SQLite</p> <p>3.6 Working with Firebase - CRUD operations</p> <p>3.7 Content Provider</p> <p>3.8 Background Services and its Life cycle</p> <p>3.9 Working with multi-threading and AsyncTask</p> <p>3.10Broadcast Receivers</p> <p>Unit : 4 : Working with Google Play Services and API</p> <p>4.1 Location Navigation</p> <p>4.2 Geocoding and Reverse Geocoding Notifications</p> <p>4.3 Working with Google Maps API</p> <p>4.4 Working with Rest API and Retrofit Library</p> <p>4.5 Working with web Services</p> <p>4.6 Google Cloud messaging</p> <p>Unit : 5 : Advanced Android Programming</p> <p>5.1 Android property animations</p> <p>5.2 Push notification with Firebase</p> <p>5.3 Cloud storage with Firebase</p> <p>5.4 JSON Parsing</p> <p>5.5 Social Media Integration</p> <p>5.6 Working with Coroutines</p> <p>5.7 Testing and Debugging Android Application</p> <p>5.8 Publishing Apps</p>
Reference Books	<ol style="list-style-type: none"> 1. Android Programming with Kotlin for Beginners, by John Horton, Packt publication 2019 2. Learn Kotlin for Android Development by Peter Spath, Apress publication, 2019 3. Head First Kotlin - a brain friendly guide by Dawn Griffiths and David Griffiths, O'Reilly publication 2019 4. Learn Android Studio 3 with Kotlin by Ted Hagos, Apress publication, 2018 5. Kotlin In-Depth by Aleksei Sedunov, BPB publications, 2020 6. Mastering Kotlin by Nate Ebel, Packt publication 2019
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Dasan

B.Sc. (I.T.) 5th Semester

Course : 504 : System Analysis and Design

Course Code	504																												
Course Title	System Analysis and Design																												
Credit	4																												
Teaching per Week	4 Hrs																												
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																												
Last Review / Revision	June 2023																												
Purpose of Course	To enable students to understand modeling ,designing, analyzing and testing a system																												
Course Objective	To give coherent view of design and analysis intended for software development process. The course provides comprehensive concepts of software engineering practice that involves various models, analysis models, design concepts, various testing methods and introduction to UML diagrams.																												
Course Outcomes	<p>CO1 : Students will be able to understand fundamental concepts of software engineering</p> <p>CO2 : Students will be able to learn principles of system analysis and design</p> <p>CO3 : Students will be able to apply object oriented analysis and design principles in development of software applications.</p>																												
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>						PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																								
CO1																													
CO2																													
CO3																													
Pre-requisite	Basics of any programming language																												
Course Content	<p>Unit : 1 : Fundamentals of Software Engineering</p> <p>1.1 The Nature of Software</p> <p style="padding-left: 20px;">1.1.1 Defining Software</p> <p style="padding-left: 20px;">1.1.2 Software Application Domains</p> <p style="padding-left: 20px;">1.1.3 Legacy Software</p> <p>1.2 The unique nature of WebApps</p> <p>1.3 Software Engineering</p> <p>1.4 The software process</p> <p style="padding-left: 20px;">1.4.1 The umbrella activities</p> <p>1.5 Software Myths</p> <p>1.6 The software process models</p> <p style="padding-left: 20px;">1.6.1 The Waterfall model</p> <p style="padding-left: 20px;">1.6.2 Incremental process models</p> <p style="padding-left: 20px;">1.6.3 Evolutionary process models</p> <p style="padding-left: 40px;">1.6.3.1 Prototyping model</p> <p style="padding-left: 40px;">1.6.3.2 Spiral model</p> <p style="padding-left: 20px;">1.6.4 Specialized process models</p>																												

