Program Educational Objective(s)	
After graduation and few years of graduation, the (Branch Name) graduates would	
PEO I	Interpret, design and analyze data for effective problem solving
PEO II	Pursue advanced studies to adapt to current trends
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude

Program Outcome(s)

PO1. An ability to apply principles and methodologies of basic sciences, mathematics and basic engineering disciplines

PO2. An ability to identify, formulate the computing requirements appropriate to its solution

PO3. An ability to design & conduct experiments, as well as to analyze & interpret data

PO4. An ability to select and use appropriate techniques, resources and modern engineering and IT tools necessary for engineering practice

PO5. An ability to design implement and evaluate a computer based system, process, component, or program to meet desired needs with appropriate consideration for public health and safety and cultural societal and environmental considerations

PO6. An understanding of professional engineering practice with concern to environmental, ethical, legal, social issues and responsibilities

PO7. An ability to continue their studies in I. T. related programs to enhance their careers in information technology and other diverse areas

PO8. An ability to function & communicate effectively in team to accomplish a common goal

PO9. An ability to recognize the need and engage in continuing professional development

PO10. Communicate effectively to comprehend and write effective reports, design documentation and make effective presentations

PO11. An ability to engage in independent and life-long learning to enhance their careers for continuing professional development

PO12. An understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

Mapping of PEOs and POs

Programme Educational Objective(s)	Program Outcome(s)	
PEO I	Interpret, design and analyze data for effective problem solving	1,2,3
PEO II	Pursue advanced studies to adapt to current trends	3,4,5,6,7,9
PEO III	Attain professional careers and provide services in societal and environmental context for sustainable development	4,5,6,7,8,9,10,11,12
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10,11,12

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD
(An Autonomous Institute of Government of Maharashtra)
Department of Information Technology
Teaching and Evaluation Scheme
BE (Full-Time) in IT Engineering
SEMESTER-I

S. No.	Course Code	Subject	PO	L	T	P	Credits	Test	TA	ESE	Term Work	Practical/ Viva-voce	Total
		THEORY COURSES											
1	IT-341	Microprocessor and Interfacing	1,2,3,4, 11	03	01		04	20	20	60			100
2	IT-342	Computer Algorithms	1,2,4,5,12	03	01		04	20	20	60			100
3	IT-343	Software Engineering and Testing	2,3,4,5,6,7,8,9 10,11,12	04			04	20	20	60			100
4	IT-344	Programming in Java	3,5,7,8,9,10,11,12	03			03	20	20	60			100
5	IT-345 IT-346	Elective – I Human Computer Interface Information Theory and Coding	2,3,4 2,4,5,6	04			04	20	20	60			100
		LABORATORY COURSES											
1	IT-347	Lab: Microprocessor and Interfacing	1,2,3,11,12			02	01				25	25	50
2	IT-348	Lab: Computer Algorithm	1,2,3,5			02	01				25	25	50
3	IT-349	Lab: Software Engineering and Testing				02	01				25	25	50
4	IT-350	Lab.- Programming in Java	3,5			02	01				25	25	50
5	IT-351	Lab: Software Development Lab I(C Sharp)	2,3,4,5			02	01				25	25	50
				17	02	10	**24**	100	100	300	125	125	750

GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD
(An Autonomous Institute of Government of Maharashtra)
Department of Information Technology
Teaching and Evaluation Scheme
BE (Full-Time) in IT Engineering
SEMESTER-II

S. No.	Course Code	Subject	PO	L	T	P	Credits	Test	TA	ESE	Term Work	Practical/ Viva-voce	Total
THEORY COURSES				**Scheme of Teaching (Hrs/Week)**				**Scheme of Evaluation (Marks)**					
								Theory					
1	IT-352	Theory of Computation	2,3	03	01		04	20	20	60			100
2	IT-353	Computer Networks	2,3,5	03	01		04	20	20	60			100
3	IT-354	Advance Database Management System	2,3,4,5,6,7,9,10.12	04			04	20	20	60			100
4	IT-355	Operating System	1,2,3,4,5,6,8,9,10	03			03	20	20	60			100
5	IT-356 IT-357	Elective –II Advanced Java Object Oriented Modeling and Design	2,3,4,5 / 1,2,3,5,6,7,8,11,12	04			04						100
LABORATORY COURSES													
1	IT-358	Lab: Computer Networks	2,3,4,5			02	01				25	25	50
2	IT-359	Lab: Advance Database Management System	2,3,5,7,8,10,11,12			02	01				25	25	50
3	IT-360	Lab: Software Development Lab-II(ASP.NET)	2,3,4,5			02	01				25	25	50
4	IT-361	Lab: Operating System	2,4,5			02	01				25	25	50
5	IT-362 IT-363	Elective-II Lab: Advanced Java Lab: Object Oriented Modeling and Design	2,3,4,5			02	01				25	25	50
				17	02	10	24	**80**	**80**	**240**	125	125	750

L-Lectures, T-Tutorials, P-Practicals, TA-Teacher Assessment, ESE-End-Semester Examination

IT 341: Microprocessor and Interfacing

Teaching Scheme		Evaluation Scheme	
Lectures	:3Hrs/Week	Test	:20 Marks
Tutorials	:1Hrs/Week	Teacher Assessment	:20 Marks
Total Credits	:4	End-Semester Examination	:60 Marks

Prerequisites:
IT-243: Digital Electronics

Course Description
This course introduces the fundamental concepts of 8086 microprocessor, architecture and instruction set of 8086 microprocessor. It also deals with Assembly Language Programming, 8086 Interrupt Structure, interfacing chips- Programmable Peripheral Interface (Intel 8255), Programmable Interval timer (Intel 8253), Programmable Interrupt Controller (Intel 8259), Programmable Keyboard/Display Interface (Intel 8279), Support chips 8282,8284,8286,8288 8087(NDP) used in microprocessor-based systems.

Course Educational Objectives:
1. To learn architecture, instruction set, interrupt structure of 8086 microprocessor.
2. To learn assembly language programming of 8086
3. To study the DOS Internals
4. To learn peripherals and their interfacing with 8086 Microprocessor
5. To Study NDP and Design of Microprocessor based System

Course Outcomes Expected: After successful completion of the course, students will be able to:

CO1	Present the fundamental concepts of 8086 microprocessor, their architecture and instruction set, interrupt structure.
CO2	Use assembly language programming of 8086.
CO3	Apply BIOS and DOS interrupts
CO4	State the concept of DMA controller, NDP and other interfaces for implementing real applications
CO5	Design small model by using assembly level language.

Detailed Syllabus:

UNIT-1	Introduction to 16 bit microprocessor, Architecture and Pin diagram of 8086, Programmers model of 8086 (Registers), Segmentation, logical to physical address translation, even and odd memory banks, Read write cycle timing diagrams, Address mapping and decoding, I/O: memory mapped I/O & I/O Mapped I/O.
UNIT-2	Addressing modes, Instruction set of 8086 in detail, Instruction Formats, Stacks, Assembly Language Programming, Assembler, Linker, Debugger (Turbo debugger), Directives, Procedures (Near & Far), Macros, Loop constructs, 8086 Programming examples.
UNIT-3	8086 Interrupt Structure, Interrupt Vector Table (IVT), ISR, Hardware and software Interrupts Internals of DOS, DOS loading, DOS memory map, Internal and external commands of DOS, BIOS & DOS Interrupts. Concepts of PSP, .EXE & .COM files, Concepts of TSR, 8259 (Programmable Interrupt Controller): Features, Block Diagram, Control & status registers, Interfacing & Programming.
UNIT-4	Study of Peripheral chips: 8255 (Programmable Peripheral Interface), Serial Communication- Synchronous & Asynchronous, 8251(USART): Features, Block Diagram, Control & status registers, Operating modes, Interfacing & Programming (8255 and 8251) Concept of ADC -Successive Approximation & Interfacing, Concept of DAC R-2R (ladder) & Interfacing, Introduction to Sensors & Transducers, Keyboard Display &Centronics Printer Parallel Interfacing using 8255.
UNIT-5	8279 Keyboard and Display Controller, 8253 (Programmable Interval Timer): Features, Block Diagram, Control & status registers, Operating modes, Interfacing & Programming, Concept of DMA, 8237 DMA Controller: Features, Block Diagram. Minimum & Maximum mode of 8086, Support chips 8282,8284,8286,8288 8087(NDP) - Features, Block Diagram, Control & status registers, typical Instruction Set & Programming, Detail Design of 8086 based minimum system with EPROM, SRAM & Peripherals such as 8255,8253,8251,8279 with keyboard & seven segments Display.

