GOVERNMENT COLLEGE OF ENGINEERING, AURANGABAD

(An Autonomous Institute of Government of Maharashtra)

Department of Information Technology Engineering

Teaching and Evaluation Scheme

SE (Full-Time) in Information Technology Engineering

SEMESTER-I

THEORY COURSES													
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical/ Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	GE-241	Environmental Studies	03	-	-	03	20	20	60			100
2	GE-242	Engineering Mathematics	03	01	-	04	20	20	60			100
3	IT- 243	Digital Electronics	03	-	-	03	20	20	60			100
4	IT-244	Object Oriented Programming	04	-	-	04	20	20	60			100
5	IT-245	Data Communication and Networking	03	01	-	04	20	20	60			100
LABORATORY COURSES												
6	IT-246	Lab- Digital Electronics			02	01				25	-	25
7	IT-247	Lab- Programming in C			02	01				25	-	25
8	IT-248	Lab- Web Technology			04	02				50	25	75
9	IT-249	Object Oriented Programming			04	02				50	25	75
		Total	16	02	12	24	100	100	100	150	50	700

SEMESTER-II

THEORY COURSES													
S. No.	**Course Code**	**Subject**	**Scheme of Teaching (Hrs/Week)**			**Total Credits**	**Scheme of Evaluation (Marks)**					
			L	**T**	**P**		**Theory**			**Term Work**	**Practical/ Viva-voce**	**Total**
							Test	**TA**	**ESE**			
1	IT-258	I)Computer Ethics and Cyber Security	03	-	-	03	20	20	60			100

	IT-259	II)Computer Systems										
2	GE-253	Mathematics-IV	03	01	-	04	20	20	60			100
3	IT-251	Data Structure	03	01	-	04	20	20	60			100
4	IT-252	Computer Graphics	03			03	20	20	60			100
5	IT-253	DatabaseManagement System	04	-		04	20	20	60			100
LABORATORY COURSES												
6	IT-254	Lab- Data Structure			02	01				25	25	50
7	IT-255	Lab- Computer Graphics			02	01				25	-	25
8	IT-256	Lab-Database Management System			04	02				50	25	75
9	IT-257	Lab-Computer Workshop			04	02				50	-	50
		Total	16	02	12	24	100	100	300	150	50	700

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

IT 243: Digital Electronics

Teaching Scheme		**Evaluation Scheme**	
Lectures	3Hrs/Week	Test	20 Marks
Tutorials	0Hrs/Week	Teacher Assessment	20 Marks
Total Credits	3	End-Semester Examination	60 Marks

Course Educational Objectives:

- To train the students on fundamentals of Digital basics
- To train the students to lay a strong foundation for digital systems.
- To train the students on basic Design issues of processors

Course Outcomes Expected:

-Student will understand concepts of logic gates, Universal gates, map, Flip-flops.

-Student will able to design small circuitry

UNIT-1	**Number Systems and codes, Logic Gates, Boolean algebra** Number system and codes: Number systems, Binary number system, signed binary numbers, binary arithmetic, 2's complement arithmetic, octal number system, Hexadecimal number system, Gray code, Excess three codes, error detecting and correcting codes. Basic gates, Universal gates and their truth tables, De-Morgan's theorem.	5 Hrs
UNIT-2	**Combinational circuit design,** And **Sequential Logic Design, Flip-Flops:** Combinational Circuit Design : K-Map minimization using K-map , don't care condition, Binary half and full adders and subtractors, BCD to Seven Segment decoder, binary to gray and gray to binary conversion. Quine-McClusky minimization technique. Multiplexers, cascading of multiplexers, Demultiplexers, cascading of Demultiplexers, Binary and BCD Adders Flip-flops - One bit memory cell, Clocked SRFF, JKFF, D Type, T Type FF, Application of Flip-flops Introduction registers, shift registers, universal registers, application of shift registers, as ring counters, twisted ring counter	8 Hrs
UNIT-3	**Combinational Logic Design and Flip-Flops, Sequential Logic Design** Multiplexers, cascading of multiplexers, Demultiplexers, cascading of Demultiplexers, Binary and BCD Adders Flip-flops - One bit memory cell, Clocked SRFF, JKFF, D Type, T Type FF, Application of Flip-flops Introduction registers, shift registers, universal registers, application of shift registers, as ring counters, twisted ring counter	6 Hrs
UNIT-4	**Counters :**Ripple or Asynchronous Counters, Modulus of Counters, Introduction to general purpose 54/74 series, Asynchronous IC's, Cascading of ripple counter IC's, Synchronous counters, up/down counters	6 Hrs
UNIT-5	**Timing circuits**: Application of logic gates in timing circuits, OP AMP and its application in timing circuits, Schmitt trigger ICs, Monostable multivibrator ICs, 555 timer , A/D Conveter , D/A Converter , Examples of Digital Systems.	6 Hrs

TEXT BOOKS

1. R. P Jain, "Modern Digital Electronics", Tata Mcgraw Hill.

2. R. P. Jain & Thomas L. Floyd,"Digital Fundamentals", Pearson Education**2.** R. P. Jain & Thomas L. Floyd, "Digital Fundamentals", Pearson Education

3. D. P. Leach, A. P. Malvino, G. Saha ; Digital Principles & applications.

REFERENCE BOOKS:

1. John F. Wakerly; Digital Design (Principles & Practices).

IT 244: Object Oriented Programming

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

Course Educational Objectives:

-To train the students on fundamentals of Object Oriented Programming

- To train the students for a strong foundation for using these concepts in software development

Course Outcomes Expected:

- Student will understand concepts of Class and Objects.

-Student will understand concepts of Inheritance, polymorphism etc.