P. V. Desai

	<ul style="list-style-type: none"> 1.6.4.1 Component based development 1.6.4.2 The formal methods model 1.6.4.3 The aspect oriented software development <p>1.7 Introduction to Agile Methodology</p> <ul style="list-style-type: none"> 1.7.1 Agile principles 1.7.2 Extreme Programming 1.7.3 Introduction to agile process models: ASD, Scrum, AUP <p>Unit : 2 : Requirement Engineering and Structured System Analysis</p> <p>2.1 Requirement Engineering</p> <ul style="list-style-type: none"> 2.1.1 Requirement Inception, elicitation, Elaboration, Negotiation, Specification, Validation, Management 2.1.2 Requirement Elicitation <ul style="list-style-type: none"> 2.1.2.1 Collaborative Requirement Gathering - FAST 2.1.2.2 Quality Function Deployment 2.1.2.3 Usage Scenario 2.1.3 Functional and Non- Functional requirements 2.1.4 Software Requirement Specification <p>2.2 Analysis Modeling</p> <ul style="list-style-type: none"> 2.2.1 Requirements Analysis 2.2.2 Requirement modelling approaches 2.2.3 Flow oriented modelling using DFD <ul style="list-style-type: none"> 2.2.3.1 Data Flow Diagram 2.2.3.2 The Process Specification 2.2.4 Data Dictionary <p>Unit : 3 : Software Design</p> <p>3.1 The Design Process</p> <p>3.2 Design concepts</p> <ul style="list-style-type: none"> 3.2.1 Abstraction 3.2.2 Architecture 3.2.3 Patterns 3.2.4 Modularity 3.2.5 Information hiding 3.2.6 Functional independence <ul style="list-style-type: none"> 3.2.6.1 Cohesion - Functional, Layer, Communicational 3.2.6.2 Coupling - Content, Common, Control, Stamp, Data, External <p>3.3 The design model</p> <p>3.4 Architectural design</p> <p>3.5 Component level design</p> <p>3.6 User interface design</p> <p>Unit : 4 : Object Oriented Analysis and Design</p> <p>4.1 Unified Modeling model</p> <ul style="list-style-type: none"> 4.1.1 UML Diagrams <ul style="list-style-type: none"> 4.1.1.1 Use Case Diagrams
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P. V. Desai

	<p>4.1.1.2 Class Diagrams 4.1.1.3 Sequence Diagrams 4.1.1.4 Activity Diagrams 4.1.1.5 State chart Diagrams</p> <p>Unit : 5 : Software Testing 5.1 Principles of testing 5.2 Verification and Validation 5.3 Testing types and strategies 5.3.1 Unit Testing 5.3.2 Integration Testing 5.3.3 Validation Testing - Alpha and Beta Testing 5.3.4 System Testing 5.4 The art of debugging 5.5 White-Box Testing 5.5.1 Basis path testing 5.5.2 Cyclomatic complexity 5.6 Black -Box Testing 5.6.1 Equivalence Partitioning 5.6.2 Boundary Value Analysis</p>
Reference Book	<p>1. Software Engineering Practitioner's Approach ,Roger Pressman, 7th edition, TMH 2. Fundamentals of software engineering ,Rajib mall, Third edition, PHI 3. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa 4. The Unified Modeling Language User Guide - Grady Booch, James Rumbaugh, Ivar Jacobson Addison Wesley.</p>
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	<p>30% Internal assessment 70% External assessment</p>

P. V. Desai

B.Sc. (I.T.) 5th Semester

Course: 506: Practical 10

Course Code	506					
Course Title	Practical 10					
Credit	2					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)					
Effective From	June 2023					
Purpose of Course	The course provides practical knowledge of advanced web applications development.					
Course Objective	The course prepares students to develop web applications with PHP and frameworks.					
Course Outcomes	CO1 : Students will be able to practically develop web applications in PHP. CO2 : Students will be able to implement MVC architecture and develop API in web applications. CO3 : Students will be able to develop web applications using Web Application Frameworks.					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Prerequisite	Object Oriented Programming, Web Technology Fundamentals					
Course Content:	Based on 501 Web Development-II					
Reference Books	NIL					
Teaching Methodology	Lab Work, Assignment					
Evaluation Method	30% Internal Assessment 70% External Assessment					

P. V. Prasad

B.Sc. (I.T.) 5th Semester

Course : 507 : Practical 11

Course Code	507																								
Course Title	Practical 11																								
Credit	2																								
Teaching Per Week	4 Hrs																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2023																								
Purpose of Course	To impart practical knowledge of PL/SQL programming.																								
Course Objective	To give practical knowledge of PL/SQL programming.																								
Course Out comes	CO1 : Students will be able to create PL/SQL programs in RDBMS. CO2 : Students will be able to manage database transactions using PL/SQL . CO3 : Students will be able to write code using PL/SQL programming concepts using cursors, triggers, packages, procedures, functions and transactions.																								
Mapping between COs with PSOs	<table border="1"><thead><tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr></thead><tbody><tr><th>CO1</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO2</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO3</th><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Prerequisite	Knowledge of SQL, DBMS																								
Course Content	Practical based on Paper No. 502 : Relational Database Management System – II																								
Reference Books	NIL																								
Teaching Methodology	Lab Work, Assignment																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Das