Text and Reference Books:
Text Books:
>1. Douglas Hall, "Microprocessors & Interfacing", McGraw Hill, Revised 2nd Edition, 2006 ISBN 0-07-100462-9
>2. John Uffenbeck," The 8086/88 Family: Design, Programming & Interfacing", PHI
>3.Ray,K.Bhurchandi, "Advanced Microprocessors and peripherals: Arch, Programming &Interfacing",Tata McGraw Hill,2004 ISBN 0-07-463841-6

References Books:
>1. Liu, Gibson, "Microcomputer Systems: The 8086/88 Family", 2nd Edition, PHI,2005
>2. Kenneth Ayala, "The 8086 Microprocessor: Programming & Interfacing the PC", Cengage Learning, Indian Edition, 2008
>3. Ray Dunkon, "Advanced MSDOS Programming", 2nd Edition, BPB Publication.
>4. Kip Irvine, "Assembly language for IBM PC", PHI, 2nd Edition, 1993
>5. Peter Abel, "Assembly language programming", Pearson Edu,5th Edition,2002
>6.Intel Microprocessor and peripheral Handbook: Volume 1
>7.YashwantKanetkar, "Writing TSR through C", BPB Publication, 1995, ISBN 81-7029-520-

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	1	1	1									
CO3		3	2									
CO4	3	2	1	2							2	
CO5	1	1	1	1							2	

1 – High   2 – Medium   3 – Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Application development
2) Power point presentation
3) Question & answer
4) Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	18
K2	Understand	10	10	24
K3	Apply	05	05	12
K4	Analyze	00	05	06
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K3	K3	K2	K4
	C01	CO2	C03	C04	CO5
Class Test (20 Marks)	10	05	00	05	00
Teachers Assessment (20 Marks)	05	05	05	05	00
ESE Assessment (60 Marks)	18	12	00	24	06

Special Instructions if any: Nil

Designed by:
1.Prof.K.R.Sarode
2.Prof. K.S.Gandle
3.Prof. V.P.Gaikwad

IT 342 : Computer Algorithms		
Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hrs/Week	**Test**	**: 20 Marks**
Total Credits: 4	**Teachers Assessment**	**: 20 Marks**
Tutorial: 1 Hr/ Week	**End Semester Exam**	**: 60 Marks**

Prerequisites: IT 233 - Data Structures

Course description: In this course students will learn the techniques of design and analysis of algorithms. Topics like Divide and Conquer, Greedy and Dynamic programming, Backtracking will be covered. Students will also learn to analyze the performance of algorithms.

Course Objectives:

1.To provide introduction of algorithm writing
2. To use various techniques to find complexity of algorithms
3. To familiarize with different algorithm design techniques
 4. To impart practical programming skills necessary for problem solution

Course Outcomes
After completing the course, students will able to:

CO1	Explain the asymptotic notations, recurrences and algorithm analysis
CO2	Practice divide and conquer technique for sorting problems
CO3	Demonstrate the use of greedy technique
CO4	Apply dynamic programming to solve problems effectively
CO5	Employ backtracking technique to solve various problems

Unit 1	**Introduction** Definition of an Algorithm, Algorithm Specification, Performance Analysis: Space and Time Complexity, Asymptotic Notation, Practical Complexities, A Brief Review of Elementary Data Structures: Stacks, Queues, Trees, Priority Queues, Sets and Disjoint Set Union, Graphs.
Unit 2	**Divide And Conquer** General Method of Divide And Conquer, Binary Search, Finding The Maximum and Minimum, Merge Sort, Quick Sort, Selection, Strassen's Matrix Multiplication
Unit 3	**The Greedy Method** General Method, Knapsack Problem, Tree Vertex Splitting, Job Sequencing with Deadlines, Minimum Cost Spanning Trees, Optimal Storage on Tape, Optimal Merge

	Patterns, Single Sources Shortest Paths.
Unit 4	**Dynamic Programming** The General Method of Dynamic Programming, Multistage Graphs, All Pairs Shortest Paths, 0/1 Knapsack, the Travelling Salesperson Problem **Basic Search And Traversal Techniques** Techniques For Binary Trees, Techniques For Graphs, Connected Components And Spanning Trees, Biconnected Components And DFS
Unit 5	**Backtracking And Branch And Bound** The General Method Of Backtracking, The 8- Queens Problem, Sum Of Subsets, Graph Coloring, Hamiltonian Cycles, Knapsack problem, The Method Of Branch And Bound, 0/1 Knapsack Problem, Travelling Sales Person Problem Using Branch And Bound

Text and Reference Books
1. Ellis Horowitz, SaratajSahni, S.Rajasekaran, "*Fundamentals of Computer Algorithms*", Galgotia Publications
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman , "*The Design and Analysis of Computer Algorithms*",
3. Addison Wesley Coreman, Leiserson, Rivest, Stein, *"Introduction to Algorithms",* PHI

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2		3								
CO2		2		1	1							3
CO3				1	1							3
CO4				1	1							3
CO5				1	1							3

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Simulation
2) Problem Solving
3) Power point presentation of case studies
4) Question & answer / Numerical solution

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	15

K2	Understand	10	05	20
K3	Apply	05	10	15
K4	Analyze	00	05	10
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K3	K3	K3
	C01	C01	C02	CO3	CO4	CO5
Class Test (20 Marks)	05	05	05	00	00	00
Teachers Assessment (20 Marks)	00	00	05	05	05	05
ESE Assessment (60 Marks)	15	20	10	05	05	05

Special Instructions if any: Nil

Designed by
1.Prof.C.M. Gaikwad
2.Prof. A.N.Ghule
3.Prof. K.S.Gandle

IT 343 -Software Engineering and Testing

Teaching Scheme			Evaluation Scheme	
Lectures	04Hrs/Week		Test	20 Marks
			Teacher Assessment	20 Marks
Total Credits	04		End-Semester Examination	60 Marks

Contact Hours for this subject is 60
Prerequisites: Computer Workshop

Course Description

The course aims to prepare students for careers in software engineering, software project management, and software development and integration. Software engineering comprises the core principles consistent in software construction and maintenance: fundamental software processes and life-cycles, mathematical foundations of software engineering, requirements analysis, software engineering methodologies and standard notations, principles of software architecture and re-use, software quality frameworks and validation, software development, and maintenance environments and tools.

This course will examine fundamental software testing and program analysis techniques. In particular, the important phases of testing will be reviewed, emphasizing the significance of each phase when testing different types of software. Students will learn the state of the art in testing technology for object-oriented, component-based, concurrent, distributed, graphical-user interface, and web software. Emerging concepts such as test-case prioritization and their impact on testing will be examined. Students will gain hands-on testing/analysis experience via a multi-phase course project. By the end of this course, students should be familiar with the state-of-the-art in software testing. Students should also be aware of the major open research problems in testing.

Course Educational Objectives:
1. To understand fundamental concepts of software engineering principles.
2. to design and implement the software solutions and methodologies, good test cases
3. To understand the role and contents of testing activities in different life cycle phases.
4. To train the students on basic principles of Software Engineering used in Industry.

Course Outcomes:
1. Able to design and apply software engineering principles, tools and techniques to develop, maintain and evaluate software solutions

2. ability to work as an effective member or leader of software engineering teams and meet ethical standards with legal responsibilities
3. ability to manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals

UNIT-1	**Introduction, Life Cycle Models:** Software engineering, Role of Management in software Development. SDLC Models, Selection of Life Cycle Model, Requirement Engineering, Requirements Elicitation, Requirement analysis, Requirements documentation, **Software Project Planning** Size estimation, Cost estimation, Models, The constructive Cost mode COCOMO II, Software Risk management.
UNIT-2	**Software Design** Design, Modularity, Strategy of design, Function oriented design, IEEE Recommended practice for Software Design Description , Object Oriented Design, Unified Modeling Language : Basic Notations, Class diagram, State diagram activity diagrams, Use-case diagrams sequence diagrams. **Software Metrics and Reliability** Software metrics, data structures metrics, Information flow metrics, Metrics analysis, Software quality, software reliability Models, capability maturity Model, ISO 9000
UNIT-3	**Introduction to Basic of software testing & Terminology:** Quality Concepts, Quality Assurance, Quality Control, Needs of testing, Objective of testing, Software Development & Software Testing Life Cycle, Testing Standards:-IEEE, CMM,ANSI. **Levels of Testing:** Verification and Validation Model, Techniques of Verification:- Peer Review, Walkthrough, Inspection. Functional testing, Structural testing, Unit testing, Integration testing, System testing, Installation Testing, Usability Testing, Regression testing, Performance testing, Load Testing, Stress Testing. Security testing, Volume testing Acceptance testing ,Alpha testing, Beta testing, Gamma testing, Object –oriented testing, Web testing, GUI testing
UNIT-4	**Testing methods and Testing tools:** Black Box methods:-Equivalence partitioning, Boundary-value analysis, Error guessing. White Box methods:-Statement coverage, Decision coverage, Condition coverage. Testing Tools:-Win Runner, Load Runner.
UNIT-5	**Test Planning & Documentation:** Testing Strategy:-type of project, type of software. Test Plans, Test Case, Test Data, Risk Analysis. **Defect Management and Test Reporting:** Defect analysis, Defect Reporting, Tracking Workflow, Test reporting, Defect rates and schedules Software maintenance, Maintenance process, maintenance models, estimation of maintenance costs, reverse engineering, software re-engineering, Configuration management, documentation.