-Students will able to do some small projects by using c++

UNIT-1	**Introduction:** Advantages of OOPS language & development platform, program statements preprogramming directives, include directives, header files ,I/O statement variables, manipulators Introduction**,** Data types, Control statements(if-else, loops), switch case ,Arrays, Pointers, Functions, Structures	8 Hrs
UNIT-2	**Object and Classes:** Class as Data type, Basic concepts of oops, Specifying a class, Defining member functions, Array within a class, Memory allocation for objects, Static data and member function, Array of object, object as function argument	8 Hrs
UNIT-3	**Constructor and Destructor:** Concept of constructor, Its Types (default, parameterized, copy, dynamic), constructor overloading, Constructor with default argument, Destructor, Function overloading, Operator overloading (Overloading unary and binary operators, Overloading binary operators, multiple overloading)	8 Hrs
UNIT-4	**Inheritance and Polymorphism:** Derived class and base class-specifying the derived class, accessing base class member, Types of Inheritance (single, multilevel, multiple,Hierarchical,Hybrid) accessing specifies, Virtual base classes, Abstract Classes, Constructors in inheritance. Concept of Polymorphism, its Types Run time and compile time polymorphism, Concept of overloading and overriding. Storage.	8 Hrs
UNIT -5	**Files and Stream classes:** Streams-stream class hierarchy, stream classes-string I/O Writing strings, detecting end of file, character I/O Object I/O,I/O with multiple objects-the fstream class, "open" function-file pointers-specifying position, specifying the offset, the calling function, error handling-redirection-redirecting input, Manipulators.	8 Hrs

TEXT BOOKS

1. E. Balagurusamy; *Object Oriented Programming with C++, Third Edition, Tata McGraw Hill.*
2. K. R.Venugopal, Rajkumar B., T.Ravishankar; *Mastering C++, Tata McGraw Hill*.

REFERENCE BOOKS:

1. Bjarne Stroustrup; *C++ Programming Language, Pearson Education Asia.*
2. Scott Meyers; *More Effective C++; Addison-Wesley 1996*.
3. James Rumbaugh et al; *Object Oriented Modeling and Design, Pearson Education.*
4.Object oriented programming in Turbo C++ by David Parsons
Object oriented programming in Turbo C++ by V. Kanetkar

Reference Web Sites

1.www.cplusplus.com/doc/tutorial/
2. www.smartdraw.com/tutorials/software-uml/uml.html

245: Data Communication and Networking

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

Course objectives:

1. To explore Data communication, Networking , Protocols and Standards and Networking Models
2. To discuss issues related to physical layer and transmission medium
3. To discuss services provided by data link layer. Implementation of these services in Local Area Networks and Wide Area Networks

Expected outcomes:

1. Students are expected to know about various protocols, models in networks.
2. Students are able to design, implement and analyze simple computer networks.
3. Identify, formulate and solve network-engineering problems.
4. Knowledge of contemporary issues in computer networks

UNIT-1 Introduction **05 Hrs** **6 Hrs**

Data Communication, Networks, Internet, Protocols and Standards, Network Models: OSI, TCP/IP, analog and digital data, analog signal, digital signal, transmission impairments, data rate limits, performance.

UNIT-2 Bandwidth Utilization and Transmission Media **05Hrs** **6 Hrs**

Signal Conversion: digital-to-digital, analog-to-digital, analog-to-analog, digital-to-analog conversion, multiplexing, spread spectrum, guided media and unguided media

UNIT-3 Switching and Error Detection - Correction **05Hrs** **6 Hrs**

Switching: circuit switched networks, datagram networks, virtual circuit networks, structure of types of errors, redundancy, detection vs correction, FEC vs retransmission, coding, modular arithmetic, block coding, linear block codes, cyclic codes, checksum, hamming code

UNIT-4 Data Link Control and Medium Access **05Hrs** **6 Hrs**

Framing, flow control and error control protocols, protocols: stop-and-wait, go-back-n, selective-repeat, piggybacking, HDLC and PPP. random access: ALOHA, CSMA, CSMA/CD, CSMA/CA, controlled access, channelization

UNIT-5 Ethernet , LAN and Virtual Circuit Networks **05Hrs** **6 Hrs**

IEEE standards, different Ethernets. connecting devices, backbone networks, VLAN. Frame Relay, ATM, ATM LANs

TEXT AND REFERENCE BOOKS:

1. BehrouzA. Forouzan, **Data Communications and Networking**, Tata McGraw Hill
2. Gilbert Held, **Understanding Data Communications Seventh Edition**, Pearson Education
3. AndrewS. Tanenbaum, **Computer Networks**, Prentice Hall
4. James F. Kurose and Keith W. Ross, **Computer Networking**- A Top-Down Approach, Pearson
5. Douglas Comer, **Network Systems Design using Network Processor**, Pearson Education
6. William Stallings, **High-Speed Networks and Internets**, Pearson Education

IT- 246 – LAB: Digital Electronics

Teaching Scheme:
Practical: 2 Hrs/week
Credits: 2

Examination Scheme:
Term work: 25
Practical/Viva:-

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

Suggestive List of experiments:

1. A) To study the logic gates & verify the truth table.
   (B) To realize the Universal Gates.
2. To study & verify the truth table for Half Adder
3. To study & verify the truth table for Full Adder
4. To study & verify the truth table for Half Subtractor
5. To study & verify the truth table for Full Subtractor
6. To study & verify the code conversion circuits Binary to Gray Code
7. To study & verify the code conversion circuit · Gray to Binary Code.
8. To study the following circuit and verify their truth table.
   ·16 to 1 line multiplexer.
9. To study the following circuit and verify their truth table
   1 to 16 line De-multiplexer
10. To study of flip-flops & prove truth tables.

IT- 247 – LAB: Programming in C

Teaching Scheme:
Practical: 2 Hrs/week
Credits: 1

Examination Scheme:
Term work: 25
Practical/Viva:-

Contents to be covered in practical's

UNIT-1 Introduction to C Language fundamentals, The C character set, variables and constants, data types, keywords, expressions, statements, operators- arithmetic operators , unary operators, relational & logical operators, conditional operators, type conversions , type casting.

UNIT-2 Conditional execution - if, nested if, it else, switch, goto statement, Loop execution - For loop, While loop, Do while loop, break, and continue statements. Functions - Defining a function, passing arguments to functions, returning values from function, command line arguments, Recursion, Local & Global variables concept.

UNIT-3 Arrays- definition, passing array to the function, Multidimensional array, String operation- String copy, String length, String concatenation, String compare. Introduction to structure and union. Array of structure, Passing structure as an object to function. Structure as an return type of function

UNIT-4 Pointers- pointer as a variable, pointer to array, pointer as argument to function. String operations using pointers. File handling - file handling modes, File open, File close, File input and Output Functions, End of file functions.