B.Sc. (I.T.) 5th Semester

Course: 508: Practical 12

Course Code	508																								
Course Title	Practical 12																								
Credit	1																								
Teaching per Week	2 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Effective From	June 2023																								
Purpose of Course	The course provides practical knowledge of application development for smart devices using Android.																								
Course Objective	The course prepares students to develop applications for smart devices using Android.																								
Course Outcomes	CO1 : Students will be able to develop android applications using the latest design concepts, controls and components. CO2 : Students will be able to develop applications using the local database-SQLite and integrate web services in android. CO3 : Students will be able to create applications using background services, location services, google maps, etc.																								
Mapping between COs with PSOs	<table border="1"><thead><tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr></thead><tbody><tr><th>CO1</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO2</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO3</th><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Object Oriented Programming Concepts																								
Course Contents	Practical based on Paper 503 : Mobile Application Development.																								
Reference Books	Nil																								
Teaching Methodology	Lab Work, Assignment																								
Evaluation Method	30 % Internal Assessment 70% External Assessment																								

P. V. Das

B.Sc. (I.T.) 6th Semester

Course : 601 : Java

Course Code	601																								
Course Title	Java																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	To learn the concept of Object oriented programming, threads, graphics, database operation in java.																								
Course Objective	To introduce the comprehensive concepts of java programming language that includes OOP concepts using core java, desktop based visual designs using swing. At the end of this course, a student will be able to comprehend the fundamental concepts required for the development and design of software systems.																								
Course Outcomes	CO1 : Students will be able to develop java programs on threads and IO CO2 : Students will be able to work with java collections, streams and perform CRUD operations on database CO3 : Students will be able to create GUI with Swing																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Object Oriented Concepts of C++																								

Course Content	<p>Unit : 1 : Java Concepts</p> <p>1.1 Introduction to Java and its tool-chain</p> <p style="padding-left: 20px;">1.1.1 History of Java</p> <p style="padding-left: 20px;">1.1.2 Java Architecture and its Components</p> <p style="padding-left: 40px;">1.1.2.1 JDK,JVM,JRE</p> <p style="padding-left: 20px;">1.1.3 Java Platforms</p> <p style="padding-left: 20px;">1.1.4 Java SE,ME,EE</p> <p style="padding-left: 20px;">1.1.5 Java Class File</p> <p style="padding-left: 20px;">1.1.6 C++ and Java comparison</p> <p style="padding-left: 20px;">1.1.7 Features of java</p> <p style="padding-left: 20px;">1.1.8 Installing java development kit</p> <p style="padding-left: 20px;">1.1.9 Java compiler and Interpreter</p> <p style="padding-left: 20px;">1.1.10 Using CLASSPATH</p> <p style="padding-left: 20px;">1.1.11 Use of text editor, IDE</p> <p>1.2 Basics of Java programming</p> <p style="padding-left: 20px;">1.2.1 Understanding main() method</p>
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P. V. Desai

1.3 Fundamentals

- 1.3.1 Statements
 - 1.3.2 Variables and data types
 - 1.3.3 Primitive data types
 - 1.3.4 Object Reference Types
 - 1.3.4.1 Strings
 - 1.3.5. Arrays- single and multi dimension
 - 1.3.6. Primitive Wrapper Classes
 - 1.3.7. Classes
 - 1.3.8. Objects
 - 1.3.9. Array of objects
 - 1.3.10. AutoBoxing and Unboxing
- ### 1.4 Working with General Utility Classes
- 1.4.1 ArrayList
 - 1.4.1.1 Accessing with for each Loop
 - 1.4.1.2 Accessing with iterator
 - 1.4.2 Vectors
 - 1.4.3 String
 - 1.4.4 Math
 - 1.4.5 Date

Unit : 2: OOPs in JAVA

2.1 Object Oriented Programming in Java

- 2.1.1 Inheritance and Polymorphism
- 2.1.2 Overloading and Overriding
- 2.1.3 Abstract classes
- 2.1.4 Static classes
- 2.1.5 Final Classes
- 2.1.6 Chaining constructor using this() and Super()
- 2.1.7 Interfaces
- 2.1.8 Garbage Collection
- 2.1.9 Lambda Expressions
- 2.1.10 Generics

2.2 Packages and Imports

- 2.2.1 Package levels
- 2.2.2 Creating package
- 2.2.3 Importing and Using Packages
- 2.2.4 Package and inheritance
- 2.2.5 Package and access specifiers