Text books:
1. Pressman R.S., " *Software Engineering*", McGraw-Hill Publication
2. K.K.Aggarwal , Yogesh Singh , "*Software Engineeri*ng" , New Age International Publishers
3. Ron Patton, "*Software testing*", Pearson Publications
Reference Books:
1. Ian Sommerville , "*Software Engineering*" , Pearson Education
2. Boris Bezier, "*Software testing techniques*", Dreamtech Publications
3. Meilir Page-Jones, " *Fundamentals of Object Oriented Design in UML*" Pearson Education
4. Rex Black , "*Software testing*", Wrox Publications
5. Dr.K.V.K.K. Prasad, "*Software testing tools*", Dreamtech Publications

Reference Website:
www.onestoptesting.com
www.wikipedia.org

Program Outcomes:

Successful completion of this course will contribute to the following Program Outcomes:

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	1	1	1							
CO2					2	1	3	1	1	2	2	
CO3						2	2	3	1	3	2	1

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Power point presentation of case studies
 2)   Application development
3)   Question & answer
4)   Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	15
K2	Understand	10	00	20
K3	Apply	05	10	10
K4	Analyze	00	10	15

K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment Tool	K1/K3	K2/K4	K5
	C01	C02	C03
Class Test (20 Marks)	05	10	05
Teachers Assessment (20 Marks)	00	05	05
ESE Assessment (60 Marks)	15	20	10

Special Instructions if any: Nil

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Designed By

1.Prof. V. P.Gaikwad

2.Prof. K.S.Gandle

3.Prof. S. M.Chavan.

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IT 344 : Programming in Java	
Teaching Scheme **Lectures: 3 Hrs/Week** **Credits :03**	**Examination Scheme** **Test** : 20 Marks **Teachers Assessment** : 20 Marks **End Semester Exam** : 60 Marks

Prerequisites: IT 244- Object Oriented Programming Systems

Course description: This course will introduce the core principles of the Java Language.It consists of concepts like Exception handling,Multithreading,Interfaces,Packages. Students will also learn database connectivity.

Course Objectives:

1.To enable the students to understand the core principles of the Java Language.
2. To understand the concept of Interfaces, Packages.
3. To understand the concept of Exception Handling and Multithreading.
4. Introduce the students to use visual tools to produce well designed, effective applications using applets and AWT/Swing.
5. Introduce the students to database connectivity.

Course Outcomes

After completing the course, students will able to:

CO1	Describe Object oriented concepts using java programming language.
CO2	Write programs using Inheritance, Interfaces and packages.
CO3	Apply Multithreading and Exception handling.
CO4	Model user interface application using AWT/Swing.
CO5	Create JDBC applications to access/query the database.

Detailed Syllabus:

Unit 1	**Introduction to Java:** Why Java is important to the Internet? Java's Magic: The Byte Code, Java Buzzwords, Data types, Basic syntax of Java. Classes & Objects – Constructors, Access Modifiers, Instance Methods, this & static keywords. Overloading Methods, Overloading Constructors, Using objects as Parameters, A closer look at argument passing, Returning objects, Command Line Arguments
Unit 2	**Inheritance and Exception handling:** Inheritance :Basics, Using Super, Types of inheritance, Constructors in Derived Classes, Method Overriding, Abstract Classes & methods, Final Classes & Final Methods, Packages, Importing Packages and Interfaces. Exception Handling: Fundamentals of Exception handling, Exception Types, Uncaught Exceptions, Using Try and Catch, Multiple Catch Clauses, Throw, throws, finally, Built-in Exceptions ,user defined Exceptions
Unit 3	**I/O Package and Multithreading:** I/O Package:File class, Various Methods of File class, Files and Directories, Overview of Streams, File Stream classes, Print Writer Class, Byte Stream classes Multithreading: Java Thread Model, The Main thread, Creating a Thread, Creating Multiple Threads, Using Alive ( ) and Join ( ), Thread Priorities, Synchronization, InterthreadCommunication,Suspending, Resuming and Stopping Threads
Unit 4	**Java AWT/Swing:** Graphical Programming - Applet, Event Handling. Abstract Windows Toolkit-Components and Graphics, Containers, Frames and Panels Layout Managers- Border layout, Flow layout, Grid layout, Card layout AWT all components, Event delegation Model - Event source and handler, Event categories, Listeners, Interfaces
Unit 5	**Java database connectivity:** JDBC and Database Programming: Introduction to JDBC, JDBC Drivers, creating DSN, The java.sql package, PreparedStatement class, CallableStatement object, Scrollable Resultset, Updatable Resultset

Text and Reference Books

Text Books: Herbert Schildt, "The Complete Reference Java2", 5th Edition, TMH Publications. Deitel&Deitel, "How To Program JAVA", Pearson Education E Balguruswamy, "Programming with Java - A Primer" **Reference Books:** Cay S. Horstmann, Gary Cornell, "Core Java Volume II" - Pearson Education.

Steven Holzner, "Java 2 Black Book", Dreamtech Pub.
Reference websites:
www.java.sun.com/docs/books/tutorial

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2							
CO2			2									
CO3			2									
CO4					3		3	3	3	3	3	3
CO5					2		3	2	3			

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Simulation
2)   Application development
3)   Power point presentation of case studies
4)   Question & answer / Numerical solution
5)   Mini projects

Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	00	00	00
K2	Understand	05	00	15
K3	Apply	00	05	10
K4	Analyze	05	10	15
K5	Evaluate	10	05	20
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K2	K5	K3	K4	K5
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	00	05	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	15	20	10	15	00

Special Instructions if any: Nil

Designed by
1.Prof.S.S.Laddha
2.Prof. C.M. Gaikwad
3.Prof. V.P.Gaikwad

IT 345: Human Computer Interface	
Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/Week	**Test** **: 20 Marks**
Tutorial : 0 Hr/Week	**Teachers Assessment** **: 20 Marks**
Credits :03	**End Semester Exam** **: 60 Marks**

Prerequisites: Artificial Intelligence

Course description: This course introduces the fundamentals of human interaction with computer and their applications. Topics covered include human component function,computers component function,interaction design basics and design rules.

Course Objectives:

1. Demonstrate human component functions

2. Understand computer components function

3. Describe interaction design basics

Course Outcomes
After completing the course, students will able to:

CO1	Analyze technology acceptance model and usability
CO2	Design effective dialogue for HCI
CO3	Articulate HCI implications for designing e commerce websites
CO4	Formulate queries that permit users to search the web
CO5	Know how to design with individuals and persons with disabilities

Detailed Syllabus:

Unit 1	**Overview of HCI, Theories and Principles** Introduction, Goals of System Engineering, Goals of User-Interface Design Usability of Interactive systems, Motivations for Human Factors in Design, Guidelines, Principles, Theories, Conceptual, Semantic, Syntactic and Lexical Model, GOMS and the Keystroke-level Model, Object-Action Interface Mode
UNIT-2	**Managing Design Processes and Tools and Testing** Three pillars of Design, Development Methodologies, Ethnographic Observation, Participatory Design, Scenario Development, Expert Reviews, Usability Testing and Laboratories, Acceptance Tests, Evaluation during active use, Specification Methods, Interface Building Tools, and Evaluation Tools
UNIT-3	**Design Principles for Designing GUI Objects** Direct manipulation (examples, explanations), Visual Thinking and Icons, 3D Interfaces, Virtual Reality, Introduction to Menu Selection, Form Fill-in, and Dialog Boxes, Task Related Organizations, Fast Movement through Menus, Item Presentation Sequence, Response Time and Display Rate, Data Entry with Menus, Menu Layout, Command-Organizational Strategies, Naming and Abbreviations, Command Menus, Natural Language in Computing
UNIT-4	**Interaction Styles**

	Introduction to Interaction Devices, Keyboards and Function Keys, Pointing devices, Speech and Auditory Interfaces, Speech Recognition, Image and video displays, Printers, Response time and display rate with respect to display, Goals of Collaboration, Asynchronous and Synchronous Interfaces, Face-to-Face Interfaces
UNIT-5	**Presentation Design Issues and Information Search and visualization** Error Messages, Display Design, Individual-Window Design, Multiple Window Design, Co-ordination by Tightly-coupled Windows, Color, Printed Versus Online Manuals, Preparation of Online facilities, Online Tutorials, Online Communities for User Assistance Introduction, Search in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Search Interfaces, Information Visualization, OAI Model for Website Design

Text and Reference Books

1. Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven Jacobs, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", 5th Edition, Pearson Education
2. Alan Dix, Janet Finlay, Gregory Abowd, and Russell Beale, "Human-Computer Interaction", 3rd Edition , Prentice Hall
3. Jenny Preece, Yvonne Rogers, Helen Sharp, David Benyon (1994): Human-computer interaction. Addison-Wesley, ISBN 0201627698.
4. Debbie Stone, Caroline Jarrett, Mark Woodroffe, Shailey Minocha (2005): User Interface Design and Evaluation. Morgan Kaufmann, ISBN 978-0120884360

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1								
CO2			1									
CO3			1									
CO4		1										
CO5			1									

1 – High2 – Medium3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Simulation
2)   Application development
3)   Power point presentation of case studies

4)   Question & answer / Numerical solution
5)   Case Study

Recommended Assessment pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	05	15
K2	Understand	10	10	20
K3	Apply	05	05	15
K4	Analyze	00	00	10
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K2	K3	K6	K3	K4
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	00	05	05
Teachers Assessment (20 Marks)	05	05	00	05	05
ESE Assessment (60 Marks)	15	10	10	15	10

Special Instructions if any: Nil

Designed by:

1.Prof.S.M.Chavan

2.Prof. A.N.Ghule

3. Prof.K.R.Sarode

IT- 346 : Information Theory and Coding	
Teaching Scheme **Lectures: 4 Hrs/Week** **Total Credits :4**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: Mathematics IV

Course description: This course introduces the quantitative theory of information and its applications to communication systems.