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

Suggestive List of experiments:

1. Simple program which shows use of scanf and printf
2. Program for showing use of Control Statements
3. Program By using Loops
4. Program to generate Fibonacci series and/or factorial of a number using recursive function
5. Program for dynamic memory allocation functions: malloc( ), calloc( ), and free( ).
6. Program to accept and display student information using structure.
7. Program to pass structure/array as a parameter to a function
8. Program to prepare monthly telephone bill
9. Menu driven program for matrix addition and subtraction
10. Program for matrix multiplication
11. Program to prepare salary bill of a company using files

IT- 248 – Web Technology

Teaching Scheme: **Examination Scheme:**

Practical: 4 Hrs/week Term work: 50

Credits: 2 Practical/Viva:25

Contents to be covered in Practical's

UNIT-1 **Introduction to web Technology**:
Basic concepts of web technology, different between website Design and Construction, Basic tags of Html ,div, giving title, formatting text, adding paragraphs, HR, BR tags, working with color and fonts. Importing images and adding background images, subscript, superscript, strike, ordered unordered list, Creating Tables and Frames.

UNIT-2 **Advances Concept in CSS :**ID, and class based CSS, CSS borders, border styles, padding and type sizing options in CSS, dynamic CSS menus, CSS layout two columns three columns . Scripting variables, operators, looping construct, decision construct, handling events, javascript entities

UNIT-3 **Apache and PHP:**: Installing Apache Web server, PHP: testing installation basics of PHP scripts, variables Data types, Operators and Constants, flow control functions, if statement, loops arrays, strings, Dates and times PHP GET and POST functions. Interacting with the File System and the Server, Session control in PHP, Exception handling in PHP.

UNIT-4 **Java Script and MySQL:**: Configuration MySQL server, working with MySQL Databases, MySQL Tables, Commands INSERT, SELECT, UPDATE, REPLACE, DELETE. Date and Time function MySQL.

UNIT-5 **Application Development:**Connecting to MySQL with PHP, Inserting data with PHP,retrieving data with PHP, Developing PHP scripts for dynamic web page like Feedback form, online admission form, online test.

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

Suggestive List of experiments:

1. Program using list, hyperlinks, and image maps.
2. Program using tables, Lists, Creating frames.
3. Creating forms using various available objects.
4. Creating forms using various available objects.
5. Creating Dynamic menu and various layout in CSS
6. Use of java script constructs loops and variables.
7. Event handling using java script.
8. Storing and retrieving data in PHP.
9. Writing functions in PHP.
10. Use PHP GET and POST functions.
11. Introduction to designing web database structure in MYSQL.

IT- 249 –LAB Object Oriented Programming

Teaching Scheme:
Practical: 4 Hrs/week
Credits: 2

Examination Scheme:
Term work: 50
Practical/Viva:25

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

Suggestive List of experiments:

1.] Implement program using Structure
2. Program which shows use class and Objects.
3. Program for Static Data Members and Member functions.
4. Program for friend function and inline function.
5. Write a program to demonstrate different types of constructors
6. Write a program for overloading various binary operators.
7. Write a program for overloading various unary operators.
8. Write a program for Multilevel and multiple inheritances.
9. Write a program for Hierarchical and hybrid inheritance.
10. Write a program for polymorphism (virtual function).
11. Program using manipulators.
12. Program for User Defined Manipulators
13. Program using streams
14. Program using files (open function method)
15. Program using files(constructor method)
16. Mini Project

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.

Institute Elective IT-258 Computer Ethics and Cyber Security

Teaching Scheme:
Lectures: 3 hrs/week
Tutorials :0
Total Credits: 03

Evaluation Scheme:
Test : 20 Marks
Teacher Assessment: 20 Marks
End-Semesters Examination: 60 Marks

Course Educational Objectives:

-To make students familiar with the fundamental concepts of computer ethics
- To know the linkage between computer, professional, philosophical ethics and decision making
- To develop the concepts in computer forensics
- To introduce the linkage between technology, law and ethics

Course Outcomes Expected:

-After completing Computer Ethics and Cyber Security, students should reflect on the humanitarian, social, and cultural impact of computer technology by focusing on ethical issues faced by and brought about by computing professionals, including those related to networking and the internet, intellectual property, privacy, security, reliability, and liability.
-changing attitudes toward work and wealth related to the open source phenomenon, as well as issues raised by the possible emergence in the future of highly intelligent machines.
-Student should understand the importance of laws, IT act and cyber security

UNIT-1 **Computer ethics and philosophical ethics:** 6 Hrs

What is Vacuum of policies, conceptual muddles, social context, moral and legal issues, uniqueness of ethical issues, role of analogy, descriptive and normative claims, ethical relativism, utilitarianism

Professional Ethics:

Characteristics, the system of professions, computing as a profession, professional relationships, responsibilities, code of ethics and professional conduct

Privacy: Computers and privacy issue, reframing this issue, legislative background, better privacy protection

UNIT-2 **Intellectual property issues in cyberspace** 6 Hrs

Introduction to intellectual property Protections via Copyright, Trade Secrets, Trademarks, Patents, Contracting to protect intellectual property, Protection options – Encryption, steganography, watermarking, copyright on web-content, copyright on software

Ethical Decision Making: Types of ethical choices, Making defensible decisions, Ethical dilemmas, law and ethics,

UNIT-3 **Crime incident Handling Basics**: 6 Hrs

Hacking, cyber activism, Tracking hackers, clues to cyber crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations

Information Technology Act 2000

Scope, jurisdiction, offense and contraventions, powers of police, adjudication

UNIT-4 **Cyber Forensics** 6 Hrs

Cyber forensics, cyber crime examples, forensics casework, investigative incident-response actions, computer forensics tools, Threats in cyberspaces, Blended attacks

Sample Policy Documents: i) Antivirus Guidelines Policy ii) Internal Lab Security

Policy iii) Server Security Policy iv) Wireless Communications Policy

UNIT-5 **Information Security Certifications** 6 Hrs

CISSP and SSCP, CISA and CISM, SCP, GIAC, certification weaknesses, Role of these certified professionals

Text Books:

1. Deborah G Johnson, " *Computer Ethics*", Pearson Education Pub., ISBN : 81-7758-593-2.
2. Earnest A. Kallman, J.P Grillo, "*Ethical Decision making and IT: An Introduction with Cases",* McGraw Hill Pub.
3. John W. Rittinghouse, William M. Hancock, "*Cyber security Operations Handbook*", Elsevier Pub.
4. Michael E. Whitman, Herbert J. Mattord, "*Principles of Information Security",* 2nd Edition,, CengageLearning Pub.