2.3 Exception Handling

- 2.3.1 Exception and error classes
- 2.3.2 Exception Handling
- 2.3.3 Throw statement and throws clause
- 2.3.4 Custom exception

2.4 Thread Programming

- 2.4.1 Overview of Threads
- 2.4.2 Thread Life Cycle

P. V. Das

	<p>2.4.3 Creating Thread –Runnable interface</p> <p>2.4.4 Multithreaded programs</p> <p>2.4.5 Synchronization</p> <p>2.4.6 Deadlock</p> <p>2.4.7 Inter-Thread communication (wait & notify)</p> <p>2.4.8 Fork and Join</p> <p>2.4.9 Asynchronous processing</p> <p>Unit: 3: I/O in JAVA</p> <p>3.1 Java I/O</p> <p>3.1.1 Files and directories</p> <p>3.1.2 Byte and Character Streams</p> <p>3.1.3 PrintWriter Class</p> <p>3.1.4 Input and Output Streams</p> <p>3.1.5 Random access Files</p> <p>3.1.6 Serialization and Deserialization</p> <p>3.2 Collections API</p> <p>3.2.1 Collection</p> <p>3.2.2 Java Streams</p> <p>3.2.3 Set-HashSet,TreeSet</p> <p>3.2.4 List-LinkedList</p> <p>3.2.5 Map-HashMap,TreeMap</p> <p>3.3 Annotations</p> <p>Unit : 4: JAVA SWING</p> <p>4.1 Java Foundation Classes</p> <p>4.2 Features</p> <p>4.3 Basic Swing Containers</p> <p>4.4 Swing Components</p> <p>4.5 Event Handling</p> <p>Unit : 5 : JDBC Connections</p> <p>5.1 Working with JDBC APIs</p> <p>5.1.1 Connection</p> <p>5.1.2 Statement</p> <p>5.1.3 Transaction methods</p> <p>5.1.4 Optimized Statements with PreparedStatement and Callable Statement</p> <p>5.1.5 Metadata</p> <p>5.1.6 Rowsets</p>
Reference Book	<ol style="list-style-type: none"> 1. Java Complete Reference, Schildt, Herbert,9th edition,TMH 2. Java Platform, Jaworski, Jamie,Techmedia 3. Head First Java, Sierra, Bates,second edition,,SPD O’Relly 4. Core Java for Beginners, S. Shah, V. Shah 5. Programming with Java, Dr. Kamlendu Kumar Pandey, Dr. Veena Jokhakar, Mr. Ronak Panchal, Onlinegatha.com

P. V. Desai

Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Das

B.Sc. (I.T.) 6th Semester

Course: 602 ASP.NET Core MVC using C#

Course Code	602																								
Course Title	ASP.NET Core MVC using C#																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	This course helps to learn basics programming for web application development using ASP.NET Core and C#.NET Core.																								
Course Objective	The objective of the course is to impart basic introduction to Microsoft C#.NET language and concepts of web application development technology.																								
Course Out come	<p>CO1: Students will be able to understand and learn object-oriented concepts using C#.NET Core.</p> <p>CO2: Students will be able to understand and learn web application development using ASP.NET Core MVC architecture using C#.NET Core.</p> <p>CO3: Students will be able to learn and implement database integration using C#.NET Core for ASP.NET MVC Core based web applications.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Knowledge of Programming, Object Oriented Programming, Database Management System and Scripting languages like HTML, JavaScript, etc.																								
Course Content	<p>Unit : 1 : Introduction to .NET Core and C#</p> <ol style="list-style-type: none"> 1.1. .NET Framework <ol style="list-style-type: none"> 1.1.1 .NET Framework architecture 1.1.2 Common Language Runtime 1.1.3 Common Type System 1.1.4 Common Language Specification 1.1.5 Microsoft Intermediate Language 1.1.6 Framework Class Libraries 1.2. .NET Core <ol style="list-style-type: none"> 1.2.1 .NET Core Architecture 1.2.2 Difference between .NET Core and .NET Framework 1.2.3 Advantages of .NET Core 1.3. Assemblies and Namespaces 1.4. Overview of C#.Net CORE 1.5. .NET CORE Assemblies and Libraries 1.6. Data Types 1.7. Variables and Constants 1.8. Operators 1.9. Flow Control Statements 1.10. Program Structure 1.11. Application Configuration 1.12. ADO.NET Architecture 																								