Course Objectives:

1. To introduce information theory, uncertainty and measures of information
2. To explore the ideas of entropy and information content.
3. To assess the limitations for data transmission on a given channel
4. To know error control coding techniques and their applications

Course Outcomes

After completing the course, students will able to:

CO1	To calculate the information content of a random variable
CO2	To define channel capacities and properties using Shannon's Theorems
CO3	To make efficient codes for data on communication channels
CO4	To simplify the discrete concepts to continuous signals on continuous channels
CO5	To describe the efficient error control coding techniques

Detailed Syllabus:

Unit 1	Information Theory: Introduction, Measure of information, Average information content of symbols in long independent sequences, Mark-off statistical model for information source, Entropy and information rate of mark-off source. Source Coding Uncertainty and information, average mutual information and entropy, information measures for continuous random Variables, source coding theorem, Huffman codes
Unit 2	Source Coding: Encoding of the source output, Shannon's encoding algorithm,Communication Channels, Discrete communication channels, Continuous channels, Channel Capacity And Coding, Channel models, information capacity theorem, The Shannon limit. Linear And Block Codes For Error Correction
Unit 3	Fundamental Limits on Performance: Memory less Channels, Mutual information, Cyclic Codes Polynomials, division algorithm for polynomials, a method for generating cyclic codes, matrix description of cyclic codes, BCH Codes, Differential entropy and mutual information for continuous ensembles, Channel capacity Theorem Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes, Convolutional Codes
Unit 4	Introduction to Error Control Coding: Types of errors, examples, Types of codes Linear Block Codes: Matrix description, Error detection and correction, Standard arrays and table look up for decoding, Binary Cycle Codes, Syndrome calculation. Tree codes, trellis codes, distance notions for convolutional codes, decoding of convolutional codes,

	distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding
Unit 5	RS codes, Golay codes, Shortened cyclic codes, Burst error correcting codes. Burst and Random Error correcting codes, Convolution Codes, Time domain approach,Transform domain approach.

Text and Reference Books

1. Information theory, coding and cryptography - Ranjan Bose; TMH.
2. Information and Coding - N Abramson; McGraw Hill.
3. Introduction to Information Theory - M Mansurpur; McGraw Hill.
4. Information Theory - R B Ash; Prentice Hall.
5. Digital and analog communication systems, K. Sam Shanmugam, John Wiley, 1996.
6. Digital communication, Simon Haykin, John Wiley, 2003
7. ITC and Cryptography, Ranjan Bose, TMH, II edition, 2007
8. Digital Communications - Glover and Grant; Pearson Ed. 2nd Ed 2008

Mapping of Course outcome with Program Outcome:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2				2								
CO3					1							
CO4					2	3						
CO5												

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Quiz
2) Question & answer / Numerical solution
3) Power point presentation
4) Simulation

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination

K1	Remember	05	00	10
K2	Understand	05	05	25
K3	Apply	05	05	15
K4	Analyze	05	05	05
K5	Evaluate	00	05	05
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool					
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	05	05	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	12	12	12	12	12

Special Instructions if any: Nil

Designed by
1.Prof.C M. Gaikwad
2.Prof.A N. Ghule
3.Prof.K.S. Gandle

IT 347: Lab Microprocessor and Interfacing	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : 25 Marks **Practical Examination** **& Viva Voce:** : 25 Marks

Prerequisites: IT341 Microprocessor and Interfacing (theory)

Course Outcomes Expected: After successful completion of the course, students will be able to:

CO1	Demonstrate Arithmetic operators by using MASM
CO2	Understand the use of BCD converter
CO3	Implement logical and string operations
CO4	Use DOS/BIOS functions
CO5	Understand the use of Interfacing by using various ICs

Suggestive List of experiments:

	I. Microprocessor 8086 :	
1	Introduction to MASM/TASM.	
2	Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation	
3	Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion	
4	By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison	
5	DOS/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.	
	II. Interfacing:	
1	8259 – Interrupt Controller : Generate an interrupt using 8259 timer.	
2	8279 – Keyboard Display : Write a small program to display a string of characters	
3	8255 – PPI : Write ALP to generate sinusoidal wave using PPI.	
4	8251 – USART : Write a program in ALP to establish Communication between two processors.	

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		3									
CO2	1											
CO3	1											
CO4		2	2									
CO5	2	1	1								2	3

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	05	10	05	05	00
Practical Examination & Viva Voce (25 Marks)	05	10	05	05	00

Assessment Pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	05	05
S2	Manipulation	10	10
S3	Precision	05	05
S4	Articulation	05	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	05	05
Conduct of Experiment (S2)	07	07
Observation and Analysis of Results (S3)	05	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	05	05
Total	**25**	**25**

Designed by
1.Prof.K.R.Sarode
2.Prof. K.S.Gandle
3.Prof. V.P.Gaikwad

IT-348: Lab Computer Algorithms	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** **: 25 Marks** **Practical Examination** **& Viva Voce:** **: 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Design and implement appropriate data structures for computation
CO2	Demonstrate algorithms using divide and conquer approach
CO3	Solve problems using greedy method.
CO4	Employ dynamic programming techniques.
CO5	Illustrate backtracking techniques in problem solving

List of Experiments

Sr. No.	Details
1	Implement recursive and iterative algorithms for specific problems.
2	Implementation of sorting methods using recursion.
3	Write a program for finding maximum and minimum using divide and conquer approach
4	Implement merge sort using divide and conquer approach.
5	Implement the Greedy Knapsack problem.
6	Write a program for finding minimal spanning Trees using Prim's/ Kruscal's Greedy approach.
7	Write a program for finding shortest path using multistage graph problem.
8	Implement the all pairs shortest path problem using dynamic programming approach.
9	Implement the different techniques for tree traversals
10	Implement the graph traversal techniques
11	Illustrate 8-Queens problem using general backtracking method and recursive backtracking method.
12	Write a program for travelling salesperson problem algorithm using (a) Dynamic programming approach, and (b) Backtracking

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										

CO2		1	2		3							
CO3		1	2		3							
CO4		1	2		3							
CO5		1	2		3							

1 – High   2 – Medium   3 - Low

Assessment Table

Assessment Tool	S1	S2	S2	S2	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	07	07	05	03	03
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Assessment Pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	05	03
S2	Manipulation	08	10
S3	Precision	12	12
S4	Articulation	00	00
55	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed by
1.Prof.C.M. Gaikwad
2.Prof. A.N.Ghule
3.Prof. K.S Gandle

IT 349 - Lab: Software Engineering and Testing

Teaching Scheme			Evaluation Scheme	
Practical	02Hrs/Week		Term Work	25Marks
Credits	01		Practical/Viva-voce	50Marks

Course Outcomes:
1. Hands on software engineering principles, tools and techniques to develop, maintain and evaluate software systems
2. ability to design and develop efficient, reliable, robust and cost-effective software solutions
3. ability to work as an effective member or leader of software engineering teams and meet ethical standards with legal responsibilities

   Computer Usage / Lab Tool
   Win Runner/ IBM Rational Suite/Data Modeling tools/ Rationale's Software Engineering tools

Suggestive List of Experiments:

1	Program Analysis and project planning through the study of problem Identify project scope, objectives and Infrastructure.
2	Software requirement analysis , describe the individual phases/ Module of the project, Identify Deliverables.
3	Software design – use work product – data dictionary diagram, activity diagram, build and test class diagram, sequence diagram, DFD diagram, ER diagram
4	Software development and debugging using and tool (front end and back end)
5	Software verification and validation procedure
6	Study of Testing tools
7	Introduction to Win runner / rational rose/load runner.
8	Recording test in analog and context sensitive mode
9	Synchronizing test

10	Checking GUI Objects and bitmap objects
11	Programming test with TSL
12	Creating data driven test
13	Maintaining test script
14	Project (Creating test report)

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1		2	1	1	1	3	3					
CO2					1		2			3		
CO3						2		1	1			1

1 – High   2 – Medium   3 – Low

Assessment Tool	S1/S2	S3	S4
	CO1	CO2	CO3
Term Work (25 Marks)	08	10	07
Practical Examination & Viva Voce (25 Marks)	10	07	08

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	07	10
S3	Precision	07	05
S4	Articulation	07	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed By

- Pro. V. P.Gaikwad
- Prof. K.S.Gandle
- Prof. S. M.Chavan

IT 350: Lab Programming in Java	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 25 Marks** **Practical Examination** **& Viva Voce : 25 Marks**

Laboratory Course Outcomes
As an outcome of completing the Laboratory course, students will able to:

CO1	Design application using Java syntax and semantics.
CO2	Write an applications with database connectivity
CO3	Apply Inheritence and Multithreading
CO4	Illustrate Exception handling
CO5	Create application using Swing/Applet

List of Practical

Sr. No.	Details
1	Install the JDK,set the variables and write a program to print "Hello" word in Java.
2	Program to find factorial of number using command line argument.
3	Program to find area of circle, square and rectangle using method overloading.
4	Program to design class Account using inheritance and static that show all functions of bank(Withdraw ,Deposit).
5	Program to design a class using abstract method and classes.

