6th sem

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	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	After the completion of the course, students will be able to develop and manage various types of software based on technologies learnt throughout the course and emerging technologies in IT industry which will give them excellent career prospects.
Effective From	June 2018

Program Structure		B.Sc. (I.T.) – Semester 5 (M.Sc. (I.T.) 5 years Integrated Course)						
Course Code	Title	Teaching per week (Hrs.)		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	Computer Graphics	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 (Hrs.)		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	4	0	4	3 Hrs	70	30	100
603	Operating System	4	0	4	3 Hrs	70	30	100
604	E Business and Cyber Law	4	0	4	3 Hrs	70	30	100
605	Practical 13	0	4	2	2 Hrs	70	30	100
606	Practical 14	0	6	3	2 Hrs	70	30	100
607	Project	0	0	4		140	60	200
	Total	16	10	25		560	240	800

Program Passing Rules	As per University rules

P. M. Deshpande

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 2018
Purpose of Course	To be learn the concept of OOPs 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 and applets. 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.
Pre-requisite	Object Oriented Concepts of C++
Course Out come	Students will be able to use various java concepts and develop a java based system
Course Content	**Unit : 1 : Java Concepts** 1.1 Introduction to Java and its tool-chain 1.1.1 History of Java 1.1.2 Java Architecture and its Components 1.1.2.1 JDK,JVM,JRE 1.1.3 Java Platforms 1.1.4 Java SE,ME,EE 1.1.5 Java ClassFile 1.1.6 C++ and Java comparison 1.1.7 Features of java 1.1.8 Installing java development kit 1.1.9 Java compiler and Interpreter 1.1.10 Using CLASSPATH 1.1.11 Use of text editor, IDE 1.2 Basics of Java programming 1.2.1 Understanding main() method 1.3 Fundamentals 1.3.1 Statements 1.3.2 Variables and Datatypes 1.3.3 Primitive datatypes 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 General Utility Classes 1.4.1 ArrayList 1.4.1.1 Accessing with foreach 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 Interfaces
2.1.10 Lambda Expressions
2.1.11 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
2.4.3 Creating Thread –Runnable interface
2.4.4 Multithreaded programs
2.4.5 Synchronization
2.4.6 Deadlock
2.4.7 Inter-Thread communication (wait & notify)
2.4.8 Fork and Join
2.4.9 Asynchronous processing

Unit: 3: I/O in JAVA

3.1 Java I/O
3.1.1 Files and directories
3.1.2 Byte and Character Streams
3.1.3 PrintWriter Class
3.1.4 Input and Output Streams
3.1.5 Random access Files
3.1.6 Serialization and Deserialization

3.2 Collections API
3.2.1 Collection
3.2.2 Java Streams
3.2.3 Set-HashSet,TreeSet
3.2.4 List-LinkedList
3.2.5 Map-HashMap,TreeMap

3.3 Annotations

Unit : 4: JAVA SWING and APPLETS

4.1 Java Swing
4.1.1 Java Foundation Classes
4.1.2 Features
4.1.3 Swing Components –
4.1.3.1 Jcomponent
4.1.3.2 JFrame
4.1.3.3 JPanel
4.1.3.4 Basic Containers
4.1.3.4.1 Buttons, lables, text fields etc
4.1.3.5 Event Handling

4.2 Applets
4.3.1 Creating Applets
4.3.2 Passing parameter to applet
4.3.3 Drawing images on Applet

4.3 Sandbox Security Model
4.4 Policy tool

P. M. Desai

	Unit : 5 : JDBC Connections 5.1 Working with JDBC APIs 5.1.2 Connection 2.1.2 Statement 5.1.3 Transaction methods 5.1.4 Optimized Statements with prepare Statement and Callable Statement 5.1.5 Metadata 5.1.6 Rowset, Dettached Rowset
Reference Books	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
Teaching Methodology	Black Board Teaching, power point presentation for theory, practical shown in projector for showing programs
Evaluation Method	30% Internal Exam 70% External Exam

P.Y.Desai

Course: 602 ASP.NET

Course Code	602
Course Title	ASP.NET
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2018
Purpose of Course	This course helps to learn basics programming of web forms applications using C#.NET.
Course Objective	The objective of the course is to impart basic introduction to Microsoft C#.NET language and concepts of web application development technology.
Pre-requisite	Knowledge of Programming, Object Oriented Programming, Database Management System and Scripting languages like HTML, JavaScript, etc.
Course Out come	Students will be able to develop web forms basic applications using C#.NET.
Course Content	**Unit : 1 : Introduction to C# .NET** 1.1 Language Constructs 1.2 Data Types 1.3 Classes and Objects 1.4 Structures 1.5 Program Structure 1.6 Preprocessor Directives 1.7 Inheritance 1.8 Polymorphism – Overloading, Overriding, etc. 1.9 Properties 1.10 Indexer 1.11 Collection 1.12 Exception Handling 1.13 Delegates 1.14 Events 1.15 Reflection **Unit : 2 : Introduction to ASP.NET and Web Development Concepts** 2.1 Dynamic web pages 2.2 Introduction to ASP 2.3 Web server – Internet Information Server (IIS) 2.4 Architecture of ASP.NET 2.5 ASP.NET Page Lifecycle 2.6 ASP .NET Page Directives **Unit : 3 : Programming in ASP.NET** 3.1 Controls – HTML Controls and ASP.Net Server Controls 3.2 Control Properties and Events 3.3 PostBack 3.4 Exception Handling 3.5 Validation Controls 3.6 Navigation Controls 3.7 Login Controls 3.8 User Controls 3.9 MasterPages **Unit : 4 : Web Application Management** 4.1 State Management 4.1.1 ViewState 4.1.2 Application 4.1.3 Session 4.1.4 Cookie 4.1.5 QueryString