Reference Books:

1. Randy Weaver, Dawn Weaver, "*Network Infrastructure Security*", Cengage Learning Pub

Website: http://www.emagister.in/ethical_hacking_cyber_security_courses-

IT-259 Computer Systems

Teaching Scheme:
Lectures: 3 hrs/week
Tutorials: 0
Total Credits: 03

Evaluation Scheme:
Test : 20 Marks
Teacher Assessment: 20 Marks
End-Semesters Examination: 60 Marks

Course Educational Objectives:

-To make students familiar with the fundamental concepts of computer organization
- To know the linkage between computer Memories,Peripherials

-Course Outcomes

Student will understand the structure as well as working of hardware of computers Systems
Student will understand the concept of RAID as well as concepts of memories.
Student will understand the concept of multiprocessing and Hazards.

UNIT-1 **Building Basics** Organization 4 Hrs
and Architecture, Structure and Function, Why computer organization and Architecture and Assessing and Understanding Performance, Top-level view of Computer Function.

UNIT-2 **Memory** 6 Hrs
Basic Structure of Memory Hierarchy, **Internal Memory:** Semiconductor main memory, Error Correction, Advanced DRAM, **External Memory:** Magnetic Disks, RAID, Optical Memory, Magnetic Tapes, **Exploiting Memory Hierarchy:** The Basics of Cache, Measuring and improving cache performance, A Common Frame work for memory hierarchies,
Fallacies and Pitfalls.
Case Study: P4 and AMD Operant Memory Hierarchy.

UNIT-3 **The Central Processing UNIT** 6Hrs
Computer Arithmetic's, Instruction Set Characteristics and Functions, Addressing modes and Formats, Structure and Functions, RISC, The Processor: Data Path and Control

UNIT-4 **I/O, Networks and Peripherals** 7Hrs
Disk Storage Dependability, Networks, Buses and Other Connections (between processors, Memory and I/O), Interfacing I/O Devices (to Processors, Memory and operating System), I/O performance Measures, Designing an I/O System, External Interfaces: Firewire and Infobahn. Case Study: A Digital Camera.

UNIT-5 **Pipeline and Instruction level Parallelism & Advanced Architectural Concepts** 7Hrs
Overview, A Pipelined Data Path, Pipelined Control, Data Hazards and Forwarding, Stalls, Brach Hazards, Exceptions Case Study: The Pentium 4 Pipeline. Parallel Processing: Multiple Processor organizations, symmetric Multiple processors, Cache Coherence and MESI protocol, Clusters, NUMA, and Vector Computation

TEXT AND REFERENCE BOOKS

1. David Patterson, John Hennessy "Computer Organization And Design", Third Edition, ELSEVIER publications.
2. William Stallings, "Computer Organization and Architecture", Sixth Edition 2003, Pearson Education.

IT 251: Data Structure

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

Course Educational Objectives:

- To train the students on fundamentals that one must learn of data structures
- To train the students for a strong foundation for programming using data structures

Course Outcomes Expected:

1. To choose the appropriate data type for a given problem.
2. To implement the algorithms including various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching on real time applications.
3. Design and implement abstract data types such as linked list, stack, queue and tree by using the programming language using static or dynamic implementations.
4. Analyze, evaluate and choose appropriate data types and algorithms with respect to solve particular problems.

UNIT-1 **Sorting & searching** 8 Hrs

Different sorting tech, classification on the basis of big-O notation, tech such as straight selection sort, bubble sort, merge sort, quick sort, heap sort, shell sort, radix sort, comparisons between different sorting techniques

UNIT-2 **Introduction to data structure, The Stacks& Queues** 8 Hrs

The Arrays as an ADT: Using One-Dimensional Arrays, Using Two-Dimensional Arrays, Using Multidimensional Arrays, Definition and Examples, Primitive Operation, The stack as an ADT, The queue and its sequential representation, The queue as an ADT, Basic Definition and examples: Infix, Postfix, and Prefix, Program to evaluate a Postfix expression, Limitations of the program, Circular Queue, priority queue

UNIT-3 **Linear Data Structure & their representation :** 8 Hrs

Definition, concept, operation on linked lists, Circular linked lists
Doubly linked lists, Operations like insertion, deletion, insertion in order, searching, updating , Applications of linked lists such as polynomial manipulation, Comparison of singly linked, circularly linked & doubly linked list

UNIT-4 Definition, Basic terminology, operation on binary trees, linked storage representation for binary 8Hrs
search trees, Basic operation on binary search tree such as creating a binary search tree, searching, modifying an element, inserting & deleting the element, destroy a binary search tree, tree traversals ,in-order, pre-order, post-order , tree application for expression evaluation & for solving sparse Matrices, Sequential searching, binary searching, height balanced trees2-3 tree, B trees, B+ trees, AVL trees

UNIT-5 **Graph:** 8 Hrs

Definitions, basic terminology, matrix representation & implementation of graphs, graph travels, DFS, BFS, Shortest path, spanning tree

TEXT AND REFERENCE BOOKS

1. Yedidyah Langsam, Moshe J. Augenstein, Aaron M.Tenenbaum, “Data Structures using C and C++ “ , Pearson Pub.
2. Yashavant P Kanetkar, “Data Structures through C”, BPB Pub. (Book with CD)
3. G.S. Baluja, “Principles of Data Structures using C and C++”,
4. Ellis Horowitz, Sartaj Sahni, “Fundamentals of Data Structures”,
5. Robert L Kruse, “Data Structures and Program Design”, PHI

IT 252: Computer Graphics

Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test	20 Marks
Tutorial	0 Hr/Week	Teacher Assessment	20 Marks
Total Credits	3	End-Semester Examination	60 Marks

Course objectives:

Introduce the students to graphics fundamentals & make them aware of 2-D and 3-D graphics primitives
The course will consider methods for modeling 3-dimensional objects and efficiently generating photo realistic renderings on color raster graphics devices.
The emphasis of the course will be placed on understanding how the various elements that underlie computer graphics (algebra, geometry, algorithms and data structures, optics, and photometry) interact in the design of graphics software systems.
Study the GUI design methods & to introduce the programming principles of computer graphics, including fundamental data-structures and algorithms for rendering and modeling. The course will cover both practical programming through C, C++ and OpenGL, and mathematical and theoretical foundations.