6	Program which use try & catch for Exception handling.
7	Program to write a java Applet that create some text fields and text areas to demonstrate features of each.
8	Program to handle user defined exception using throw keyword.
9	Program to implement interthread communication.
10	Program to demonstrate system clock.
11	Program to implement Flow layout and Border layout.
12	Mini Project on database connectivity.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					2							
CO2			2									
CO3			2									
CO4					3							
CO5					2							

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	08	06	03
Practical Examination & Viva Voce (25 Marks)	05	10	05	05	00

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	04	10

S3	Precision	11	05
S4	Articulation	06	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed by
1.Prof.S.S.Laddha
2.Prof. C.M. Gaikwad
3.Prof. V.P.Gaikw

IT 351: Lab Software Development Lab I(C Sharp)	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work** : 25 Marks **Practical Examination** **& Viva Voce** : 25 Marks

Laboratory Course Outcomes
As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate object oriented principles
CO2	Resolve run-time errors using Exception Handling techniques
CO3	Create programs using Events handling techniques for interaction of the user with GUI
CO4	Write advance programs using C# which is required in IT industry
CO5	Illustrate real life usage of different Microsoft technologies

List of Practical

Sr. No.	Details
1	Demonstrate use of Constructors, Destructors and Garbage Collector
2	Demonstrate use of Interfaces and Abstract classes
3	Demonstrate use of Namespaces, Assemblies, Reflection

4	Demonstrate Exception Handling in C#
5	Demonstrate use of rich text control
6	Demonstrate use ListBox and ComboBox control
7	Demonstrate use of ListView control
8	Demonstrate use of TreeView control to create explorer
9	Demonstrate use of LinkLabel to establish connection between two forms
10	Demonstration of Microsoft Technologies
11	Mini Project

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2			3									
CO3			2									
CO4					3							
CO5				3								

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	08	06	03
Practical Examination & Viva Voce (25 Marks)	05	10	05	05	00

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	04	10
S3	Precision	11	05
S4	Articulation	06	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed by
1. Prof.S.S.Laddha
2. Prof.V.P.Gaikwad
3. Prof. A.N. Ghule

SEMESTER-II

IT 352 : Theory of Computation		
Teaching Scheme	**Examination Scheme**	
Lectures: 3 Hrs/Week	**Test**	**: 20 Marks**
Total Credits: 4	**Teachers Assessment**	**: 20 Marks**
Tutorial: 1 Hr/ Week	**End Semester Exam**	**: 60 Marks**

Prerequisites: IT 233 - Data Structures

Course description: This course includes introduction to theory of computation. Topics like automata theory, formal languages and grammars, Turing machines are covered in this course.

Course Objectives:

1. To provide introduction to formal languages and grammars
2. To recognize deterministic and nondeterministic automata for regular languages
4. To get acquainted with the use of context free languages and Push down automata
5. To know Turing machines and computing with them

Course Outcomes

After completing the course, students will able to:

CO1	Design finite automata and its equivalent regular expressions
CO2	Convert DFA's to NFAs and regular expression
CO3	Formulate pushdown automata and its equivalent context free grammars
CO4	Use pumping lemmas to prove the type of language
CO5	Illustrate Turing machines

Unit 1	**Mathematical Preliminaries and Finite Automata:** Sets, Relations and Functions, Principle of Induction, Introduction to Finite Automata, Structural Representations, Automata and Complexity, Central Concepts to Automata Theory, Deterministic finite Automata (DFA), Nondeterministic finite Automata (NFA), Equivalence of DFA and NFA, FA with epsilon transition, Applications of FA, Moore and Mealy machines
Unit 2	**Regular Expressions and Languages:** Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions, Proving languages not to be regular, Closure Properties of Regular Expressions, Decision Properties of Regular Expressions, Equivalence and minimization of Automata
Unit 3	**Context Free Grammar:** Definition, Derivations using grammar, Language of a grammar, Parse Trees, Application of CFG, Ambiguity in Grammars and Languages, Normal Forms for Context Free Grammars, Pumping Lemma for CFL, Closure and Decision Properties of Context Free Languages
Unit 4	**Pushdown Automata:** Definition of Push Down Automata, Languages of Pushdown Automata, Equivalence of PDA's and CFG's, Deterministic PDA
Unit 5	**Turing Machine:** Introduction to Turing Machine, The Turing machine, Programming Techniques of Turing Machines, Extension to Basic Turing Machine, Turing Machines and Computers, Undecidable Problems about Turing Machines

Text and Reference Books
1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "*Introduction to Automata Theory, Languages, and Computation*" 3rd ed., Pearson Education, ISBN: 81-317-1429-2
2. K.L.P. Mishra, N. Chandrasekaran, "*Theory of Computer Science: Automata, Languages and Computation*" 3rd Edition, PHI, ISBN: 978-81-203-2968-3
3. John C Martin, "*Introduction to Languages and the Theory of Computation*", 3rd ed., Tata McGraw Hill, ISBN: 0-07-066048-4

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12

CO1		1	3										
CO2		1	3										
CO3		1	3										
CO4		2	3										
CO5		1	3										

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Simulation
2)   Problem Solving
3)   Power point presentation of case studies
4)   Question & answer / Numerical solution

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	05	15
K2	Understand	10	05	20
K3	Apply	05	05	15
K4	Analyze	00	05	10
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K2	K2	K2	K3	K4	K3
	C01	C02	C03	CO4	CO4	CO5
Class Test (20 Marks)	05	05	05	00	00	00
Teachers Assessment (20 Marks)	00	00	05	05	05	05
ESE Assessment (60 Marks)	15	20	10	05	05	05

Special Instructions if any: Nil

Designed by:

1. Prof.C.M.Gaikwad
2. Prof.A.N.Ghule
3. Prof. K.S.Gandle

IT 353- Computer Networks	
Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/Week	**Test** : 20 Marks
Tutorial : 1 Hr/Week	**Teachers Assessment** : 20 Marks
Total Credits :4	**End Semester Exam** : 60 Marks

Prerequisites: Data Communication and Networking

Course description: Students learn about the distinct concepts and protocols in network architecture.

Course Objectives:

1. To explore protocols and networking concepts
2. To discuss issues related to application-layer concepts, including network services required by applications
3. To discuss working of Network layer and Transport Layer
4. To make the students understand Multimedia networking

Course Outcomes
After completing the course, students will able to:

CO1	Define the different protocols, software, and network architectures
CO2	Explain application-layer concept and working of different protocols of application layer
CO3	Describe the principle of working of transport layer and implementation of these principles in existing protocols
CO4	Express working of network layer and routing protocols
CO5	Explore underlying principles behind video streaming

Detailed Syllabus:

Unit 1	**Computer Networks and the Internet** The Internet, The Network Core Packet Switching Circuit Switching , A Network of Networks, Delay, Loss, and Throughput in Packet-Switched Networks, Overview of Delay in Packet-Switched Networks, Queuing Delay and Packet Loss, End-to-End Delay, Throughput in Computer Networks ,Protocol Layers and Their Service Models Layered Architecture ,Encapsulation, Networks Under Attack
Unit 2	**Application Layer** **Principles of Network Applications**, The Web and HTTP: Overview of HTTP Non-Persistent and Persistent Connections HTTP Message Format ,User-Server Interaction: Cookies 108, Web Caching, The Conditional GET,**File Transfer**: FTP Electronic Mail in the Internet: SMTP ,Comparison with HTTP, Mail Message Format, Mail Access Protocols, **DNS**–The Internet's Directory Service: Services Provided by DNS Overview of How DNS Works, DNS Records and Messages, Peer-to-Peer Applications, P2P File Distribution, Distributed Hash Tables (DHTs), **Network Management** :What Is Network Management? The Infrastructure for Network Management, The Internet-Standard Management Framework, Structure of Management Information: SMI, Management Information Base: MIB, SNMP Protocol Operations and Transport Mappings
Unit 3	**Transport Layer** **Introduction and Transport-Layer Services:** Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, **Connectionless Transport-UDP**: UDP Segment Structure, UDP Checksum, **Principles of Reliable Data Transfer**: Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR) **Connection-Oriented Transport: TCP** : The TCP Connection, TCP Segment Structure, Round-Trip Time Estimation and Timeout , Reliable Data Transfer, Flow

	Control, TCP Connection Management **Principles of Congestion Control** :The Causes and the Costs of Congestion, Approaches to Congestion Control TCP Congestion Control
Unit 4	**The Network Layer** **Introduction Forwarding and Routing:** Network Service Models Virtual Circuit and Datagram Networks, Origins of VC and Datagram Networks, **Router:** Input Processing, Switching, Output Processing, The Routing Control Plane **The Internet Protocol (IP):** Forwarding and Addressing in the Internet, Datagram Format, IPv4 Addressing, Internet Control Message Protocol (ICMP), IPv6, A Brief Introduction to IP Security **Routing Algorithms**: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, **Routing in the Internet** : Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing
Unit 5	**Ethernet , LAN and Virtual Circuit Networks** IEEE standards, different Ethernets. Connecting devices, backbone networks, VLAN. Frame Relay, ATM, ATM LANs

Text and Reference Books

1. "Computer Networking- a top-down approach featuring the Internet", by James F. Kurose and Keith W. Ross, Person Education, ISBN-10- 0132856204, 6th Edition.
2. "Data Communications and Networking", by Forouzan B. A, Tata McGraw-Hill Publications, 2006, ISBN-0-07-063414-9, 4th edition.
3. "Computer Networks", by Tanenbaum A. S., Pearson Education , 2008, ISBN- 978-81-7758-165-2, 4th Edition
4. "Computer Networks and Internet", by Comer D., Pearson Education, ISBN-81-297- 0330-0, 2nd Edition.
5. "Computer Networks- A Systems Approach", by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann, ISBN-978-81-312-1045-1, 4th Edition.