P. V. Desai

Unit : 2 : Object Oriented Programming using C# .NET Core

- 2.1. Object Oriented Concepts and Principles
- 2.2. Classes
 - 2.1.1 Design of Class types
 - 2.1.2 Sealed Class
 - 2.1.3 Abstract Class and Abstract Base Class
 - 2.1.4 Partial Class
- 2.3. Structures
 - 2.2.1 Design of Structure type
 - 2.2.2 Comparison of Structure type and Class type
- 2.4. Enumeration
- 2.5. Construction and Disposal of object
- 2.6. Importance of special keyword like this, static, etc.
- 2.7. Access Modifiers
- 2.8. Inheritance
- 2.9. Polymorphism
 - 2.9.1 Overloading
 - 2.9.2 Overriding
- 2.10. Properties
 - 2.10.1 Importance of Property type
 - 2.10.2 Read-Only and Write-Only Properties
 - 2.10.3 Static Properties
- 2.11. Interfaces
 - 2.11.1 Concept and usage of Interface Type
 - 2.11.2 Designing Custom Interface
 - 2.11.3 Importance of Interface
 - 2.11.4 Comparing Interface with Abstract Base Class
 - 2.11.5 Implementing an Interface
 - 2.11.6 Working with built-in Interfaces like IEnumerable, IEnumerator, ICloneable and IComparable
- 2.12. Exception & Error Handling
- 2.13. Threads and Multi-Threading
- 2.14. Nullable Type
- 2.15. Serialization
- 2.16. Attributes and Annotations

Unit : 3 : Working with Collections, Delegates and Events

- 3.1 Collections
 - 3.1.1 Introduction to Collections
 - 3.1.2 Array
 - 3.1.3 ArrayList
 - 3.1.4 BitArray
 - 3.1.5 Stack
 - 3.1.6 Queue
 - 3.1.7 SortedList
 - 3.1.8 Hashtable
- 3.2 Indexer
 - 3.2.1 Defining Indexer
 - 3.2.2 Indexing Collection using Different Data Types
 - 3.2.3 Advantages over Collections
 - 3.2.4 Difference between Indexer and Property Type
- 3.3 Delegates
 - 3.3.1 Defining Delegates
 - 3.3.2 Creating and Invoking Delegate

P. V. D. S. A.

	<p>3.3.3 Advantages of Delegates 3.3.4 Multicasting Delegates 3.3.5 Limitations of Multicast Delegates 3.4 Events 3.4.1 Defining Events 3.4.2 Creating Custom Events 3.4.3 Publishing and Subscribing an Event 3.4.4 Raising an Event</p> <p>Unit : 4 : Programming using ASP.NET Core MVC 4.1. Introduction to ASP.NET Core 4.1.1 Web Forms 4.1.2 Web Pages 4.1.3 MVC 4.2. Two-Tier, Three-Tier and N-Tier Application Architecture 4.3. MVC Architectural Pattern 4.4. URL Routing and Configuration 4.5. Working with Models 4.5.1 Creating Models 4.5.2 Data Access using Models 4.5.3 Managing Temporary Data using Models 4.5.4 Managing Data using ADO.NET 4.5.5 Working with Stored Procedures 4.6. Working with Controllers 4.6.1 Creating a Controller 4.6.2 Role of Controller 4.7. Working with Views 4.7.1 Creating and Rendering a simple View 4.7.2 Custom View with and without Model 4.7.3 Layout View and Partial View 4.7.4 HTML Helper Class, Extension and Strongly Typed Methods 4.7.5 Design of View using CSS 4.7.6 Use of JavaScript and Bootstrap 4.7.7 Working with Razor Pages 4.7.8 Data Validation</p> <p>Unit : 5 : Web Application Management 5.1 State Management 5.1.1 Application 5.1.2 Session State 5.1.3 Cookie 5.1.4 QueryString 5.1.5 TempData, ViewBag and ViewData 5.2 Environment Variables 5.3 Multiple Environments and Development Mode 5.4 Unit Testing of MVC Application 5.5 NuGet Package Manager 5.6 Navigation</p>
Reference Book	<ol style="list-style-type: none"> 1. C# and the .NET Platform by Andrew Troelsen : APress 2. C# The Basics by Vijay Mukhi : BPB 3. C# Essentials by Ben Albahari : O'Reilly 4. Professional! C# by Simon Robinson : Wrox 5. ADO.NET Programmer's Reference : Wrox.