Expected outcomes:

Student will able understand the concept of GUI
Student will do the programs based on the algorithm as DDA,Bresenham's
Student will able understand the concept of rendering and fractals.

UNIT-1 **Introduction and applications** 6 Hrs

What is Computer Graphics?, GUI Applications, Conceptual framework for CG. Display Devices: Random scan and raster scan monitors; color CRT, Plasma panel displays, LCD panels, 3-D viewing devices. Graphical Input Devices, Introduction to graphics standards (SRGP, PHIGS etc)
Line drawing algorithms: DDA and Bresenham's. Graphics primitives, Line functions, character attributes, properties of circle, Circle generating algorithm, filling rectangles, filling polygons

UNIT-2 **2-D Drawing Geometry and transformation** 6 Hrs

2-D transformations, homogeneous coordinates and matrix representation of 2-D transformations, other 2-D transformations: reflection and shear, window to viewport transformation, clipping in raster world, clipping lines, clipping polygons, text clipping and exterior clipping

UNIT-3 **3 D transformations/ User interface** 6 Hrs

3-D viewing: An introduction, Projections, 3-D transformations, matrix representation, composition of 3-D transformation, coordinate system
GUI and interactive input methods: The user dialogue, features of GUI: Windows and icons, accommodating multiple skill levels, consistency, minimizing memorization, backup and error handling, feedback. Logical classification of input devices, input functions, concurrent use of input modes, interactive picture construction techniques.

UNIT-4 **GRAPHICS PROGRAMMING** 6 Hrs

Color Models – RGB, YIQ, CMY, HSV, Animations, General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing 3D scenes

RENDERING

Introduction to Shading models, Flat and Smooth shading, Adding texture to faces, Adding shadows of objects, Building a camera in a program, Creating shaded objects, Rendering texture – Drawing Shadows.

UNIT-5 **FRACTALS** 6 Hrs

Fractals and Self similarity – Peano curves – Creating image by iterated functions –
Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing Intersecting rays with other primitives – Adding Surface texture – Reflections and
Transparency – Boolean operations on Objects

TEXT AND REFERENCE BOOKS

Text Books:

1.Donald Hearn and Baker, “Computer Graphics”, PHI Pub.
2. ISRD Group, “Computer Graphics”, Tata McGraw Hill Pub. , ISBN-0-07-059376-0.
3. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education,2003.

Reference Books:

1. A P Godse , “Computer Graphics”, Technical pub., 3rd Revised Edition
2. J.D. Foley, A V Dam, “Computer Graphics, Principles and Practice”, Addison Wesley Pub.

IT 253: Database Management System

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

Course Educational Objectives:

- To understand the basics of Database Management System.
- To make students familiar with database normalization..
- To train students as they can write SQL/ PL-SQL Queries as per requirement of application.

Course Outcomes Expected:

- Students should be able to design and implement databases.
- Student should able to write SQL/ PL-SQL Queries as per requirement of application.

UNIT-1	**Introduction:** What is Database? Necessity of database? DBMS, Examples, Characteristics of the Database Approach, Advantage of using a Database Approach, Database System Architecture, Data Models, Schemes and Instances, Data Independence, Database Languages and Interfaces, Database System Environment, Classification of Database Management Systems. Database users and administrator.	6 Hrs
UNIT-2	**ER Models, Relational Models:** Different types of integrity constraints-Primary Key, Unique , Foreign key, Check, Not Null, Super key, Candidate Key, **E-R model**- Entity, Entity set, Strong and Weak entity ,Entity-Relationship Diagrams, Entity-Relationship Design Issues, Weak Entity Sets, Attributes- Simple, Derived, Composite, Multi valued, Identifier, Relationship, Associative entity, Cardinality constraints, Degree of relationship. E-R diagram naming conventions and design issues. Examples, Extended E_R Features. **Relational Models:-** the Relational Data Model, the Relational Algebra: Fundamental Relational-Algebra Operations, Additional Relational-Algebra Operations, Extended Relational-Algebra operations. ER-to-Relational Mapping	6 Hrs
UNIT-3	**SQL:**Background, Structure of SQL Queries, Data Definition language-Create, alter, Describe, Drop, Truncate clause, create table using Integrity constraints Select clause, Set Operations, Functions-single row functions-general, conversion, date, character, Multiple row functions - Aggregate Functions, Group by clause, Having clause, Nested Sub queries, Complex Queries, Views, Modification of the Data-DML-Insert, Update, Delete, Different types of joins **Advanced SQL :,** Authorization and transaction control SQL clauses, Embedded SQL, Introduction to PL/SQL-Cursor, triggers, Procedures.	6 Hrs
UNIT-4	**Database Designing and Storage:** **Relational Database Design**: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Decomposition Using Functional Dependencies, Decomposition using Multivalued Dependencies, More Normal Forms up to BCNF. **Storage and File Structure:** Overview of Physical Storage Media, Data-Dictionary Storage.	6 Hrs
UNIT-5	**Query Processing and Transaction Processing:** Overview of Query Processing, Measures of Query Cost, Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation. Transaction support in SQL Concurrency control techniques, concurrency control based on timestamp based protocol, validation based protocol, deadlock handling, Database Recovery Techniques based on	6 Hrs

Immediate Update, Failure classification, Shadow Paging, Log based recovery, failure with loss of Nonvolatile Storage.

TEXT BOOKS

1. Abraham Silberschatz and Henry Korth, Sudarshan : Database System Concepts, 5th Edition, ISBN : 0-07-120413X, Tata McGraw-Hill. Author, Title of the book, Publisher, Edition, Year of publication
2. Elmasri and Navathe : Fundamentals of Data base Systems (5th Ed.), Addison-Wesley, 1999.

