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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-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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ક્રમાંક : એસ/પરિપત્ર/૬૫૩૫/૨૦૨૨

તા.૩૧/૦૩/૨૦૨૨

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

વિષય :- બી.એસસી. (આઈ.ટી.) સેમે.-૩ અને ૪ નાં રિવાઈઝડ અભ્યાસક્રમ બાબત.

મહાશયશ્રી,


સવિનય જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર બી.એસસી. (આઈ.ટી.) સેમે.-૩ અને સેમે.-૪ નો પેટાસમિતિએ તૈયાર કરેલ અભ્યાસક્રમ અંગે વિચારણા કરતા ઈન્ફોર્મેશન ટેકનોલોજી અભ્યાસસમિતિની તા.૧૯/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે નીચે મુજબ કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૧૩ અન્વયે સ્વીકારી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલે તેની તા. ૨૩/૦૩/૨૦૨૨ ની સભાના ઠરાવ ક્રમાંક :૧૫૭ થી સ્વીકારી મંજૂર કરેલ છે. જેની આથી જાણ કરવામાં આવે છે.

ઈન્ફોર્મેશન ટેકનોલોજી અભ્યાસસમિતિની તા.૧૯/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૨
:: આથી ઠરાવવામાં આવે છે કે, શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર બી.એસસી. (આઈ.ટી.) સેમે.-૩ અને સેમે.-૪ નો પેટાસમિતિએ તૈયાર અભ્યાસક્રમ મંજૂર કરી કોમ્પ્યુટર એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાને ભલામણ કરવામાં આવે છે.

કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાની તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૧૩

:: આથી ઠરાવવામાં આવે છે કે, ઈન્ફોર્મેશન ટેકનોલોજી અભ્યાસસમિતિ તા.૧૯/૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૨ અન્વયે કરેલ સ્વીકારી શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર બી.એસસી. (આઈ.ટી.) સેમે.-૩ અને સેમે.-૪ નો અભ્યાસક્રમ મંજૂર કરવા એકેડેમિક કાઉન્સિલને ભલામણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૨૩/૦૩/૨૦૨૨ ની સભાનાં ઠરાવ ક્રમાંક: ૧૫૭
:: આથી ઠરાવવામાં આવે છે કે, કોમ્પ્યુટર સાયન્સ એન્ડ ઈન્ફોર્મેશન ટેકનોલોજી વિદ્યાશાખાએ તા.૨૧/૦૩/૨૦૨૨ની સભાનાં ઠરાવ ક્રમાંક: ૧૩ થી કરેલ ભલામણ સ્વીકારી શૈક્ષણિક વર્ષ ૨૦૨૨-૨૩ થી અમલમાં આવનાર બી.એસસી. (આઈ.ટી.) સેમે.-૩ અને સેમે.-૪ નો અભ્યાસક્રમ મંજૂર કરવામાં આવે છે.


ઈ.યા.કુલસચિવ

બિડાણ: ઉપર મુજબ

પ્રતિ,

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

...તરફ જાણ તેમજ ઘટતી કાર્યવાહી સારૂ.

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 is being used in the industry. The continuous syllabi review adds value to the program for the outgoing students and make them ready to face challenging demands of the industry.</p> <p>PO4 : Advanced Tools Usage The program teaches the students to apply the 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 an appropriate project management capabilities.</p> <p>PO6 : Real World Problem / Project Development Real world project provides 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 : Team Work and Leadership Development Trains students to work in a team and also to take leadership of the 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</p>

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design solutions to face computational challenges.
 PSO3 : Students will be able to apply software engineering concepts to solve real world problems.
 PSO4 : Students will be able to learn emerging technologies and apply them for the development of Web applications, Mobile application, Desktop application, etc.
 PSO5: Students will develop necessary Entrepreneur and Technical skills to start their own business in I.T domain.

Mapping between POs and PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5
PO1					
PO2					
PO3					
PO4					
PO5					
PO6					
PO7					

Medium of Instruction English

Last Review / Revision June 2022

Program Structure B.Sc. (I.T.) – Semester 3 (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		
301	Soft Skills and Personality Development	4	0	4	3 Hrs	70	30	100
302	Fundamental of Electronics	4	0	4	3 Hrs	70	30	100
303	Data Structures	4	0	4	3 Hrs	70	30	100
304	Object Oriented Programming	4	0	4	3 Hrs	70	30	100
305	Computer Network	4	0	4	3 Hrs	70	30	100
306	Practical 5	0	4	2	2 Hrs	70	30	100
307	Practical 6	0	6	3	2 Hrs	70	30	100
	Total	20	10	25	-	490	210	700

Program Structure B.Sc. (I.T.) – Semester 4 (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		
401	Environmental Studies and Disaster Risk Reduction	4	0	4	3 Hrs	70	30	100
402	Fundamental of Embedded System and IoT	4	0	4	3 Hrs	70	30	100
403	VB .NET	4	0	4	3 Hrs	70	30	100
404	Relational Database Management System-I	4	0	4	3 Hrs	70	30	100
405	Web Development-I	4	0	4	3 Hrs	70	30	100
406	Practical 7	0	2	1	2 Hrs	70	30	100
407	Practical 8	0	4	2	4 Hrs	70	30	100
408	Practical 9	0	4	2	2 Hrs	70	30	100
	Total	20	10	25	-	560	240	800