P. V. Desai

	6. C# The Nuts & Bolts by Akash Sarat & Sonal Mukhi : BPB 7. ASP.NET MVC with Entity Framework and CSS by Lee Naylor : APress 8. Pro ASP.NET Core MVC by Adam Freeman : APress 9. Learning ASP.NET Core MVC Programming by Mugilan T. S. Ragupathi : Packt Publishing Ltd 10. Murach's ASP.NET Core MVC by Mary Delamater, Joel Murach : Mike Murach & Associates, Inc
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. M. D. S. M.

B.Sc. (I.T.) 6th Semester

Course : 603 : Operating System

Course Code	603																								
Course Title	Operating System																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	To impart conceptual knowledge and functioning of Operating System																								
Course Objective	This course provides knowledge about core concepts of operating system.																								
Course Outcomes	<p>CO1 : Students will be able to learn about fundamentals of operating system.</p> <p>CO2 : Students will be able to understand the concept of processes, threads and its scheduling algorithms, various memory management schemes, file and device management, I/O management in detail.</p> <p>CO3 : Students will be able to learn about shell scripting.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic knowledge of Computer organization, data structures and computer programming																								
Course Content	<p>Unit : 1: Operating System Concepts</p> <p>1.1 Evolution of Operating System 1.2 Needs of an Operating System 1.3 Elements of an Operating System 1.4 Types of O.S.: Single User & Multi-User, Batch, Multi-Programmed, Time-Sharing, Real-Time, Distributed, Parallel, Mobile 1.5 Operating System Structure: Layered System, Microkernel and Virtual Machine 1.6 Booting process of various Operating Systems</p> <p>Unit : 2 : Process Management</p> <p>2.1 Process concept 2.2 Process State Model 2.3 Process Scheduling 2.3.1 Scheduling Criteria 2.3.2 Scheduling algorithms</p>																								

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- 2.4 Thread and Multithreading
- 2.5 Inter-process Communication
- 2.6 Process Coordination
 - 2.6.1 Critical Section problem
 - 2.6.2 Semaphores
- 2.7 Deadlocks
 - 2.7.1 Deadlock Characteristics
 - 2.7.2 Deadlock Prevention, Avoidance
 - 2.7.3 Deadlock Detection, Recovery

Unit : 3 : Memory Management

- 3.1 The notion of physical and logical address space
- 3.2 Contiguous allocation
- 3.3 Non-Contiguous allocation
 - 3.3.1 Paging
 - 3.3.2 Segmentation
- 3.4 Other Memory Management Schemes: Swapping and Overlays
- 3.5 Demand Paging & Demand Segmentation
- 3.6 Allocation of frames & Page Replacement policies
- 3.7 Implementation in various operating systems

Unit : 4 : File and Device Management

- 4.1 File Management
 - 4.1.1 Device Characteristics
 - 4.1.2 I/O Hardware
 - 4.1.3 Application I/O Interface
 - 4.1.4 Kernel I/O Subsystem
 - 4.1.5 STREAMS
- 4.2 Mass Storage Structure
 - 4.2.1 Disk Structure
 - 4.2.2 Disk scheduling
 - 4.2.3 Disk Management
- 4.3 File Concept: File Types and File Operation
 - 4.3.1 Directory Structure
 - 4.3.2 Directory Implementation
 - 4.3.3 File-System Implementation
 - 4.3.4 Allocation Methods
 - 4.3.5 Free-Space Management
 - 4.3.6 File-System Mounting, File Sharing and Protection
 - 4.3.7 Implementation in various operating systems

Unit : 5 : Introduction to Shell Scripting

- 5.1 User and system variables
- 5.2 I/O statements

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	<p>5.3 Escaping, Quoting Redirection and Piping</p> <p>5.4 Positional Parameters</p> <p>5.5 Operators – arithmetic, relational, logical, file related, string related</p> <p>5.6 Conditional & Looping statements</p> <p>5.7 Arrays</p> <p>5.8 Functions</p> <p>5.9 Grep, egrep and fgrep</p> <p>Case Study: Windows, Linux and Mobile OS</p>
Reference Book	<p>1. Operating Systems Concepts - Galvin Silberschatz - McGraw Hill</p> <p>2. Operating Systems - William Stallings – PHI</p> <p>3. Modern Operating Systems - Andrew S. Tanenbaum - Pearson Edu./PHI</p> <p>4. Operating System, Dhamdhare, TMH-3rd Edition</p> <p>5. Unix Shell Programming : Yashwant Kanetkar: 2003 Edition</p> <p>6. Mastering Linux shell Scripting: Andrew Mallett:2015 edition Packt Publisher</p>
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	<p>30% Internal assessment</p> <p>70% External assessment</p>