P. M. Desai

	4.1.6 Profile 4.2 Response Object, Request Object 4.3 Server Object 4.4 web.config and machine.config 4.5 global.asax 4.6 Authentication Methods 4.7 Caching **Unit : 5 : Database Programming with ADO.NET** 5.1 ADO.NET Architecture 5.2 Connection Object 5.3 Command Object 5.4 DataReader Object 5.5 DataAdepter Object 5.6 DataSet Object 5.7 Working with Data Controls 5.8 Design time data binding 5.9 Runtime data binding 5.10 Working with Stored Procedures
Reference Book	1. C# and the .NET Platform by Andrew Troelsen : APress 2. C# The Basics by Vijay Mukhi : BPB 3. C# Essentials by Ben Albabari : O'Reilly 4. Professional C# by Simon Robinson : Wrox 5. ASP.NET - A Beginner's guide by Dave Mercer : TMH 6. Professional ASP.NET : Wrox. 7. ASP.NET Programmer's Reference : Wrox 8. ADO.NET Programmer's Reference : Wrox. 9. Professional C# 2008 by Christian Nagel : Wrox 10. C# The Nuts & Bolts by Akash Sarat & Sonal Mukhi : BPB 11. C# Made Simple : BPB Publication 12. C# 3.0 Unleashed: With the .NET Framework 3.5 by Joseph Mayo : Sams 13. Special Edition Using ASP.NET by Richard Leinecker : Pearson Education 14. ASP.NET Unleashed. : Sams. 15. ASP.NET for Developers : Amundsen.
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

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 2018
Purpose of Course	Elaborate understanding of Middle Layer which manages hardware and application software.
Course Objective	To understand detailed working of OS
Pre-requisite	Basic knowledge of Computer organization, data structures and computer programming
Course Out come	Students will be able to understand OS internals and learn basic shell scripting
Course Content	**Unit : 1: Operating System Concepts** 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 **Unit : 2 : Process Management** 2.1 Process concept 2.2 Process State Model 2.3 Process Scheduling 2.3.1 Scheduling Criteria 2.3.2 Scheduling algorithms 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

P. M. Desai

	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 5.3 Escaping, Quoting Redirection and Piping 5.4 Positional Parameters 5.5 Operators – arithmetic, relational, logical, file related, string related 5.6 Conditional & Looping statements 5.7 Arrays 5.8 Functions 5.9 Grep, egrep and fgrep **Case Study: Windows, Linux and Mobile OS**
Reference Book	1. Operating Systems Concepts - Galvin Silberschatz - McGraw Hill-9th Edition 2. Operating Systems - William Stallings – PHI- 9th Edition 3. Modern Operating Systems - Andrew S. Tanenbaum - Pearson Edu./PHI -4th edition 4. Operating System, Dhamdhere, TMH-3rd Edition 5. Understanding Operating System, Ann McIver McHoes ,Ida Flynn, 5th Edition 6. Operating System, P Balakrishna Prasad, Scitech- 2nd Edition 7. Unix Shell Programming : Yashwant Kanetkar: 2003 Edition 8. Mastering Linux shell Scripting: Andrew Mallett:2015 edition Packt Publisher
Teaching Methodology	Lectures, Discussion, Independent Study, Seminars and Assignment
Evaluation Method	30% Internal assessment, 70% External assessment