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B.Sc. (I.T.) 3rd Semester

Course: 302: Fundamental of Electronics

Course Code	302					
Course Title	Fundamental of Electronics					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)					
Last Review / Revision	June 2022					
Purpose of Course	To impart knowledge of electronics devices in Information technology					
Course Objective	An understanding of basics of electronic and digital circuits.					
Course Out come	<p>CO1 : Students will be able to learn about Electronics components and Application of Electronic circuits .</p> <p>CO2 : Students will be able to learn about Digital Electronics concepts and its application in digital Arithmetic circuitry.</p> <p>CO3 : Students will be able to learn about the Digital Sequential circuits and its application.</p>					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Nil					
Course Content	<p>Unit : 1 : fundamental of electrical engineering</p> <p>1.1 Introduction of Voltage, Current, Power, Phase and Frequency</p> <p>1.2 Ideal Volt source & Ideal current source, ,</p> <p>1.3 Ohm's Law & Kirchoff's laws</p> <p>1.4 Electromagnetism</p> <p style="margin-left: 20px;">1.4.1 Magnetic Flux, Flux density, Magnetic force and permeability</p> <p style="margin-left: 20px;">1.4.2 Electromagnetic Induction and transformer</p> <p style="margin-left: 20px;">1.4.3 Heating effect due to current and need of fuses</p> <p>Unit : 2 : fundamental of electronics components and semiconductor physics</p> <p>2.1 Passive components and circuits</p> <p style="margin-left: 20px;">2.1.1 Introduction of Resistor, capacitor, Inductor</p> <p style="margin-left: 20px;">2.1.2 Series & parallel connection of resistors & capacitors</p> <p>2.2 Active components and circuits</p> <p style="margin-left: 20px;">2.2.1 different type of Diodes</p> <p style="margin-left: 20px;">2.2.2 Transistors, FET and MOSFETs</p> <p style="margin-left: 20px;">2.2.3 SCR</p> <p>2.3 Introduction of Electronics circuits</p> <p style="margin-left: 20px;">2.3.1 Power supply: rectifier and simple filter circuits</p> <p style="margin-left: 20px;">2.3.2 oscillator</p> <p style="margin-left: 20px;">2.3.3 voltage regulator</p> <p style="margin-left: 20px;">2.3.4 Amplifier,</p> <p style="margin-left: 20px;">2.3.5 switches and relay</p> <p>Unit : 3 : fundamental of Digital Electronics</p> <p>3.1 Introduction of Different Logic gates,</p> <p>3.2 Interchangeability bubbled gates,</p> <p>3.3 Demorgan's theorem & Duality theorem,</p>					

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	<p>3.4 Universal gates 3.5 product of sum and sum of product method 3.6 Karnaugh map & it's simplification. 3.7 NAND-NAND ckts and NOR - NOR circuits</p> <p>Unit : 4 : Data processing and Arithmetic circuits</p> <p>4.1 Multiplexers and De-multiplexers 4.2 Decoders and Encoders 4.3 parity generator and checkers 4.4 Half adder, full adder , adder - subtracter circuits</p> <p>Unit : 5 : Sequential circuits</p> <p>5.1 FLIP FLOPS: 5.1.1 Construction of flip flops using different gates 5.1.2 RS, D,J-K flip-flop, 5.1.3 JK master slave concept.</p> <p>5.2 Shift Registers and counters: 5.2.1 study of shift Registers 5.2.2 Synchronous counter and Asynchronous counter 5.2.3 Mod counters.</p>
Reference Book	<ol style="list-style-type: none"> 1. Principal of Electrical and Electronics by V.K. Mehta, S.Chand Limited,1998 2. Digital design, M. Morris Mano, Prentice Hall,2002 3. Basic Electronics by B.L.Theraja, S. Chand Limited,2007 4. Digital electronics, Anil Kumar Maini, Wiley,2007 5. Digital principals and applications by Donald P. Leach ,Albert Paul, Malvino,Tata McGraw-Hill,2010 6. Fundamental of Electronic Engineering by Rajendra Prasad, Cengage Learning,2012 7. Digital Electronics: A Practical Approach with VHDL, 9th edition, William Kleitz,pearson,2012 8. Basic Electronics, D P Kothari, I J Nagrath, McGraw-Hill Education,2013 9. Digital Electronics 1: Combinational Logic Circuits,Tertulien Ndjountche, Wiley-ISTE,2016 10. Digital Electronics 3: Finite-state Machines. Tertulien Ndjountche, Wiley-ISTE,2016 11. Digital Systems, 12th edition, Ronald J. Tocci, Neal S. Widmer, Greg Moss, pearson,2017 12. Digital Fundamentals, 11th edition,Thomas L Floyd,pearson,2017 13. Electronics: Principles and Applications, Charles Schuler, McGraw-Hill Education,2018 14. Electronic Circuits, Fundamentals and Applications, Mike Tooley CRC Press,2019 15. Fundamentals of Digital Electronics, Dhanasekharan Natarajan, Springer Nature Switzerland AG,2020 16. Electronic Principles, Albert Paul Malvino, David J. Bates, Patrick E. Hoppe,McGraw-Hill Education,2020 17. Grob's Basic Electronics, Mitchel E. Schultz,McGraw-Hill Education; 13thedition ,2020 18. Digital Electronics: Principles and Applications, Roger Tokheim and PatrickHoppe, McGraw-Hill Education,2021
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

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B.Sc. (I.T.) 3rd Semester

Course : 303 : Data Structures

Course Code	303																								
Course Title	Data Structures																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2022																								
Purpose of Course	To introduce the basic concepts of data structures and algorithms involving linear and non-linear data structures and their logical implementation.																								
Course Objective	To teach fundamental concepts of data structures including stack, queue, linked list, tree and various sorting, searching techniques. This course also entails practical aspect of applications of data structures.																								
Course Outcomes	CO1 : Students will be able to learn data structure techniques and algorithms used for solving complex problems CO2 : Students will be able to learn linear data structure and non-linear data structure algorithms CO3 : Students will be able to learn working of various sorting and searching algorithms																								
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> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO2</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></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	Fundamentals of Computer, C Programming Language																								
Course Content	<p>Unit : 1 : Introduction</p> <p>1.1 Definition and Classification 1.2 Importance of data structures 1.3 Data Structure Operations 1.4 Analysis of Algorithms, Algorithm Complexity 1.5 Time-Space Trade off, Big-O and theta Notation</p> <p>Unit : 2 : Linear Data Structures</p> <p>2.1 Array: Storage, mapping and applications 2.2 Stack 2.2.1 Concept and Definition 2.2.2 Operations 2.2.3 Applications of stack 2.2.4 Polish Expression 2.2.5 Infix, Prefix and Postfix Notation 2.2.6 Converting Infix to Postfix Notation 2.2.7 Expression Evaluation 2.2.8 Recursion and Tower of Hanoi Problem</p>																								

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- 2.3 Queue
- 2.3.1 Concept and Definition
- 2.3.2 Types of Queue
- 2.3.3 Simple Queue
- 2.3.4 Circular Queue
- 2.3.5 Double ended Queue
- 2.3.6 Priority Queue
- 2.3.7 Operations on all queue
- 2.3.8 Applications of queue

- 2.4 Linked List
- 2.4.1 Concept and Definition
- 2.4.2 Types of Linked list
- 2.4.3 Singly Linked List
- 2.4.4 Circular Linked List
- 2.4.5 Doubly Linked List
- 2.4.6 Circular Doubly Linked List
- 2.4.7 Header Linked List
- 2.4.8 Operations on linked list
- 2.4.9 Applications of linked list
- 2.4.10 Polynomial Manipulation