REFERENCES

1 Raghu Ramakrishnan, "Database Management System", Tata McGraw-Hill Publishing Company, 2003.

2 Hector Garcia–Molina, Jeffrey D.Ullman and Jennifer Widom- "Database System Implementation"- Pearson Education- 2000. 3. Peter Rob and Corlos Coronel- "Database System Concepts", Cengage Learning Edition 2008.

IT- 254– LAB: Data Structure

Teaching Scheme:
Practical: 2 Hrs/week

Examination Scheme:
Term work: 25
Practical/Viva: 25
Credits: 01

Course Outcomes Expected:

1. To implement the algorithms including various operations on Queues, Stacks, Linked Lists, Trees, Graphs, Sorting, Searching on real time applications.
2. Design and implement abstract data types with static or dynamic representation.
3. Analyze, evaluate and design appropriate data types and algorithms for solving particular problems.

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

Suggestive List of experiments:

1. Program for Bubble Sort and Bucket Sort.
2. Program for Merge Sort and Heap Sort.
3. Program for Insertion Sort and Quick sort.
4. Program for Binary Search to search an element in the given sequence
5. Program to implement two stacks in the one array.
6. Program for implementing Stack and Queue.
7. Program for implementing Singly Linked List and Doubly Linked List.
8. Program for implementing Circular Queue using Linked List.
9. Program for Creation of Binary Tree and operations on it.
10. Program for Creation of Binary Threaded Tree.
11. Program for Depth First search and Breadth First search.

Practical Evaluation:

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

IT- 255 – LAB: Computer Graphics

Teaching Scheme:
Practical: 2 Hrs/week

Examination Scheme:
Term work: 25
Practical/Viva: -
Credits: 01

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

Suggestive List of experiments:

1. Write a program to draw a hut or another geometrical figures.
2. Write a program for DDA Line drawing Algorithm
3. Write a program for Bresenham's Line drawing Algorithm
4. Write a program for circle.
5. Write a program for ellipse
6. Write a program for polygon filling
7. Write a program for 2 D transformation
8. Write a program for 3 D transformation
9. Write a program for Line clipping Algorithm
10. Write a program to draw a hut or another geometrical figures
11. Write a program for DDA Line drawing Algorithm

IT- 256– LAB: Database Management Systems

Teaching Scheme:
Practical: 4 Hrs/week

Examination Scheme:
Term work: 50
Practical/Viva: 25
Credits: 2

TERM Work:
The term work shall consist of a journal record of at least 10 experiments/ assignments and Mini project based on the syllabus of the subject - DBMS.
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

Suggestive List of experiments:

1. To Study different types of Oracle Data types
2. To Study different types of DDL commands.
3. To study different types of DML commands.
4. To study different integrity constraints
5. To study different types SQl functions
6. To study subqueries.
7. To study views.
8. To study different types of joins
9. To study cursor and procedure in PL/SQL
10. To study trigger in PL/SQL

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.

IT 257: Lab-Computer Workshop

Teaching Scheme		**Evaluation Scheme**	
Practical	4 rs/Week	Term Work:50	50 Marks
Credits	2	Practical/Viva-	--

Course objectives:

1. To introduce common hardware and software standards
2. To acquire the knowledge of working principles of the total system i.e. C.P.U., peripherals, interfaces and system software
3. Gain a understanding of the protocols and communication techniques used by networks
4. To learn about Network hardware like Media Types (cables, Wireless), Categories of UTP, Connectors, Network interface Card
5. Learn connecting hosts, Peer to Peer Networks, Client/Server Model, Workstation client Software

Expected Outcomes:

1. By the end of this course students should be able to make intelligent decision about the appropriate design, purchase, integration and use of devices.
2. Students get familiar with Networking Devices (Layer 1, Layer 2)

The term work shall consist of following practicals /assignments

1. Drawing the motherboard layout of Pentium IV and studying the chipset through data books or Internet
2. CMOS setup of Pentium.
3. Hard Disk Partitioning.
4. Study of HDD: Identify various components of HDD and write their functions.
5. Assignment on different types of cards such as graphics card, LAN card, multimedia cards etc.
6. Installation of Scanner, Printers and Modems.
7. Configuration of Client and Server PC, Laptop and Network components
8. Study of Diagnostic Software's. (Any one)
9. Fault findings: (a) Problems related to monitor (b) Problems related to CPU.
10. Assembling of PC and Installation of Operating System.
11. Study of LAN, its components and topologies.
12. Familiarization with Transmission Media.
13. Introduction to Network Architecture (Client/Server, Peer-to-Peer and Hybrid).
14. Preparing straight through and crossover cables.
15. Study of LAN, its components and topologies.
16. Making Point-to-Point connectivity.
17. Configuring Network.
18. Sharing of resources between two connected nodes.

TERM Work:

The term work consists of at least 16 experiments/ assignments based Suggestive List of experiments.

Assessment of term work should be done based on the points mentioned below:

- Continuous lab assessment
- Actually performing practices in the laboratory

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

"*In Pursuit of Global Competitiveness*"

(An Autonomous Institute of Government of Maharashtra)

Department: Information Technology

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		Scheme of Teaching (Hrs/Week)			Credits	Scheme of Evaluation (Marks)					
				L	T	P		Theory			Term Work	Practical/ Viva-voce	Total
			PO					Test	TA	ESE			
		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		Scheme of Teaching (Hrs/Week)			Credits	Scheme of Evaluation (Marks)					
				L	T	P		Theory			Term Work	Practical/ Viva-voce	Total
			PO					Test	TA	ESE			
		THEORY COURSES											
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, 9,10.1 2	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, 8,11,1 2	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 Algorithm*s", 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 Engineer*ing" , 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

Designed By

1.Prof. V. P.Gaikwad

2.Prof. K.S.Gandle

3.Prof. S. M.Chavan.