Mapping of Course outcome with Program Outcome

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	3									
CO2			2		2							

CO3				2								
CO4		2		2								
CO5		2										

1 – High2 – Medium3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Quiz
2) Question & answer / Numerical solution
3) Power point presentation
4) Simulation
5) Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	12
K2	Understand	05	05	24
K3	Apply	05	05	12
K4	Analyze	05	05	06
K5	Evaluate	00	05	06
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool					
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	05	05	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	12	12	12	12	12

Special Instructions if any: Nil

Designed by
1. Prof.A.N.Ghule
2. Prof.K.R.Sarode
3. Prof. V.P.Gaikwad

IT 354 : Advance Database Management Systems

Teaching Scheme			Evaluation Scheme	
Lectures	4 Hrs/Week		Test	20 Marks
Tutorials	0 Hrs/Week		Teacher Assessment	20 Marks
Total Credits	4		End-Semester Examination	60 Marks

Contact Hours for this subject is 60
Prerequisites: IT253 Database Management System

Course Description
Focuses in-depth instruction in the handling of critical tasks of planning and implementin
g large databases. Course content includes an introduction to concepts of advanced data
warehousing and database configuration

Course Educational Objectives:
1. Identify, describe, and categorize database objects

2. Administer a database by recommending and implementing procedures including database
tuning, backup and recovery

3. Propose, implement and maintain database security mechanisms

4. Explore non-relational database systems and structures

Course Outcomes Expected:
1. Design and implement advanced queries using Structured Query Language

2. Design, construct and maintain a database and various database objects using procedural
language constructs, forms and reports to solve problems

3. Define the role of data warehousing and enterprise intelligence in industry and government
4. Design and implement a complete problem solution using current database technology. (Oracle
11g)

UNIT-1	PL/SQL – Introduction to PL/SQL – Declare, begin statements, Variables, Control Structure, PL/SQL Transactions – Savepoint, Cursor, PL/SQL Database Objects – Procedures, Functions, Packages, Triggers. Programmatic SQL – Embedded SQL, Dynamic SQL, and ODBC Standard
UNIT-2	**Parallel and Distributed Databases :**Database System Architectures: Centralized and Client-Server Architectures – Server System Architectures – Parallel Systems- Distributed Systems – Parallel Databases: I/O Parallelism – Inter and Intra Query Parallelism – Inter and Intra operation Parallelism –

	Distributed Database Concepts - Distributed Data Storage – Distributed Transactions – Commit Protocols – Concurrency Control – Distributed Query Processing – Three Tier Client Server Architecture- Case Studies.
UNIT-3	**Object and Object Relational Databases :**Concepts for Object Databases: Object Identity – Object structure – Type Constructors – Encapsulation of Operations – Methods – Persistence – Type and Class Hierarchies – Inheritance – Complex Objects – Object Database Standards, Languages and Design: ODMG Model – ODL – OQL – Object Relational and Extended – Relational Systems : Object Relational features in SQL/Oracle – Case Studies
UNIT-4	**Introduction to Data warehousing** 1. Overview and Concepts: Need for data warehousing, Basic elements of data warehousing, Trends in data warehousing. Planning and Requirements: Project planning and management, Collecting the requirements. Architecture And Infrastructure: Architectural components, Infrastructure and metadata
UNIT-5	**Designing and maintaining Data warehouse** 1. Data Design And Data Representation: Principles of dimensional modeling, Dimensional modeling advanced topics, data extraction, transformation and loading, data quality. 2. Information Access And Delivery: Matching information to classes of users, OLAP in data warehouse, Data warehousing and the web. 3. Implementation And Maintenance: Physical design process, data warehouse deployment, growth and maintenance

TEXT AND REFERENCE BOOKS

1. Silberschatz A., Korth H., and Sudarshan S., DatabaseSystem Concepts, McGraw-Hill (5th Ed), 2006, ISBN:
   0072958863
2. Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education
3. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, McGraw-Hill
4. Han and Kamber, Data Mining: Concepts and Techniques, Second Edition, Morgan Kaufmann, 2006& Longman, Introduction to Database Systems, Pearson Education

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	2									
CO2		2	1		2					2		
CO3		2	1			2			3			3
CO4			1	3			3					2

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Power point presentation of case studies
2)   Application development
3)   Question & answer
4)   Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	15
K2	Understand	10	05	20
K3	Apply	05	05	10
K4	Analyze	00	10	15
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K4	K3
	C01	C02	C03	CO4
Class Test (20 Marks)	05	10	05	00
Teachers Assessment (20 Marks)	00	05	05	10
ESE Assessment (60 Marks)	15	20	10	15

Special Instructions if any: Nil

Designed by
1. Prof.V.P.Gaikwad
2.Prof.S.S.Ladda
3. Prof.K.R.Sarode

IT 355: Operating System		
Teaching Scheme	**Examination Scheme**	
Lectures: 03 Hrs/Week	**Test**	**: 20 Marks**
	Teachers Assessment	**: 20 Marks**
	End Semester Exam	**: 60 Marks**

Prerequists: Computer Organization

Course description: This course provides students with major functions and principles of operating systems using latest OS among its types. Main topics include the structure of operating systems, process management, memory management, I/O management, file management,essential utilities and commands,basic shell scripting, and system programming.

Course Objectives:

1.Explain the objectives and functions of modern operating systems.

2. Describe the need for concurrency within the framework of an OS.

3. Summarize the various approaches to solving the problem of mutual Exclusion, deadlock in an operating system.
4. Explain memory hierarchy.

Course Outcomes
After completing the course, students will able to:

Detailed Syllabus:

Unit 1	**Introduction** : Operating system and functions, organization of a computer system, operational view of a computing system with resources like processor, memory, input and output, issues in resource management, introduction to the issues in communication with devices, kernel and shell of an operating system ,Classification of Operating systems- Batch, Interactive, Time sharing, Real Time System, Multiprocessor Systems, Multiuser Systems, Multiprocessor Systems, Multithreaded Systems, Operating System Structure- Layered structure, System Components, Operating System services, Monolithic and Microkernel Systems, System calls, Concept of Virtual machine
Unit 2	**Process Management**: Process Concept, Process States, Process Transition Diagram, Schedulers, Process Control Block (PCB), Process address space, Process identification information, Threads and their management, Scheduling Concepts, Performance Criteria, Scheduling Algorithms, Multiprocessor Scheduling Inter Process Communication models and Schemes, Process generation.

CO1	Apply knowledge and principles of OS to identify the requirements in basic engineering deciplines
CO2	Understand the concept of process,thread to formulate shceduling algorithm solutions
CO3	Examine the concept of process syncronization to conduct experiments as per appropriate techniques.
CO4	Understand the concept of deadlock to handle with enviornamental considerations.
CO5	Analyze memory mangement techniques with respective to legal and soacial issues of professional enginerring practice
CO6	Apply the concept of I/O management and file sytem in a group to accomplish common goal
CO7	Recognize the need of protection and security in continuing professional development projects as a leader in a team
Unit 3	**Process Management with Synchronization**: Concurrent Processes, Principle of Concurrency, Producer / Consumer Problem, Mutual Exclusion, Critical Section Problem, Peterson's solution, Semaphores, Test and Set operation; Classical Problem in Concurrency- Dining Philosopher Problem, Monitors, Deadlock: System model, Deadlock characterization, Prevention, Avoidance and detection, Recovery from deadlock.

Unit 4	**Memory Management**: Memory management need, memory relocation, linking and loading of memory, processes and primary memory management, Multiprogramming with fixed partitions, Multiprogramming with variable partitions, Paging, hardware support for paging, segmentation, segmentation with paging, Paged segmentation, fragmentation, Virtual memory concepts, Demand paging, Performance of demand paging, Page replacement algorithms, Thrashing, Cache memory organization, Locality of reference.
Unit 5	**File System and I/O Management:** File concept, File system structure, file allocation methods (Contiguous, linked and indexed allocation), Disk space management, Swap-space management File sharing, I/O Management and disk scheduling. **Protection & security:** Goals of protection, Access matrix, Implementation of access matrix, The security problem, Authentication, Programming threats, System threats, Threat monitoring, Encryption.