Unit : 3 : Non Linear Data Structures

- 3.1 Tree
- 3.1.1 Introduction and Representation
- 3.1.2 General Tree
- 3.1.3 Binary Tree
- 3.1.4 Threaded and linked storage representation of Binary Tree
- 3.1.5 Operations on Binary Tree
- 3.1.6 Binary Tree Traversals
- 3.1.7 Binary Search Tree
- 3.1.8 Height-Balanced Tree: AVL tree
- 3.1.9 Splay Tree
- 3.1.10 Applications of tree: Expression Tree
- 3.1.11 Symbol table and Syntax Analysis

Unit : 4 : Basic Techniques and Example Algorithms

- 4.1 Divide and Conquer Method
- 4.2 Greedy Method
- 4.3 Backtracking
- 4.4 Other Algorithm techniques

Unit : 5 : Searching and Sorting

- 5.1 Searching
- 5.1.1 Linear Search
- 5.1.2 Binary Search
- 5.1.3 Hashing

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	5.1.3.1 Hash Tables 5.1.3.2 Hash Functions and Hash Keys 5.1.3.3 Collision and Collision Resolution 5.1.3.4 Rehashing 5.2 Sorting 5.2.1 Bubble sort 5.2.2 Selection sort 5.2.3 Insertion sort 5.2.4 Shell sort 5.2.5 Merge sort 5.2.6 Quick sort 5.2.7 Radix sort 5.2.8 Heap Sort
Reference Book	1. An Introduction to Data Structures with applications – Trembley, Sorenson – TMH 2. Theory and problems of data structures – Seymour Lipschutz – TMH 3. Data Structures and Algorithms in C++ - Michael T. Goodrich, Roberto Tamassai, David M. Mount – Wiley 4. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson-Freed - W. H. Freeman & Co. New York, NY, USA 5. Data Structures & Algorithms, A V Aho, J E Hopcroft, J D Ullman - Addison-Wesley Publishing 6. Data Structure & "C" Programming - Vanwyte C J - Addison Wesley. 7. Data Structures, Algorithms And Object Oriented Programming – TMH edition Geogory L. Heileman. 8. Data Structures using C & C++ - Y. Langsam Moshe J. Angensterin & A.M.Terenbanm
Teaching Methodology	Lectures, Discussion, Self Study, Seminars, Case Study and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Desai

B.Sc. (I.T.) 3rd Semester

Course : 304 : Object Oriented Programming

Course Code	304																								
Course Title	Object Oriented Programming																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2022																								
Purpose of Course	To impart knowledge of object-oriented programming concepts																								
Course Objective	To make student learn the concepts of Object-Oriented Programming																								
Course Outcomes	<p>CO1 : Students will be able to learn Object Oriented programming concepts.</p> <p>CO2 : Students will be able to learn object oriented programming concepts like data abstraction, inheritance, polymorphism using C++</p> <p>CO3 : Students will be able to learn I/O operation on files using IO streams and exception handling using C++.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <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 style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></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	C Programming																								
Course Content	<p>Unit : 1 : Basic concepts of object oriented of programming</p> <p>1.1 Background</p> <p style="padding-left: 20px;">1.1.1 Procedure Oriented Programming Vs Object Oriented Programming</p> <p style="padding-left: 20px;">1.1.2 Basic Concepts of Object Oriented Programming</p> <p style="padding-left: 20px;">1.1.3 Benefits of Object Oriented Programming</p> <p>1.2 Classes & Objects</p> <p style="padding-left: 20px;">1.2.1 Specifying a class</p> <p style="padding-left: 20px;">1.2.2 Defining member functions</p> <p style="padding-left: 20px;">1.2.3 Inline function</p> <p style="padding-left: 20px;">1.2.4 Nesting of member functions</p> <p style="padding-left: 20px;">1.2.5 Private member function</p> <p style="padding-left: 20px;">1.2.6 Static data members</p> <p style="padding-left: 20px;">1.2.7 Static member functions</p> <p style="padding-left: 20px;">1.2.8 Friend functions</p> <p style="padding-left: 20px;">1.2.9 Returning objects</p> <p style="padding-left: 20px;">1.2.10 Pointers to members</p> <p>1.3 Constructors & Destructors</p> <p style="padding-left: 20px;">1.3.1 Constructors</p> <p style="padding-left: 20px;">1.3.2 Parameterized constructors</p> <p style="padding-left: 20px;">1.3.3 Multiple constructors in a class</p> <p style="padding-left: 20px;">1.3.4 Constructors with default arguments</p>																								

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- 1.3.5 Copy constructors
- 1.3.6 Dynamic constructors
- 1.3.7 Const objects
- 1.3.8 Destructors.

Unit : 2: Inheritance & Polymorphism

2.1 Inheritance

- 2.1.1 Defining derived class using single base class
- 2.1.2 Derivation using public.
- 2.1.3 Private and protected access modifiers
- 2.1.4 The implementation of inheritance in the C++ object model
- 2.1.5 The multiple-inheritance, Abstract classes
- 2.1.6 Composite objects (container objects)

2.2 Compile Time Polymorphism

- 2.2.1 Function Overloading
- 2.2.2 Unary Operators
- 2.2.3 Binary Operators
- 2.2.4 Using Friends as operator functions

- 2.2.5 Overloading other Operators
- 2.2.6 User defined conversion
- 2.2.7 Four different cases of user defined conversions
- 2.2.8 Comparison of both the methods of conversion

2.3 Run Time Polymorphism

- 2.3.1 Pointers to objects
- 2.3.2 this pointer
- 2.3.3 Pointers to derived classes
- 2.3.4 Virtual functions
- 2.3.5 Pure virtual functions.

Unit : 3: I/O Streams and Files

3.1 I/O Streams

- 3.1.1 Introduction to stream
- 3.1.2 Advantages of using C++ I/O over C I/O
- 3.1.3 The C++ Predefined streams
- 3.2.4 Formatting I/O
- 3.1.5 Formatting using I/Os members
- 3.1.6 Manipulators, Creating our own manipulator

3.2 Data Files

- 3.2.1 Introduction to File I/O
 - 3.2.2 Text and binary streams
 - 3.2.3 Opening and closing files
 - 3.2.4 Text files
 - 3.2.5 Binary files
 - 3.2.6 Providing Random Access using seek
- ### 3.3 I/O Modes Handling Errors

Unit 4: Exception Handling

- 4.1 Introduction
- 4.2 Basics of Exception Handling
- 4.3 Exception Handling Mechanism
- 4.4 Throwing Mechanism
- 4.5 Catching Mechanism
- 4.6 Rethrowing an Exception