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 **Lectures: 3 Hrs/Week** **Tutorial : 0 Hr/Week** **Credits :03**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **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 **Lectures: 03 Hrs/Week**	**Examination Scheme** **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

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

IT 356: Elective II Advanced Java	
Teaching Scheme **Lectures: 04Hrs/Week** **Credits :04**	**Examination Scheme** **Test : 20 Marks** **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
3. Prof. A.N.Ghule

GOVERNMENT COLLEGE OF ENGINEERING AURANGABAD

"*In Pursuit of Global Competitiveness*"

(An Autonomous Institute of Government of Maharashtra)

Department: Information Technology

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. 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
PEO IV	Work successfully with effective communication skills, professionalism, team work and ethical attitude	6,8,10

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	Scheme of Teaching (Hrs/Week) L	T	P	Credits	Scheme of Evaluation (Marks) Theory Test	TA	ESE	Term Work	Practical/ Viva-voce	Total
		THEORY COURSES											
1	IT-440	Mobile Computing	2,4,6,7,9	3	1		4	20	20	60			100
2	IT-441	Information Retrieval	1,3,5,8,9,10	4			4	20	20	60			100
3	IT-442	Data Mining	1,2,3,4,5,6,8,9,10	3	1		4	20	20	60			100
4		Elective –III											
	IT-443	Compiler Construction	2,3,5,10										
	IT-444	Cyber Security	2,3,4,6,7,10	4			4	20	20	60			100
	IT-445	Soft Computing	2,3,4,5,6										
		LABORATORY COURSES											
1	IT-446	Lab: Android Programming	3,4,7			2	1				25	25	50
2	IT-447	Lab: Information Retrieval	2,3,4,6,7,9			2	1				25	-	25
3	IT-448	Lab: Data Mining	1,2,3,4,5,6,8,9,10			2	1				25	25	50
4	IT-449	Lab: Advanced Programming Lab	2,3,4,5,6,9			2	1				25	-	25
5		Elective –III											
	IT-450	Lab: Compiler Construction	2,3,4,5			2	1				25	25	50
	IT-451	Lab: Cyber Security	4,5,6										
	IT-452	Lab: Soft Computing											
6	IT-453	Seminar				2	1				50	00	50
7	IT-454	Project –I				4	2				50	50	100
				14	**2**	**16**	**24**	**80**	**80**	**240**	**225**	**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		Scheme of Teaching (Hrs/Week)			Credits	Scheme of Evaluation (Marks)					
				L	T	P		Theory			Term Work	Practical/ Viva-voce	Total
			PO					Test	TA	ESE			
		THEORY COURSES											
1	IT-455	Cryptography and Network Security	2,3,4,6	3	1		04	20	20	60			100
2	IT-456	Cloud Computing	2,3,4,5, 6,7,8,9, 10	3	1		04	20	20	60			100
3	IT-457	Multimedia Processing	1,3,4,5, 7	4			04	20	20	60			100
4	IT-458 IT-459 IT-460	Elective –IV Distributed System E-Business Intelligence Linux Operating System	1,2,3,4, 5,8 2,3,4,5, 6,7 2,3,4,5, 9	4			04	20	20	60			100
		LABORATORY COURSES											
1	IT-461	Lab: Cryptography and Network Security	2,3,4,6, 7,9			2	01				25	25	50
2	IT-462	Lab: Cloud Computing	2,3,4,5, 6,7,8,9, 10			2	01				25	25	50
3	IT-463	Lab: Multimedia Processing	1,2,3,4, 9			4	02				50	25	75
4	IT-464 IT-465 IT-466	Lab: Elective –II Distributed System E-Business Intelligence Linux Operating System	1,2,4,5, 7,8,10 2,4,5,9 1,2,3,4, 5			2	01				25	-	25
5	IT-467	Project II				6	03				50	100	150
				14	**2**	**16**	**24**	**80**	**80**	**240**	**175**	**175**	**750**

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

IT440 - Mobile Computing	
Teaching Scheme **Lectures: 3 Hrs/Week** **Tutorial : 1 Hr/Week** **Credits :04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT 245 Data Communication and Networking and

IT -353 Computer Networks

Course description: After completing this course, students will have a broad and fundamental understanding concepts and principles of mobile computing. They will understand theoretical and practical issues of mobile computing. In second unit they will study GSM which is one of the most successful digital cellular network. Third and Fourth unit will cover Mobile Network Layer and Transport Layer. In Fifth unit they will study Wireless Application Protocol

Course Objectives:

To provide concepts and principles of mobile computing
To accustom with theoretical and practical issues of mobile computing
To explore the working of GSM
To understand working of Network and Transport layer in wireless and mobile environment

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

CO1	Discuss practical, theoretical, health related, environmental and social issues of mobile computing
CO2	Understand working of professional digital cellular networks like GSM and compare it with CDMA
CO3	Explain the functionalities and components of mobile computing systems into Network and Transport Layer to identify requirement appropriate to its solution
CO4	Define the navigation structure; the design template; and the differences for touch devices
CO5	Develop mobile applications using Rich Internet Application technologies including Ajax support, Dynamic HTML, and new features of HTML 5

Detailed Syllabus:

Unit 1	Introduction to Mobile Computing, Wireless transmission ,Medium access control
Unit 2	Mobile Network Layer
Unit 3	Mobile Transport Layer
Unit 4	Mobile Browsing, Architecture and Design, Setting Up Your Environment, Markups and Standards, Coding Markup, CSS for Mobile Browsers, JavaScript Mobile

Unit 5	Ajax, RIA, and HTML, Server-Side Browser Detection and Content Delivery, Geolocation and Maps, Widgets and Offline Webapps, Testing, Debugging, and Performance, Distribution and Social Web 2.0 , MIME Types for Mobile Content

Text and Reference Books

1. J. Schiller, "Mobile Communications", 2nd edition, Pearson Education, 2003.
2. Asoke K Talukder and Roopa R. Yavagal; Mobile Computing – Technology, Applications and Service Creation; TMH Pub., New Delhi, 2006
3. Maximiliano Firtman, Programming the Mobile Web, O'Reilly Media Publication, July 2010
4. Wei-Meng Lee, "Beginning Android Application development", Wiley Publishing, Inc.
5. Reto Meier, "Professional Android 4 Application Development", Wiley Publishing, Inc.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1						3				
CO2				2		2				
CO3		2								
CO4				2			3			
CO5				2			3		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) 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	00	18
K2	Understand	10	05	24
K3	Apply	05	05	12
K4	Analyze	00	05	6
K5	Evaluate	00	00	00
K6	Create	00	05	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K2	K2/K4	K3	K3	K2/K6
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	05	00	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	18	18	12	06	06

Special Instructions if any: Nil

Designed by

1. Prof. A. N. Ghule
2. Prof. V. P. Gaikwad
3. Prof. S. M. Chavan

IT 441- Information Retrieval	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits: 04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Course description: After completing this course, students will gain a good understanding of the foundation concepts of information retrieval(IR) techniques and be able to apply these concepts into practice. The subject covers the basics and important aspects associated with IR, need of retrieval, different retrieval algorithm, Retrieval Evaluation and Query Expansion, IR models and languages, Web Retrieval and Web Crawling etc.