Text and Reference Books

1. Abraham Silberschatz and Peter Barer Galvin, "*Operating System concepts",* 8th Ed. Addison Wesley, 1998
2. Andrew S. Tanenbaum, *"Modern Operating Systems",* Prentice Hall, 1991
3. D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2										
CO2		2	1		2							
CO3			1	1								
CO4				2	1							
CO5				1		1			2			
CO6								1				
CO7									1	1		

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1)   Simulation
2)   Application development
3)   Power point presentation of case studies
4)   Question & answer / Numerical solution

5) Study of Industry processes and its presentation
6) Mini projects

Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	05
K2	Understand	00	00	05
K3	Apply	05	10	25
K4	Analyze	10	10	25
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total		20	20	60

Assessment table

Assessment Tool	K3	K2	K1	K4	K4	K3	K6
	C01	C02	C03	CO4	CO5	CO6	CO7
Class Test 20 Marks	05	00	05	05	05	00	00
Teachers Assessment 20 Marks	05	00	00	10	00	05	00
ESE Assesment 60 Marks	15	05	05	10	15	10	00

Special Instructions if any: Nil

<div align="right">

Designed by
1. Prof. S.M.Chavan
2. Prof. V.P.Gaikwad
3. Prof.C.M.Gaikwad

</div>

IT 356: Elective II Advanced Java		
Teaching Scheme	**Examination Scheme**	
Lectures: 04Hrs/Week	**Test**	**: 20 Marks**
Credits :04	**Teachers Assessment**	**: 20 Marks**
	End Semester Exam	**: 60 Marks**

Prerequisites: IT 344-Programming in Java

Course description: This course will introduce the students to J2EE.It consists of advanced java concepts like RMI,Socketprogramming,Servlets,JSP and Enterprise Java beans.

Course Objectives:

1. To enable the students to understand J2EE technology..
2. To illustratesocket programming.
3. To understand RMI architecture.
4. Introduce the students to servlet programming and JSP.
5. Introduce the students to Enterprise Java Beans.

Course Outcomes
After completing the course, students will able to:

CO1	Illustrate J2EE technology
CO2	Model applications using socket programming
CO3	Create applications using servlet
CO4	Develop application using JSP
CO5	Describe EJB applications

Detailed Syllabus:

Unit 1	**Introduction to Java 2 Enterprise Edition:** Need for J2EE, Advantages of J2EE, Types of Enterprise Architecture, Architecture of J2EE, J2EE Components, J2EE Containers, J2EE Technologies
Unit 2	**Socket Programming:** Introduction to Networking, Client Sockets and Server Sockets **Introduction to RMI:** Architecture of RMI, Working with RMI, Creating Distributed Applications, Using RMI, RMI over IIOP, RMI-IIOP and J2EE, Sample Application with RMI-IIOP
Unit 3	**Servlet Programming:** Overview of Servlet, What's new in Servlet, Features of Java Servlet, Servlet Life cycle,Servlet Configuration, Understanding Request and Response Object, Reading Form Data from Servlet **Understanding Servlet Sessions:** What is Session? Introduction to Session Tracking, Mechanism of Session Tracking, Session Tracking and Java Servlet API
Unit 4	**JSP:**Introduction, Comparison between JSP &servlet., Architecture/Life cycle, Different types of JSP architectures and relative comparison.; JSP tags ,Directives, Scripting elements, Actions; JSP implicit objects, Accessing user information using implicit objects.
Unit 5	**Enterprise Java Beans:** EJB Fundamentals, EJB Architecture, EJB Interfaces, EJB Roles, Benefits and Limitations of EJB, Session Bean, Stateless versus Stateful Session Beans, Developing

Session Beans, Introduction of Entity Beans,BMT Entity Beans, CMP Beans, ejbLoad(), ejbStore() ejbRemove and Finder methods, Sample Application, Deploying EJBs.	

Text and Reference Books

Text Books:

1. "Java Server Programming, Black Book", Dreamtech Press, Edition 2007.
2. "J2EE – Complete Reference", McGraw Hill, Edition 2007
Reference Books:
1. Bruce Eckel, "Thinking in Java", Prentice - Hall

2. Herbert Schildt, Patrick Naughton, "JAVA 2 – Complete Reference", McGraw Hill

Mapping of Course outcome with Program Outcome

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2			3									
CO3			2									
CO4					3							
CO5				3								

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Mini projects

Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	15
K2	Understand	00	00	00

K3	Apply	10	05	20
K4	Analyze	05	10	15
K5	Evaluate	00	05	10
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K4	K5	K5	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	00	00	10
Teachers Assessment (20 Marks)	00	10	05	00	05
ESE Assessment (60 Marks)	15	15	00	10	20

Special Instructions if any: Nil

Designed by
1. Prof.S.S.Ladda
2.Prof.A.N.Ghule
3.Prof.V.P.Gaikwad

IT 357: Object Oriented Modeling and Design

Teaching Scheme			Evaluation Scheme	
Lectures	4 Hrs/Week		Test	20 Marks
Tutorials	0 Hrs/Week		Teacher Assessment	20 Marks
Total Credits	4		End-Semester	60 Marks

			Examination	

Contact Hours for this subject is 60
Prerequisites: IT 344-Programming in Java

Course Objectives:
1. Release the methodology that encompasses a wide range of software engineering techniques used in system analysis, modeling and design.
2. Integrate well with orientation & importance of knowledge of Object Orientation structural & behavioral modeling techniques.
3. Demonstrate the framework for software engineers to collaborate in the design and development process.
4. Design aspect with UML technology.

Course Learning Outcomes:
1. Ability to build software projects based on Object oriented software engineering practices.
2. Familiar with the UML processes on software development.
3. Industry-readiness: Learner experiments OO methodology to undertake real life software in IT industry.
4. To gets hands on expertise on UML techniques on software Projects.

UNIT-1	**Principles of Object Orientation Motivations for OOP** Object Oriented development and themes, evidence for usefulness, modeling as a design techniques Objects, classes, links and associations, generalization and Inheritance, grouping constructs, aggregation, abstract classes generalization as extension and restriction, multiple inheritance
UNIT-2	**Design Methodology** Impact of an object oriented approach, Analysis, System design with examples, combining models, Designing models, designing Algorithms, Optimization of design control, Associations, Physical packaging, Comparing methodologies using structure analysis and design, Jackson's structured Development, Information modeling notation and object oriented works
UNIT-3	**OO Programming Languages** A Comparative Study of some typical Object Oriented Programming Languages such as C++, JAVA. **Structural Modeling using UML** Classes, Relationships, Common mechanisms, Diagrams, Class Diagrams, Interfaces, Types and Roles, Packages, Instances and Object Diagram
UNIT-4	**Behavioral Modeling using UML** Interactions, Use cases, Use case diagram, Interaction Diagrams and Activity diagrams, Events and signals, State Machines, Processes and Threads, Time and space, State chart diagrams
UNIT-5	**Architectural Modeling using UML** Components, Deployment, Collaboration, Patterns and Frame works, Component Diagrams, Deployment Diagrams

Textbook:
1. Rambaugh, Premerlani, Eddy, Lorenson, *"Object Oriented Modeling and Design",* ,PHI.
2. Grady Booch, JeamsRambaugh, IvarJacotson, *"The Unified Modeling Language User Guide",* Addison Wesley

References:
1. Andrew High, *"Object Oriented Analysis and Design"*, TMG
2. **Kahate**, *"Practical Object Oriented Design with UML"*, Mark Priestley.

Program Outcomes:

Successful completion of this course will contribute to the following Program Outcomes:

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2									
CO2		2	2		1	3	3					
CO3								3			3	2
CO4					2	3	3					

1 – High   2 – Medium   3 - Low

Teacher's Assessment: Teachers Assessment of 20 marks is based on one of the / or combination of few of following
1) Power point presentation of case studies
2) Application development
3) Question & answer
4) Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	15
K2	Understand	10	00	20
K3	Apply	05	10	10
K4	Analyze	00	10	15
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3	K4
	C01	C02	C03	CO4
Class Test (20 Marks)	05	10	05	00
Teachers Assessment (20 Marks)	00	05	05	10
ESE Assessment (60 Marks)	15	20	10	15

Special Instructions if any: Nil

Designed by
1. Prof.V.P.Gaikwad
2.Prof.S.S.Ladda
2.Prof.A.N.Ghule

IT 358: Lab Computer Networks	
Teaching Scheme Practical: 2Hrs/Week Credits :01	Examination Scheme Term Work : 25 Marks Practical / Viva Voce : 25 Marks

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate routing algorithm
CO2	Exercise socket programming
CO3	Demonstrate sliding window protocols
CO4	Designnetworks using NS too and Virtual Labs
CO5	Illustrate Packet sniffing and analyze packets using Wireshark

Suggested list of Practicals

1   Write a program for distance vector algorithm to find suitable path for transmission.

2   Using TCP/IP sockets, write a client-server program file transfer

3   Write a program for congestion control using Leaky bucket algorithm.

4   Write a program for implementation of simple DNS

5   Write a program for to simulate a sliding window protocol: Go Back N

6   Write a program for to simulate a sliding window protocol: Selective Repeat

7   Study of Network Simulation
   a. Platform required to run network simulator
   b. Backend Environment of Network Simulator
   c. Basics of Tcl Programming for NS-2

8   Simulating a Local Area Network (in virtual Labs)
   a. Study of Ethernet Frame Structure
   b. Simulating a LAN using Network Simulator 2

9   Study of Wireshark
   a. Platform required
   b. Installation
   c. Packet sniffing and analysis using Wireshark

10   Study of Tcpdump

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2	2									
CO2			2		3							
CO3			2									
CO4			1		1							
CO5			2	3								

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	05	05	05	05	05
Practical Examination & Viva Voce (25 Marks)	05	05	05	05	05

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	05	05
S2	Manipulation	05	05
S3	Precision	10	10
S4	Articulation	05	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	05	05
Conduct of Experiment (S2)	05	05

Observation and Analysis of Results (S3)	05	05
Record (S2)	05	05
Mini-Project / Presentation/ Viva-Voce (S3)	05	05
Total	**25**	**25**