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	Unit : 5 Templates 5.1 Function Templates 5.2 Non Generic (Non Type) Parameters in Template functions 5.3 Template function and specialization 5.4 Overloading a template function 5.5 Using Default Arguments 5.6 Class Templates 5.7 Classes with multiple generic data types 5.8 Static data members 5.9 Primary and Partial Specialization 5.10 The Export Keyword. 5.11 Standard Template Library (STL) 5.11.1 Algorithms 5.11.2 Containers 5.11.3 Functions 5.11.4 Iterators
Reference Book	1. Object Oriented Programming with C++: Balagurusamy - TMH 2. OOP in Turbo C++: Robert Lafore - Galgotia Publication 3. C++ Primer :Lippman - Addison Wesley 4. Object Oriented Programming Fundamentals & Applications: Probal Sengupta - PHI 5. The Complete Reference: Schildt - Osborne 6. The C++ Programming Language: Stroustrup - Addison Wesley 7. Object Oriented Analysis & Design with Application, Grady Booch, LPE 8. Standard C++ with Object Oriented Programming, Paul S. Wang, Thomson
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

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B.Sc. (I.T.) 3rd Semester

Course : 305 : Computer Network

Course Code	305																								
Course Title	Computer Network																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)																								
Last Review / Revision	June 2022																								
Purpose of Course	To provide fundamental knowledge of Computer Network																								
Course Objective	To Impart fundamental Knowledge of Computer Network																								
Course Outcomes	<p>CO1 : Students will be able to learn network components and technologies</p> <p>CO2 : Students will be able to learn layered network models and protocols</p> <p>CO3 : Students will be able to learn various network security techniques.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <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></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></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																									
Prerequisite	Knowledge of Fundamental of Computers																								
Course Out come	Students will be able understand computer networking and fundamental of network security																								
Course Content	<p>Unit 1: Introduction to Networks</p> <p>1.1 Data Communications: components 1.2 Direction of data flow 1.3 Networking – Concept, 1.4 Need, Uses and advantages of Network 1.5 Categories of networks 1.6 Client, Servers and Peers based and Hybrid Networks 1.7 Topologies 1.8 Review of protocols 1.9 Models and implementations 1.10 Internet protocols</p> <p>Unit 2: Introduction to Network Model</p> <p>2.1 Introduction 2.1.1 Layered Architecture 2.1.2 Introduction to OSI Model 2.1.3 Introduction to TCP Model 2.1.4 The OSI Model layer functions</p> <p>2.2 Introduction to Physical Layer 2.2.1 Data and Signals 2.2.2 Digital Transmission 2.2.3 Analog transmission</p>																								

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- 2.2.4 Bandwidth
- 2.2.5 Transmission Media
- 2.2.6 Switching
- 2.2.7 IEEE 8.2 Standards
- 2.3 Data Link Layer
 - 2.3.1 Functions of Data link layer
 - 2.3.2 Error detection and correction
 - 2.3.3 Error detection and correction codes
 - 2.3.4 Data link control and protocols
 - 2.3.5 Multiple access protocol: CSMA/CD, LAN: Ethernet
 - 2.3.6 Introduction : Wireless LAN, Connecting devices: Repeaters, Hubs, Bridges, switches, concept of VLAN

Unit 3: Introduction to Network, Transport, Session, Application Layer

- 3.1 Network Layer
 - 3.1.1 Introduction to Network Layer
 - 3.1.2 Connection-less service
 - 3.1.3 Connection oriented service
 - 3.1.4 Inter-networking, addressing
 - 3.1.5 Routing algorithms (Distance vector, Link state)
 - 3.1.6 Introduction to Network layer in internet: Logical addressing
 - 3.1.7 IP protocol, IP address
 - 3.1.8 Classes of IP addresses
 - 3.1.9 Routers, Brouters, Gateways
- 3.2 Transport Layer
 - 3.2.1 Transport Service Primitives
 - 3.2.2 Addressing, connection establishment, flow control
 - 3.2.3 Multiplexing
 - 3.2.4 Introduction to transport layer protocols and their features
- 3.3 Session Layer
 - 3.3.1 Introduction to : Establishing Session
 - 3.3.2 Presentation with Content Encoding and Decoding
 - 3.3.3 Introduction to application layer protocols
- 3.4 Application Layer
 - 3.4.1 Introduction to application layer protocols

Unit 4: Network Configuration and Administration

- 4.1 Installing and configuring network
- 4.2 Managing network bindings
- 4.3 Sharing files and printers User profiles
- 4.4 Folder security, Account policies
- 4.5 Trust relationship between domains
- 4.6 Computer Management
- 4.7 Workstation management
- 4.8 Network Management commands

Unit 5: Network Security

- 5.1 Various Types of security
- 5.2 Security with certificates
- 5.3 Planning a security approach

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	<p>5.4 Security problems and their consequences</p> <p>5.5 Introduction to firewalls</p> <p>5.6 Encryption and decryption standards</p> <p>5.7 Secure Socket Layer</p> <p>5.8 Virtual Private Networks</p>
Reference Book	<p>1. Data Communications and Networking, 4/e Behrouz A. Forouzan - DeAnza College</p> <p>2. Computer Networks by A.S. Tanenbaum - PHI Publications</p> <p>3. Computer Networks : A pragmatic Approach, C R Sharma, Jaico, 2005</p> <p>4. Data and computer Communication, William Stallings - Pearson Education,</p> <p>5. MCSE: Networking Essentials Study Guide – TMH</p> <p>6. Mastering Local Area Networks by Christa Anderson & Mar Minasi – BPB</p>
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	<p>30% Internal assessment</p> <p>70% External assessment</p>

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B.Sc. (I.T.) 3rd Semester

Course : 306 : Practical 5

Course Code	306																								
Course Title	Practical 5																								
Credit	2																								
Teaching Per Week	4 Hrs																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2022																								
Purpose of Course	To impart practical knowledge of various data structures																								
Course Objective	To give practical knowledge on applications of data structures																								
Prerequisite	Basic knowledge of C programming language																								
Course Out comes	CO1 : Students will be able to develop programs of linear and nonlinear data structures. CO2 : Students will be able to practically implement data structures like stack, queue , linked list etc.. CO3 :Students will be able to write programs of searching and sorting techniques.																								
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																									
Course Content	Practical based on Paper No 303																								
Reference Books	NIL																								
Teaching Methodology	Lab Work, Assignment																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

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B.Sc. (I.T.) 3rd Semester

Course : 307: Practical 6

Course Code	307																								
Course Title	Practical6																								
Credit	3																								
Teaching Per Week	6Hrs																								
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Last Review/Revision	June 2022																								
Purpose of Course	To impart practical knowledge of object oriented programming																								
Course Objective	To give practical knowledge of object oriented programming																								
Prerequisite	Basic knowledge of C programming language																								
Course Out comes	<p>CO1 : Students will be able to solve problems using object oriented programming with C++.</p> <p>CO2 : Students will be able to implement programs using object oriented concepts like inheritance ,polymorphisms and data abstraction in C++.</p> <p>CO3 :Students will be able to do practical programs of I/O operation on files using IO streams and exception handling using C++</p>																								
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																									
Course Content	Practical based on paper number 304.																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