Course : 604 : E Business and Cyber Laws

Course Code	604
Course Title	E Business and Cyber Laws
Credit	4
Teaching per Week	4 Hrs
Minimum weeks per Semester	15 (Including Class work, examination, preparation, holidays etc.)
Last Review / Revision	June 2018
Purpose of Course	To provide fundamental knowledge of E Business and Cyber Laws
Course Objective	To Impart fundamental Knowledge of E Business and Cyber Laws
Pre-requisite	Knowledge of Fundamental of Computers, Computer Networks
Course Out come	Students will be able to understand E Business , Cryptocurrency, Blockchain, Cyber Security and Cyber Laws
Course Content	**Unit 1 : E Commerce** 1.1 E Business 1.2 E Business Models 1.3 The Technologies and Infrastructural requirements of E-Commerce 1.4 Advantages and Disadvantages of E-Commerce 1.5 International issues of Electronic Commerce 1.6 Types of business transactions (B2B), (B2C), (B2G),Business Processes 1.7 Digital India Services, Digi Locker and other tools **Unit 2 : Introduction to E Payments** 2.1 Digital payments requirements 2.2 Digital Token based E payment systems 2.3 Classification of new payment system 2.4 E Wallet 2.5 Online Internet Banking 2.6 Unified payment Interface – BHIM and other tools 2.7 Online financial services in India **Unit 3 : Cryptocurrency ,Bitcoin and Blockchain** 3.1 Introduction – Crytocurrency 3.2 How Cryptocurrency Works , Ewallet Services and Personal Cryptosecurity 3.3 Introduction – Bitcoin , Merchants acceptance of Bitcoin 3.4 How Bitcoin Works overview, Transaction ,Blocks , Mining 3.5 Blockchain – Technology Stack :Protocol, Currency 3.6 Financial Services 3.7 Crowd Funding 3.8 Bitcoin Prediction Markets, 3.9 Smart Property 3.10 Smart Contracts 3.11 Decentralized Governance Services. 3.12 The Blockchain is an Information Technology **Unit 4 : Cyber Security** 4.1 Introduction 4.2 Network and website Security Risks 4.3 Hacking 4.4 Privacy Risk 4.5 Cyber Defamation 4.6 Identity Theft & Fraud 4.7 Digital Forgery

	4.8 Cyber terrorism 4.9 Cyber Pornography 4.10 Digital Forgery 4.11 Digital Signature 4.12 E- business Risk management issues 4.13 Firewall, Security framework **Unit 5 : Cyber Laws** 5.1 Cyber Crimes against Individuals, Institution and State 5.2 Computer and mobile as target for crime 5.3 Introduction To Cyber Laws 5.4 Limitation of India's Cyber Laws 5.5 Types of Civil Wrongs under the IT Act, 2000 5.6 Punishments under the IT Act 5.7 Intellectual Property Rights
Reference Book	1. E-Commerce An Indian Perspective P.T. Joseph ,S. J. - PHI publication 2. IT Encyclopedia.Com: Volume 8 : Parag Diwan & Sunil Sharma :E-commerce - Pentagon Press. 3. E-Commerce Strategies : Charles Trepper – PHI 4. S. R. Bhansali, Information Technology Act, 2000, University Book House Pvt. Ltd., Jaipur. 5. Vasu Deva, Cyber Crimes and Law Enforcement, Commonwealth Publishers, New Delhi. 6. Decentralized Applications , Harnessing Bitcoin's Blockchain Technology, Siraj Raval, 2016 – O'Reilly 7. Blockchain, Blueprint for a new Economy , Melanie Swan, 2017 – O'Reilly 8. Mastering Bitcoin, Programming the open Blockchain , 2nd Edition, Andreas M. Antonopoulos, 2017 – O'Reilly 9. Essential CyberSecurity Science, Josiah Dykstra, 2017 – O'Reilly
Teaching Methodology	Class Room Teaching, Discussion and Assignment
Evaluation Method	30% Internal assessment 70% External assessment

P. N. Das

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 2018
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
Prerequisite	Basic knowledge of C++ programming language and concepts
Course Outcome	Students will be able to solve problems using java; object oriented programming methodologies
Course Content	Practical based on Paper No 601 : Java
Reference Books	NIL
Teaching Methodology	Lab Work
Evaluation Method	30% Internal Assessment 70% External Assessment

P. M. Desai

Course : 606 : Practical 14

Course Code	606
Course Title	Practical 14
Credit	3
Teaching Per Week	6 Hrs
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)
Last Review/Revision	June 2018
Purpose of Course	To impart practical knowledge of web programming
Course Objective	To give practical knowledge of ASP.Net programming using C#
Prerequisite	Programming concepts, HTML and GUI development
Course Outcome	Students will be able to develop web applications in ASP.Net using C#.Net language
Course Content	Practical based on Paper No. 602 : ASP.NET
Reference Books	NIL
Teaching Methodology	Lab Work
Evaluation Method	30% Internal Assessment 70% External Assessment

Course : 607 : Project

Course Code	607
Course Title	Project
Credit	4
Teaching Per Week	-
Duration	3 Months
Minimum Weeks Per Semester	15 (Including Practical Work, Examination, Preparation, Holidays etc.)
Review/Revision	June 2018
Purpose of Course	The project work is introduced to make students implement their theory and practical knowledge they learned during this semester to solve real life problems for software applications.
Course Objective	To help students to develop software applications using any programming language or framework.
Prerequisite	Knowledge of Object Oriented Programming, Web Technology Fundamentals, Software Engineering.
Course Outcome	After completion of this course, students will be able to develop software applications.
Course Content	The students are required to develop 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: 1. Project Joining Report 2. Project Title Report 3. Progress Report 4. Project Completion Certificate 5. Institution Certificate 6. Non disclosure of Source Code Certificate (In case the student is unable to submit project source code)
Reference Books	NIL
Teaching Methodology	Project guidance, Review
Evaluation Method	30% Internal Assessment 70% External Assessment