Designed by

1. Prof.A.N.Ghule2. Prof.K.R.Sarode3. Prof. V.P.Gaikwad

IT 359 : Lab-Advance Database Management Systems

Teaching Scheme			Evaluation Scheme	
Practical	2 Hrs/Week		Term Work	25 Marks
Credits	1		Practical/Viva-voce	25

Contact Hours for this subject is 15

Course Outcomes Expected

1. Implement SQL DDL and DML commands
2. Implement SQL functions and procedures
3. Design and implement SQL forms and Reports
4. Design and implement a complete problem solution using current database technology. (Oracle 11g)

The term work shall consist of following practical's

1. SQL
1. Simple Queries using DDL, DML and DCL
2. SQL Aggregate Functions
3. SET Operations
4. Views and Snapshots
5. Multiple Tables and Nested Queries PL/SQL
6. PL/SQL Block
7. Function and Procedures
8. Subprograms and Packages
9. Triggers

10. Cursors

FORMS AND REPORTS
11. Designing Oracle Forms using Menus and Buttons
12. Developing Oracle Reports

13. Implement Data Modeling
14. Implement Fact Table

15. Implement Star Schema

TERM Work:
The term work consists of at least 10 experiments/ assignments based on the syllabus of the subject.
Assessment of term work should be done based on the points mentioned below:
- Continuous lab assessment
- Actually performing practices in the laboratory
- Oral Evaluation conducted (internally) at the time of submission

Practical Examination:
The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		1	3		2		3					
CO2			3		2		3					
CO3								3		1	2	
CO4										2	1	2

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	05	06	08	06
Practical Examination & Viva Voce (25 Marks)	05	10	05	05

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	07	10
S3	Precision	14	05
S4	Articulation	00	05

55	Naturalization	00	00	
Total		25	25	

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed by
1. Prof.V.P.Gaikwad
2.Prof.S.S.Ladda
2.Prof.A.N.Ghule

IT 360: Lab Software Development Lab II (ASP.NET)	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 25 Marks** **Practical Examination** **& Viva Voce : 25 Marks**

Laboratory Course Outcomes
As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate secure web applications using ASP.Net
CO2	Design and test web service procedure using ASP.Net and IIS.
CO3	Create a simple web service to demonstrate the use of rich controls for creating online registration form
CO4	Write Advance programs using ASP.net which is required in IT industry
CO5	Design Windows forms and data driven applications using various controls.

List of Practical

Sr. No.	Details
1	To Study the ASP.Net Introduction.
2	Procedure to set up the ASP.Net and IIS.
3	Create a program for Online Test using ASP.NET
4	Design logon Web form and validate it
5	Demonstrate the rich controls for creating online registration form

6	Save logon and registration information in Database.
7	Develop a web page to insert, delete & modify information stored in the database.
8	To create advertisements using adRotator
9	Create a simple web service
10	Mini Project

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2			3									
CO3			2									
CO4					3							
CO5				3								

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	08	06	03
Practical Examination & Viva Voce (25 Marks)	05	10	05	05	00

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce

S1	Imitation	04	05	
S2	Manipulation	04	10	
S3	Precision	11	05	
S4	Articulation	06	05	
55	Naturalization	00	00	
Total		25	25	

Preparation (S1)	04	05	
Conduct of Experiment (S2)	04	07	
Observation and Analysis of Results (S3)	08	05	
Record (S2)	03	03	
Mini-Project / Presentation/ Viva-Voce (S3)	06	05	
Total	**25**	**25**	

Designed by
1.Prof.S.S.Laddha
2.Prof. A.N. Ghule
3.Prof.C.M.Gaikwad

IT-361:Operating System Laboratory	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : 25 Marks **Practical Examination** **& Viva Voce:** : 25 Marks

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Apply the Knowledge of basic commands for computing requirements.
CO2	Evaluate design of process component to implement with multithreading.
CO3	Analayze the need of interprocess communication to select and continue with IT tool
CO4	Understand the basic difference between primary memory and virtual memory

List of Experiments

Sr. No.	Details
1	Installation Process of various operating systems and implement various UNIX commands
2	Shell Programming: Basic of shell programming with implementation of Examples
3	Write a program using system calls of UNIX OS (fork,exec,wait)
4	Write a Program to simulate process scheduling like FCFS, Shortest Job First and Round Robin
5	Write a program for interposes communication using Shared memory
6	Write a program for interposes communication using pipes
7	Write a Program for deadlock avoidance(Bankers algorithm)
8	Write a Program to simulate page replacement algorithms like FIFO and LRU.
9	Write a Program to simulate memory allocation using First fit, Best fit, and Worst fit.
10	Case study of latest operating system

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		1								
CO2					1					
CO3				1						
CO4										

1 – High   2 – Medium   3 - Low

Assessment Table

Assessment Tool	S2	S1	S4	S1
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	04	05	10	06
Practical Examination & Viva Voce (25 Marks)	05	10	05	05

Assessment Pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05

S2	Manipulation	10	10
S3	Precision	11	05
S4	Articulation	00	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)		04	05
Conduct of Experiment (S2)		06	05
Observation and Analysis of Results (S3)		06	05
Record (S2)		04	05
Mini-Project / Presentation/ Viva-Voce (S3)		05	05
Total		**25**	**25**

Designed by
1.Prof. S.M.Chavan
2.Prof. V.P.Gaikwad
3.Prof. C.M.Gaikwad

IT 362: Lab Advanced Java	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 25 Marks** **Practical Examination** **& Viva Voce : 25 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Demonstrate J2EE technology
CO2	Design Networking applications using Socket programming and RMI
CO3	Create applications using Servlet
CO4	Write applications using JSP
CO5	Design EJB applications

List of Practical

Sr. No.	Details
1	Program to demonstrate simple chat application using Networking.
2	Program to develop RMI application for basic arithmetic calculations.
3	Create a Servlet to read data from a HTML From and display it on Servlet page.
4	Create a Cookie using Servlet API.
5	Write a JSP to output the values returned by Systems.getProperty for various system properties such as java.version, java.home, os.name, user.name, user.home, user.dir etc.
6	Create a sample application using JSP.
7	Create a Simple EJB to demonstrate Java EJB API.
8	Deploy Bean created in Previous Experiment.
9	Mini Project

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		2										
CO2			3									
CO3			2									
CO4					3							
CO5				3								

1 – High   2 – Medium   3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S4	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	08	06	03

Practical Examination & Viva Voce (25 Marks)	05	10	05	05	00

Recommended Assessment pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	04	10
S3	Precision	11	05
S4	Articulation	06	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)		04	05
Conduct of Experiment (S2)		04	07
Observation and Analysis of Results (S3)		08	05
Record (S2)		03	03
Mini-Project / Presentation/ Viva-Voce (S3)		06	05
Total		**25**	**25**

Designed by
1.Prof.S.S.Laddha
2.Prof. A.N.Ghule
3.Prof. V.P.Gaikwad

IT 363: Lab Object Oriented Modeling and Design

Teaching Scheme			Evaluation Scheme	
Practical	02Hrs/Week		Term Work	25 Marks
Credits	01		Practical/Viva-voce	25 Marks

Course Learning Outcomes:
1. Ability to build software projects.
2. Familiar with the UML processes on software development.
3. **Ability to undertake and develop real life software for IT industry.**
4. To gets expertise on UML techniques on software Projects.

1	To develop a problem statement.
2	Develop an IEEE standard SRS document. Also develop risk management and Project plan (Gantt chart).
3	Identify Use Cases and develop the Use Case model.
4	Identify the business activities and develop an UML Activity diagram.
5	Identity the conceptual classes and develop a domain model with UML Class diagram.
6	Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7	Draw the State Chart diagram.
8	User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9	Implement the Technical services layer.
10	Implement the Domain objects layer.
11	Implement the User Interface layer.
12	Draw Component and Deployment diagrams.
13	Mini Project

Suggested Software Tools

ArgoUML, Eclipse IDE, Visual Paradigm, Visual case, and Rational Suite

Practical Examination:

The Practical Examination shall consist of writing and performing an experiment / assignment and oral based on the syllabus as per the journal record. Duration of examination is three hours.

TERM Work:

The term work shall consist of a journal record of at least 10 experiments/ assignments
Assessment of term work should be done based on the points mentioned below:
- Continuous lab assessment
-Actually performing practical in the laboratory
-Oral Examination conducted (internally) at the time of submission

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	3	3		2	1		2				3	2
CO2			1	2		2						
CO3					1	2	2	3				2
					1	1	1			2	2	2

1 – High   2 – Medium   3 – Low

Assessment Tool	S2	S1	S3	S4
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	09	8	06	7
Practical Examination & Viva Voce (25 Marks)	5	5	08	7

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination & viva voce
S1	Imitation	04	05
S2	Manipulation	07	10
S3	Precision	10	05
S4	Articulation	04	05
55	Naturalization	00	00
Total		25	25

Preparation (S1)	04	05
Conduct of Experiment (S2)	04	07
Observation and Analysis of Results (S3)	08	05
Record (S2)	03	03
Mini-Project / Presentation/ Viva-Voce (S3)	06	05
Total	**25**	**25**

Designed By

1. Prof. V. P.Gaikwad
2. Prof. S.S.Laddha
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