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B.Sc. (I.T.) 4th Semester

Course: 401 Environmental Studies and Disaster Risk Reduction

Course Code	401					
Course Title	Environmental Studies and Disaster Risk Reduction					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)					
Effective From	June 2022					
Purpose of Course	To make the students aware of Environment related issues and prepare them to manage Natural disasters.					
Course Objective	<p>To sensitize the students towards the environment issues.</p> <p>To impart knowledge and concepts of disaster, disaster management and disaster risk reduction.</p> <p>To develop positive attitude towards Environmental concerns and practical responses to different stages of disaster management by adopting sustainable development.</p>					
Course Outcomes	<p>CO1:Students will be able to develop environmental awareness and a Change in their attitudes towards nature and Environment.</p> <p>CO2:Students will be able to define and analyse the factors Contributing to disasters, threats to development, life and nature.</p> <p>CO3:Students will be able to formulate , organise and assess the different environmental concerns and disaster risk reduction activities .</p>					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Basic Knowledge about the environment.					

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Course Content	<p>Unit 1: The Multidisciplinary Nature of Environmental Studies</p> <ol style="list-style-type: none"> 1.1 Definition 1.2 Scope 1.3 Importance 1.4 Need of Public Awareness <p>Unit 2: Introduction to Disasters</p> <ol style="list-style-type: none"> 2.1 Concepts and Definitions (Disaster, Hazard, Vulnerability, Resilience, Risks) 2.2 Disaster Classification: Causes, Impacts.: Differential Impacts in terms of caste ,class, gender, age ,location, Disability 2.3 Hazard and disaster type –Natural, water related, pandemic and human induced hazards and disasters. <p>Unit 3: Disaster Intervention Practices and management</p> <ol style="list-style-type: none"> 3.1 Global trends in disasters, pandemics, complex Emergencies, climate change. 3.2 Disaster management :cycle rescue, relief, rehabilitation, reconstruction, prevention ,mitigation and Preparedness. 3.3 Early warning systems 3.4 Trauma and stress management 3.5 First aid and emergency procedures 3.6 Phases of disasters/risk management and post-disaster Responses. 3.7 Disaster risk reduction strategies and national disaster management guidelines 3.8 Disaster management act- 2005 <p>Unit 4: Pollution and waste management</p> <ol style="list-style-type: none"> 4.1 Definition 4.2 Causes, effects and control measures of pollution 4.3 Air Pollution 4.4 Water Pollution 4.5 Soil pollution 4.6 Pollution problems today 4.7 Role of an Individual in Prevention of pollution 4.8 Nuclear Hazards 4.9 Solid waste management 4.10 E-waste management 4.11 Green Computing <p>Unit 5: Current Environment and Health Concerns</p> <ol style="list-style-type: none"> 5.1 Environmental Health 5.2 Mental health and stress and anxiety management 5.3 Global impact of climatic changes on Human beings and species
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P. V. Dasa

	<p>5.4 Ocean Acidification</p> <p>5.5 Deforestation and its impact</p> <p>5.6 Cancer and its awareness</p> <p>5.7 Corona: Virus and Related Issues</p> <p>5.8 Water related diseases</p> <p>5.9 Genetic modification of crops</p> <p>5.10 Unhealthy food and Risk due to chemical in food.</p> <p>5.11 Organic food and its need today</p> <p>5.12 Food waste</p>
Reference Books	<ol style="list-style-type: none"> 1. Bharucha, E. 2003, Textbook for Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune. 361. 2. Carson, Rachel. 1962. Silent Spring (Boston: Houghton Mifflin, 1962), Mariner Books, 2002 3. Singh, R. (2017), "Disaster Management Guidelines for Earthquakes, Landslides, Avalanches and Tsumani". Horizon Press Publications. 4. Taimpo (2016) "Disaster management Preparedness" CRC Press Publications. 5. Nidhi, G.D. (2014) "Disaster Management Preparedness". CBC Publications Pvt.Ltd. 6. Gupta, A.K, Nair, S.S., Shiraz, A and Dey, S (2013) "Flood Disaster Risk Management-CBS Publications Pvt.Ltd. 7. Singh, R. (2016), "Disaster Management Guidelines for Natural Disasters" Oxford University Press Pvt.Ltd. 8. Lindell, Michael K. Disaster studies. Texas A&M University, USA
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Desai

B.Sc. (I.T.) 4th Semester

Course: 402: Fundamental of Embedded System and IOT

Course Code	402					
Course Title	Fundamental of Embedded System and IoT					
Credit	4					
Teaching per Week	4 Hrs					
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)					
Last Review / Revision	June 2022					
Purpose of Course	To understand importance and role of Embedded system in Real world applications					
Course Objective	This course gives concepts about interfacing of devices with microcontroller and develops logic with assembly and "C" language at machine level					
Course Out come	<p>CO1 : Students will be able to learn about Microcontrollers.</p> <p>CO2 : Students will be able to learn about the Embedded System Development Process.</p> <p>CO3 : Students will be able to learn about the Embedded System Application in IOT.</p>					
Mapping between COs with PSOs		PSO1	PSO2	PSO3	PSO4	PSO5
	CO1					
	CO2					
	CO3					
Pre-requisite	Fundamental of Digital Logic Design, Electronics and 'C' Language					
Course Content	<p>Unit : 1 : Introduction to Embedded Systems Design</p> <p>1.1 Trends in Embedded Systems</p> <p>1.2 Challenges and Design Issues in Embedded Systems</p> <p>1.3 Introduction to Applications of embedded system</p> <p>1.4 Embedded system development process (waterfall model)</p> <p>Unit : 2 : Introduction of 8-bit and 32 bit Microcontrollers</p> <p>2.1 Introduction to 8-bit 8051 core Microcontroller Architecture and Organization</p> <p>2.2 Introduction of 32-bit ARM Microcontroller Architecture and Organization</p> <p>2.3 input / Output Ports,</p> <p>2.4 interrupt handling,</p> <p>2.5 Timers and Counters</p> <p>Unit : 3 : Microcontroller and Interfacing</p> <p>3.1 Introduction of Sensors and actuators</p> <p>3.2 Analog to digital converter(ADC)</p> <p>3.3 Introduction of UART,</p> <p>3.4 Introduction of I2C,</p> <p>3.5 Introduction of SPI,</p> <p>Unit : 4 : Programming Concepts for Embedded system</p> <p>4.1 Overview of C language in concepts of Embedded system.</p> <p>4.2 Basic concept of C-language, memory pointer, Bit wise operator</p> <p>4.3 Basic programming concept for 8-bit microcontroller peripheral configuration using c-language.</p> <p>4.4 Introduction to RTOS</p>					