P. V. D. S. A.

B.Sc. (I.T.) 6th Semester

Course : 604 : Cloud Computing

Course Code	604																								
Course Title	Cloud Computing																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2023																								
Purpose of Course	This course helps students to understand basic concepts of Cloud Computing and Cloud Architecture.																								
Course Objective	To impart knowledge of Cloud Computing basic concepts and cloud services.																								
Course Out come	CO1 : Students will be able to learn types of computing and virtualization concepts used in cloud computing. CO2 : Students will be able to learn cloud computing fundamentals and architecture. CO3 : Students will be able to learn cloud computing basic services, infrastructure and architecture.																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Pre-requisite	Basic concepts of Programming, Operating System and Networking																								
Course Content	<p>Unit : 1: Introduction to Types of Computing</p> <ol style="list-style-type: none"> 1.1 Network-Centric Computing 1.2 Peer-to-Peer Systems 1.3 Distributed Computing <ol style="list-style-type: none"> 1.3.1 Concepts and Importance of Distributed Systems 1.3.2 Communication Protocols and Process Coordination 1.3.3 Concurrency 1.3.4 Atomic Actions 1.4 Parallel Computing 1.5 Cloud Computing <ol style="list-style-type: none"> 1.5.1 Introduction to Cloud Computing 1.5.2 Evolution of Cloud Computing 1.5.3 Characteristics of Cloud Computing (Elasticity, Self Provisioning Resources, Billing and Monitoring of Services, Security, etc.) 1.5.4 Need for Cloud Computing <p>Unit : 2 : Virtualization</p> <ol style="list-style-type: none"> 2.1 Introduction of Virtualization 2.2 Need of Virtualization 2.3 Layering and Virtualization 2.4 Virtual Machine 2.5 Virtual Machine Monitors 2.6 Performance and Security Isolation 2.7 Software Fault Isolation 2.8 Types of Virtualization <ol style="list-style-type: none"> 2.8.1 Full Virtualization and Para Virtualization 2.8.2 Hard Virtualization and Soft Virtualization 2.8.3 Server Virtualization 2.8.4 OS Level Virtualization 2.8.5 Application Level Virtualization 2.8.6 Network Level Virtualization 																								

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	<p>2.8.7 Desktop Virtualization 2.8.8 Storage Virtualization 2.9 Advantages and Limitations of Virtualization 2.10 Virtualization Tools</p> <p>Unit : 3 : Fundamentals of Cloud Computing</p> <p>3.1 Cloud Service Models 3.1.1 Infrastructure as a Service 3.1.2 Platform as a Service 3.1.3 Software as a Service 3.2 Cloud Delivery Models 3.2.1 Private Cloud 3.2.2 Public Cloud 3.2.3 Hybrid Cloud 3.3 Difference Between Traditional Computing and Cloud Computing 3.4 Issues and Challenges for Cloud Computing</p> <p>Unit : 4 : Cloud Services</p> <p>4.1 Compute Service 4.1.1 Introduction to Compute Service 4.1.2 Instance based Compute Service 4.1.3 Server less Compute Service 4.1.4 Application Deployment Service 4.1.5 Container based Compute Service 4.2 Storage Service 4.2.1 Introduction to Storage Service 4.2.2 General Storage Service 4.2.2 Elastic Storage Service 4.2.3 Cold Storage Service 4.3 Database Service 4.3.1 Relational Database Service 4.3.2 No-SQL Database Service 4.3.3 Purpose-Built Database Service</p> <p>Unit : 5 : Cloud Infrastructure and Architecture</p> <p>5.1. Cloud Data Center Architecture 5.2. Region 5.3. Availability Zone 5.4. Point of Presence (PoP) 5.5. Conceptual View of Networking in Cloud Computing 5.6. Virtual Private Cloud 5.7. Service Level Agreement 5.8. Cloud Pricing Model 5.9. Identity and Access Management Service 5.10. Cloud Computing Stack 5.1.1 Composability 5.1.2 Infrastructure 5.1.3 Platforms 5.1.4 Applications</p>
Reference Book	<ol style="list-style-type: none"> 1. Cloud Computing and Virtualization by Dac-Nhuong Le, Raghvendra Kumar, Gia Nhu Nguyen, Jyotir Moy Chatterjee, WILEY 2. Cloud Computing : A Practical Approach by Anthony Velte, Toby Velte, Robert Elsenpeter, Mc Graw Hill 3. Cloud Computing – Black Book by Kailash Jayaswal, Jagannath kallakurchi, Donald Houde, Deven Shah, Dreamtech Press 4. Architecting The Cloud by Michael Kavis, WILEY 5. Cloud Computing for Dummies by Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, WILEY. 6. Executive’s Guide to Cloud Computing by Eric A. Marks, Bob Lozano,