P. M. Datta

	<p>Unit : 5 : Introduction of the Internet of the Things</p> <p>5.1 Embedded system platforms and utilities in IOT, 5.2 Ethics requirements in internet of the things 5.3 Wired and Wireless distributed embedded system applications in IOT. 5.4 Overview of Near Field Communication(NFC) like Bluetooth, RFID, etc. and its applications for IOT 5.5 Overview of development Tools for embedded system and IOT</p>
Reference Book	<ol style="list-style-type: none"> 1. 8051 Microcontroller, An Applications Based Introduction, David Calcutt, Frederick Cowan, Hassan Parchizadeh, Elsevier Science,2003 2. The 8051 microcontroller, Kenneth J. Ayala, Thomson Delmar Learning,2005 3. The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Mazidi Muhammad Ali, Pearson India,2007 4. Microcontrollers - Architecture, Programming, Interfacing and System Design, Raj Kamal, Pearson Education, 2011 5. AVR Microcontroller and Embedded Systems: Using Assembly and C, Mazidi Muhammad Ali, Pearson India,2013 6. Fundamentals of Embedded Software with the ARM Cortex-M3, Daniel W. Lewis, pearson,2013 7. 8051 Microcontrollers Internals, Instructions, Programming an interfacing, Subrata Ghoshal, Pearson Education India,2014 8. Embedded Systems: Concepts, Design and Programming, Himanshu B. Dave,pearson,2015 9. Designing The Internet of Things, Hakin Cassimally Adrian Mcewen, Willey,2015 10. Introduction To Embedded Systems, K. V Shibu, McGraw Hill,2016 11. Real-Time Embedded Systems, Jiacun Wang, Wiley,2017 12. Programming for the Internet of Things: Using Windows 10 IoT Core and Azure IoT Suit,. Dawid Borycki, Microsoft Press,2017 13. Internet Of Things, rajkamal, McGraw Hill ,2017 14. Designing Embedded Systems and the Internet of Things (IoT) with the ARM mbed, Perry Xiao,willey,2018 15. Embedded Programming with Modern C++ Cookbook, Igor Viarheichyk , Packt Publishing,2020 16. Hands-On RTOS with Microcontrollers: Building Real-time Embedded Systems Using FreeRTOS, STM32 MCUs, and SEGGER Debug Tools Brian Amos, Packt Publishing,2020 17. Embedded Systems, Raj Kamal, McGraw Hill,2020 18. The Internet of Things: From Data to Insight, John Davies (Editor), Carolina Fortuna (Editor),Wiley,2020 19. Embedded Digital Control with Microcontrollers: Implementation with C and Python, Cem Unsalan, Duygun E. Barkana, H. Deniz Gurhan, Wiley-IEEE Press,2021
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Das

B.Sc. (I.T.) 4th Semester

Course: 403: VB.NET

Course Code	403																								
Course Title	VB.NET																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																								
Effective From	June 2022																								
Purpose of Course	This course helps to learn basics programming of windows forms applications using Visual Basic .NET.																								
Course Objective	The objective of the course is to impart basic introduction to Microsoft .NET technology and concepts of GUI applications.																								
Course Outcomes	<p>CO1 : Students will be able to learn about Microsoft .NET Framework Technology and the importance of Object Oriented Programming.</p> <p>CO2 : Students will be able to learn about how to connect database by using ADO.NET and perform CRUD operations on database.</p> <p>CO3 : Students will be able to develop windows form based applications using VB.NET.</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> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO2</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></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	Knowledge of Programming, Object Oriented Programming and Database Management System																								
Course Content	<p>Unit : 1 : Visual Basic .NET and the .NET Framework</p> <ol style="list-style-type: none"> 1.1 Microsoft .NET Framework architecture 1.2 Common Language Runtime 1.3 Common Type System 1.4 Common Language Specification 1.5 Microsoft Intermediate Language 1.6 Assemblies – Private, Shared and Satellite 1.7 Namespaces 1.8 Class Libraries 1.9 Introduction of Visual Studio.Net – IDE 1.10 App.config – Application Settings and Connection String <p>Unit : 2 : Programming in Visual basic .net</p> <ol style="list-style-type: none"> 2.1 Data Type 2.2 Variables 2.3 Constants 2.4 Arrays 2.5 Control Array 2.6 Collections 2.7 Subroutines 2.8 Functions 2.9 Control Flow statements 																								

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	<p>2.10 Messagebox and Inputbox</p> <p>Unit : 3 : VB.NET Standard Controls with Properties, Events and Methods</p> <p>3.1 Form 3.2 Textbox 3.3 Label 3.4 Button 3.5 Listbox 3.6 Combobox 3.7 Checkbox 3.8 PictureBox 3.9 Radiobutton 3.10 Linklabel 3.11 Scrollbar 3.12 Timer 3.13 Panel 3.14 Listview 3.15 Treeview 3.16 Toolbar 3.17 StatusBar 3.18 Implementation of User Controls</p> <p>Unit : 4 : Built-In Dialog Boxes, Containers and Menus</p> <p>4.1 OpenFileDialog 4.2 SaveFileDialog 4.3 FontDialog 4.4 ColorDialog 4.5 PrintDialog 4.6 MenuStrip 4.7 ToolStrip 4.8 StatusStrip 4.9 FlowLayoutPanel 4.10 GroupBoxPanel 4.11 SplitContainer 4.12 TabControl 4.13 TableLayoutPanel</p> <p>Unit : 5 : Database Programming with ADO.NET</p> <p>5.1 ADO.NET Architecture 5.2 ADO.NET Components 5.3 Connection Object 5.4 Command Object 5.5 DataReader Object 5.6 DataAdapter Object 5.7 SQL Server .NET Data Provider 5.8 OLEDB .NET Data Provider 5.9 DataSet Object 5.10 DataGrid Object 5.11 Design time data binding 5.12 Runtime data binding 5.13 Working with Stored Procedures</p>
Reference Book	<ol style="list-style-type: none"> 1. Professional VB.NET by Fred Barwell : Wrox Publication 2. Visual Basic .NET Programming – Black Book by Stevan Holzner : Dreamtech Press 3. Introduction to .NET framework : Wrox publication 4. The Complete Reference Visual Basic .NET by Jeffery R. Shapiro : Tata McGraw Hills 5. Murach’s Beginning Visual basic .Net By Anne Bohem : Murach 6. Mastering VB.NET by Evangelos petroustos : BPB publications

P. M. Dora

Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Desai

B.Sc. (I.T.) 4th Semester

Course: 404: Relational Database Management System-I

Course Code	404																												
Course Title	Relational Database Management System-I																												
Credit	4																												
Teaching per Week	4 Hrs																												
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																												
Effective From	June 2022																												
Purpose of Course	To introduce the concepts of Relational Database design, relational algebra, functional dependency and normalization of relation.																												
Course Objective	<ol style="list-style-type: none"> 1. To acquaint the students with fundamental concepts of RDBMS 2. To make student understand process of normalization, functional dependency with case study. 3. To entail practical aspect of Structure Query Language (SQL) 																												
Course Outcomes	<p>CO1 : Students will be able to learn about Introduction to RDBMS, Relational database design</p> <p>CO2 : Students will be able to design a good database using normalization, decomposition and functional dependency.</p> <p>CO3 : Students will be able to perform practical on database through DDL statements, DML statements and Structured Query Language.</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></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <th>CO3</th> <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	Basic Concepts of DBMS																												
Course Out come	Students will be able to understand and implement relational database design principles, learn the process of normalizing the relation. Students will also be able to perform practical on database through DDL, DML statement of SQL																												
Course Content	<p>Unit : 1 : Relational Model</p> <ol style="list-style-type: none"> 1.1 Structure of relational databases 1.2 Codd's rules 1.3 The relational algebra <ol style="list-style-type: none"> 1.3.1 Fundamental operations <ol style="list-style-type: none"> 1.3.1.1 Selection, projection, 1.3.1.2 Set Operations <ul style="list-style-type: none"> Union, intersection, difference, Cartesian Product <p>Unit : 2: Relational Database Design</p> <ol style="list-style-type: none"> 2.1 Functional Dependency 																												

P. N. Das

- 2.1.1 Definition
- 2.1.2 Trivial and non trivial FD
- 2.1.3 Inference Rules for FDs
- 2.1.4 Closure of FD set

- 2.2 Database Normalization
- 2.2 Definitions of Keys and Attributes Participating in Keys
- 2.3 Pitfalls in Relational-Database Design
- 2.4 First Normal Form
- 2.5 Second Normal Form
- 2.6 Third Normal Form
- 2.7 Boyce Codd Normal Form
- 2.8 MVD and Fourth Normal Form
- 2.8.De-normalization
- 2.9 Database Normalization with Case Study

Unit : 3 : Structured Query Language

- 3.1. Creating database structure
- 3.2 Creating table structure
- 3.3 DDL commands
- 3.4 DML commands
- 3.5 Queries
 - 3.5.1 Simple queries
 - 3.5.2 Search conditions
 - 3.5.3 Defining constraints
 - 3.5.3.1 Table level constraints
 - 3.5.3.2 Column level constrains
 - 3.5.3.3 Primary Key, Foreign key constraints
 - 3.5.4 Operators
 - 3.5.4.1 Logical operators: AND, OR, NOT
 - 3.5.4.2 Special Operators: BETWEEN, IS NULL, LIKE, IN, EXISTS
 - 3.5.5 Range searching and pattern matching
 - 3.5.6 Aggregate functions
 - 3.5.7 In built functions
 - 3.5.7.1 Date functions
 - 3.5.7.2 String functions
 - 3.5.7.3 Conversion functions
 - 3.5.8 Grouping
 - 3.5.9 Sub Queries
 - 3.5.10 Joins
 - 3.5.10.1 Structure of Joins
 - 3.5.10.2 types of joins
 - 3.5.10.3 Using UNION, INTESECT, MINUS clause
 - 3.5.11 Views
 - 3.5.11.1 Definition
 - 3.5.11.2 Creating view
 - 3.5.11.3 Updating view
 - 3.5.11.4 Destroying view

Unit : 4 : Query Processing and Optimization

- 4.1 Introduction
- 4.2 Evaluation of relational algebra expressions
- 4.3 Query Parsing
- 4.4 Query Equivalence
- 4.5 Measures of query cost

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	<p>4.6 Query Optimization Algorithms</p> <p>Unit : 5 : Practical Relational Database Design</p> <p>5.1 Enhanced ER Diagram 5.2 ER and EER to Relational Mapping 5.3 Relational Database Design Case Study</p>
Reference Book	<ol style="list-style-type: none"> 1. Database System Concepts 7th Edition - Henry F. Korth & AbrahamSilberschatz – TMH 2. SQL, PL/SQL – The programming Language Oracle - 4th Edition-by Ivan Bayross – BPB 3. Principles of Database Systems - Jeffery Ullman - Galgotia Publication 4. An introduction to Database Systems - C.J.Date - Addison- Wesley 5. Introduction to Database Management - Navin Prakash – TMH 6. Introduction to Database System - Bipin C. Desai – Galgotia 7. Fundamental of Database Systems – Elmasri, Navathe – Pearson-Addison Wesley
Teaching Methodology	Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. V. Dasan

B.Sc. (I.T.) 4th Semester

Course: 405: Web Development - I

Course Code	405																								
Course Title	Web Development - I																								
Credit	4																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Classwork, examination, preparation, holidays etc.)																								
Effective From	June 2022																								
Purpose of Course	To provide knowledge of client side programming, XML, JSON and jQuery																								
Course Objective	To teach client side programming using JavaScript, core concepts of XML, JSON AJAX and jQuery																								
Course Outcomes	<p>CO1 : Students will be able to learn about client side technology using JavaScript.</p> <p>CO2 : Students will be able to learn jQuery to manipulate HTML elements & CSS properties, showing effects and handle events.</p> <p>CO3 : Students will be able to learn about AJAX, XML, JSON and parse XML data using JavaScript.</p>																								
Mapping between COs with PSOs	<table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <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 style="background-color: #cccccc;"></td> <td></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></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	Basic Programming Skills																								
Course Content	<p>Unit : 1 : JavaScript Basics and Object Model</p> <ol style="list-style-type: none"> 1.1. HTML to XHTML 1.2. Basic of JavaScript Programming 1.3. The <script> tag – Basic Syntax 1.4. Variables <ol style="list-style-type: none"> 1.4.1. Expressions 1.4.2. Data Types 1.4.3. Operators 1.5. Strict Mode 1.6. var, let, const 1.7. Arrays 1.8. Objects and Classes 1.9. Regular Expressions 1.10. Working with Text Converting Strings – Template Strings 1.11. Conditional Loops 1.12. Functions 1.13. Entities 1.14. Advanced Math Operations 1.15. Date Object 1.16. Timeout 1.17. Cookies 1.18. Object Model and Event Handling 																								