P. V. Das

	WILEY. 7. The Basics of Cloud Computing - Understanding the Fundamentals of Cloud Computing in Theory and Practice by Derrick Rountree, Ileana Catrillo, Elsevier.
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. M. Deson

B.Sc. (I.T.) 6th Semester

Course : 605 : Practical 13

Course Code	605																								
Course Title	Practical 13																								
Credit	3																								
Teaching Per Week	6 Hrs																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2023																								
Purpose of Course	To impart practical knowledge of object oriented programming and other concepts using java																								
Course Objective	To give practical knowledge of object oriented programming using java																								
Course Out comes	CO1 : Students will be able to develop programs of various object oriented concepts of java CO2 : Students will be able to practically implement java IO programs, threads, streams CO3 :Students will be able to write programs for CRUD operations using JDBC																								
Mapping between COs with PSOs	<table border="1"><thead><tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr></thead><tbody><tr><td>CO1</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO2</td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>CO3</td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Prerequisite	Basic knowledge of C++ programming language and concepts																								
Course Content	Practical based on Paper No 601 Java																								
Reference Books	NIL																								
Teaching Methodology	Lab Work, Assignment																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Dasa

B.Sc. (I.T.) 6th Semester

Course : 606 : Practical 14

Course Code	606																								
Course Title	Practical 14																								
Credit	2																								
Teaching Per Week	4 Hrs																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2023																								
Purpose of Course	To impart practical knowledge of object oriented programming in C#.NET Core and web application development using ASP.NET Core MVC																								
Course Objective	To give practical knowledge of object oriented programming using C#.NET Core and web development using ASP.NET Core MVC																								
Course Out comes	CO1 : Students will be able to develop programs of various object oriented concepts using C#.NET Core. CO2 : Students will be able to practically create web application(s) using ASP.NET Core MVC. CO3 : Students will be able to write programs for CRUD operations in ASP.NET Core MVC application.																								
Mapping between COs with PSOs	<table border="1"><thead><tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th></tr></thead><tbody><tr><th>CO1</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO2</th><td></td><td></td><td></td><td></td><td></td></tr><tr><th>CO3</th><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									
Prerequisite	Basic knowledge of C#.NET programming language and web development concepts																								
Course Content	Practical based on Paper No 602 ASP.NET Core MVC using C#																								
Reference Books	NIL																								
Teaching Methodology	Lab Work, Assignment																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Prasad

B.Sc. (I.T.) 6th Semester

Course : 607 : Project

Course Code	607																								
Course Title	Project																								
Credit	4																								
Teaching Per Week	4																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2023																								
Purpose of Course	The purpose of the course is to develop software to solve real world problems.																								
Course Objective	To train students to develop and implement software projects																								
Prerequisite	Knowledge of Object Oriented Programming, RDBMS, Web Technology Fundamentals, Software Engineering etc...																								
Course Out comes	CO1 : Students will be able to develop software applications. CO2 : Students will be able to apply Software Engineering concepts to solve real world problems. CO3 : Students will be able to apply database related concepts to design database for the project.																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	CO1						CO2						CO3					
	PSO1	PSO2	PSO3	PSO4	PSO5																				
CO1																									
CO2																									
CO3																									

Course Content	<p>The students are required to develop a project. The students must prepare documentation of the project completed as per the Software Engineering Guidelines. At the end of the semester, the students have to submit their project report in bounded form to the institution. The Project Presentation and Viva – Voce will be conducted as per the University exam schedule. The students have to submit the following reports at the institution:</p> <ol style="list-style-type: none"> 1. Project Joining Report 2. Project Title Report 3. Progress Report 4. Project Completion Certificate 5. Institution Certificate <p>Non disclosure of Source Code Certificate (In case the student is unable to submit project source code) University appointed examiner(s) may ask to develop some part of the project that is submitted by the student.</p>
Reference Books	NIL
Teaching Methodology	Lab Work, Assignment
Evaluation Method	30% Internal Assessment 70% External Assessment

P. V. Desai