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- 1.18.1. Programming Using Objects
- 1.18.2. Document Object Model
 - 1.18.2.1. Object Hierarchy
 - 1.18.2.2. Properties
 - 1.18.2.3. Methods
 - 1.18.2.4. Events
- 1.18.3. Events
- 1.18.4. Event Listeners and Handlers
- 1.18.5. Window Object
- 1.18.6. Open and Close New Windows Dynamically
- 1.18.7. Alert
- 1.18.8. Confirm
- 1.18.9. Prompt Windows
- 1.18.10. Frames Navigation

Unit : 2 : Manipulating Components

- 2.1. The Keyword this
- 2.2. Forms
- 2.3. Names vs. IDs
- 2.4. Arrays of Elements
- 2.5. Manipulating the Value of a Text Field
- 2.6. Text Field Events
- 2.7. Form Handlers
- 2.8. Checkboxes
- 2.9. Radio Buttons
- 2.10. Selects on Change in Various Form Elements
- 2.11. Hidden Text Field values
- 2.12. Add and remove Form elements
- 2.13. Dynamically Modifying Select Lists
- 2.14. Validating Form Entries
- 2.15. Processing Forms

Unit : 3 : Image Handling and Browser Capabilities

- 3.1. Image Swaps
- 3.2. Graphical Navigational Bar
 - 3.2.1. Rollovers
 - 3.2.2. Pre Caching
 - 3.2.3. Changing Buttons
- 3.3. Interactive Image Maps Using JavaScript
- 3.4. Browser detection
- 3.5. Browser compatibility
- 3.6. Navigator Object
- 3.7. The Location, console and History Objects
- 3.8. Screen Object
- 3.9. Cookies, localStorage, sessionStorage

Unit : 4 : Introduction to XML, JSON and AJAX

- 4.1. XML Fundamentals
 - 4.1.1. XML Syntax
 - 4.1.2. Need of XML in Application Development
- 4.2. Document Type Definition
 - 4.2.1. DTD, Data Types
 - 4.2.2. Validations
 - 4.2.3. Writing XML using a DTD
- 4.3. XML Schemas
 - 4.3.1. XML Schemas



	<p>4.3.2. Complex Data Types</p> <p>4.3.3. Sequences</p> <p>4.3.4. Binary Data Types</p> <p>4.3.5. Primitive Data Types</p> <p>4.3.6. Namespaces</p> <p>4.3.7. Data Validation</p> <p>4.4. Parsing XML DOM using JavaScript</p> <p>4.5. Asynchronous JavaScript and XML (AJAX)</p> <p>4.5.1. Introduction</p> <p>4.5.2. Get Data from the Server</p> <p>Unit : 5 : Introduction to JSON and jQuery</p> <p>5.1. Introduction to JavaScript Object Notation (JSON) Data Format and its Applications</p> <p>5.2. Introduction to jQuery</p> <p>5.2.1. Features of jQuery</p> <p>5.2.2. jQuery Syntax and Selectors</p> <p>5.2.2.1. Using the \$() function</p> <p>5.3. CSS, Attribute and custom</p> <p>5.4. Basic jQuery AJAX functions to load data: load(), \$.get()</p> <p>5.5. Basic jQuery Plugins</p>
Reference Book	<ol style="list-style-type: none"> 1. JavaScript Bible, 6th Edition – by Danny Goodman, Michael Morrison, Paul Novitski, Tia Gustaff Rayl 2. JavaScript The Complete Reference 3rd Edition - by Thomas A. Powell , Fritz Schneider 3. JavaScript Quick Syntax Reference By Mikael Olsson 4. JavaScript: The Definitive Guide, 6th Edition By David Flanagan - O'Reilly Media 5. Xml: The Complete Reference By Heather Williamson – Tata McGraw-Hill Edition 6. Learning JavaScript, 3rd Edition By Ethan Brown - O'Reilly Media, Inc. 7. Learning jQuery 4th edition, By Jonathan Chaffer, Karl Swedberg 8. Web Development with jQuery, By Richard York – WROX Publication
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. N. Das

B.Sc. (I.T.) 4th Semester

Course: 406: Practical 7

Course Code	406																								
Course Title	Practical 7																								
Credit	1																								
Teaching per Week	2 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Effective From	June 2022																								
Purpose of Course	To impart basic practical knowledge of embedded system and its applications in IoT																								
Course Objective	To give practical knowledge to develop basic programming on microcontroller for embedded system																								
Course Outcomes	CO1 : Students will be able to develop programs for microcontroller peripheral setup using C Language. CO2 : Students will be able to implement sensors and actuators in embedded system. CO3 : Students will be able to understand communication between Embedded System.																								
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	Basic knowledge of digital logic design, C programming language, microprocessor and computer system.																								
Course Content	Practical based on Paper No 402																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Desai

B.Sc. (I.T.) 4th Semester

Course: 407: Practical 8

Course Code	407																								
Course Title	Practical 8																								
Credit	2																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Effective From	June 2022																								
Purpose of Course	To impart practical knowledge of database driven windows form application																								
Course Objective	To give practical knowledge of visual basic .net window forms application and SQL																								
Course Outcomes	CO1 : Students will be able to develop applications using Microsoft .NET Framework Technology. CO2 : Students will be able to create databases in Oracle and perform DDL and DML operations using Structure Query Language. CO3 : Students will be able to develop windows form based applications using VB.NET and integrate databases in it.																								
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	Basic knowledge of DBMS and Object Oriented Programming.																								
Course Content	Practical based on Paper No 403 and 404																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Desai

B.Sc. (I.T.) 4th Semester

Course: 408: Practical 9

Course Code	408																								
Course Title	Practical 9																								
Credit	2																								
Teaching per Week	4 Hrs																								
Minimum weeks per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)																								
Effective From	June 2022																								
Purpose of Course	To impart practical knowledge of client side programming																								
Course Objective	To give practical knowledge of client side programming																								
Course Outcomes	CO1 : Students will be able to develop client side script programs using JavaScript. CO2 : Students will be able to develop interactive web applications using jQuery. CO3 : Students will be able to create XML and JSON documents and parse it programmatically using JavaScript.																								
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	Basic Programming Skills																								
Course Content	Practical based on paper number 405.																								
Reference Books	NIL																								
Teaching Methodology	Lab Work																								
Evaluation Method	30% Internal Assessment 70% External Assessment																								

P. V. Dora