Course Objectives:

To illustrate the different query properties
To construct a search engine
To compare different search engine ranking techniques
To analyse the different retrieval metrics for retrieval evaluation
To understand how Web search engines work and how they could be improved

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

CO1	Understand the difficulty of representing and retrieving documents
CO2	Use different information retrieval techniques in various application areas
CO3	Apply IR principles to locate relevant information
CO4	Analyse performance of retrieval systems
CO5	Develop retrieval systems for web search tasks

Detailed Syllabus:

Unit 1	**Introduction:** Information Retrieval Early Developments, Information Retrieval in Libraries and Digital Libraries, IR at the Center of the Stage, The IR Problem, The IR System, The Web **Modeling:**IR Models, Classic Information Retrieval, Other Models
Unit 2	**Retrieval Evaluation and Query Expansion:** Introduction, Retrieval Metrics, Implicit Feedback Through Global Analysis, Query Expansion based on a Similarity Thesaurus, Query Expansion based on a Statistical Thesaurus
Unit 3	**Documents: Languages and Properties** Introduction, Metadata, Document Formats, Markup Languages, Text Properties, Document Preprocessing, Organizing Documents,

	Text Compression
Unit 4	**Queries: Languages and Properties** Query Languages, Keyword-Based Querying, Beyond Keywords, Structural Queries, Query Protocols Query Properties, Characterizing Web Queries, User Search Behavior, Query Intent Query Topic, Query Sessions and Missions, Query Difficulty
Unit 5	**Web Retrieval and Web Crawling:**Introduction, The Web, Search Engine Architectures, Search Engine Ranking, Managing Web Data, Search Engine User Interaction, Browsing, Beyond Browsing, Web Crawling

Text and Reference Books

1. Modern Information Retrieval,The Concepts and Technology behind Search Ricardo Baeza-Yates ,Berthier Ribeiro-Neto ,Second edition
2. Information Retrieval : Implementing and Evaluating Search Engines Buttcher, larke, Cormak
3. Information Retrieval : Data Structures and Algorithms William Frakes
4. http://www.cs.utexas.edu/users/mooney/ir-course
5. http://www.informationretrieval.org/

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1					3					
CO2			2							
CO3	2									2
CO4										
CO5								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	18
K2	Understand	10	05	24
K3	Apply	05	10	12
K4	Analyze	00	05	6
K5	Evaluate	00	00	00
K6	Create	00	00	00
Total Marks 100		20	20	60

Assessment table

Assessment Tool	K1	K2	K3/K2	K3	K4
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	05	00	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	18	18	12	06	06

Special Instructions if any: Nil

Designed by

1. Prof. S. S. Laddha
2. Prof. K. S. Gandle
3. Prof. V. P.Gaikwad

IT442 - Data Mining	
Teaching Scheme **Lectures: 3 Hrs/Week** **Tutorial : 1 Hr/Week** **Credits :04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT235 Database Management System

IT354 Advance Database Management System

Course Description: Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve their performance through interaction with data. It is currently regarded as the key element of a more general process called Knowledge Discovery that deals with extracting useful knowledge from raw data. The knowledge discovery process includes data selection, cleaning, coding, using different statistical and machine learning techniques, and visualization of the generated structures. The course will cover all these issues and will illustrate the whole process by examples. Special emphasis will be give to the Machine Learning methods as they provide the real knowledge discovery tools.

Course Educational Objectives:

1. The data mining process and important issues around data cleaning, pre-processing and integration
2. The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction
3. The various application and current research areas in data mining, such as Web and text mining, stream data mining
4. Practical lab sessions using a state-of-the-art open source data mining tool will allow students to gain expertise in 'hands on data' mining, while tutorial sessions covering overview research papers will highlight important data mining issues in more depth.
5. student will become familiar with the fundamental concepts of Big Data analysis

Course Outcomes Expected:

CO1	Define knowledge discovery and data mining
CO2	Recognize the key areas and issues in data mining
CO3	Apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data
CO4	Determine whether a real world problem has a data mining solution
CO5	Apply evaluation metrics to select data mining techniques

Detailed Syllabus

UNIT-1	**Data Mining Algorithms** Concept Description: What is Concept Description? Data Generalization and Summarization-Based Characterization, Mining Descriptive Statistical Measures in Large Databases. Mining Association Rules: Association Rule Mining, Market Basket Analysis, Association Rule classification, The Apriori Algorithm, Mining Multilevel

	Association Rules, Constraint-Based Association Mining, Sequential mining.
UNIT-2	**Classification and Prediction** What is Classification and Prediction? Data Classification Process, Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification
UNIT-3	**Classification, Knowledge Discovery** Classification Based on Association Rule Mining, Other Classification Methods Cluster Analysis: What is Cluster Analysis? Types of Data in Cluster Analysis, A Categorization of Clustering Methods. Introduction to **Knowledge Discovery**, innovative techniques for knowledge discovery, application of those techniques to practical tasks in areas such as fraud detection, scientific data analysis, and web mining, Introduction to huge data sets such as Web, telecommunications networks, relational databases, object-oriented databases, and other sources of structured and semi-structured data, Problem of Large Data sets
UNIT-4	Introduction to Hadoop and Big data: What is big data, challenges for processing big data, definition of hadoop, history,use cases of hadoop,DBMSVshadoop, hardware requirements and statistics
UNIT-5	HDFC: hadoop distributed file systems- Name node and its functionality, data node & its functionality, secondary name node, job tracker, task tracker & its functionality, Data storage in HDSC-introduction about blocks and data replication, Accessing HDFC-CLI(command line interface)& admin commands , java based approach , Fault tolerance, Download Hadoop and installation of hadoop.

TEXT AND REFERENCE BOOKS

1. Dunham, Margaret H, Data Mining: Introductory and Advanced Topics, Prentice Hall.
2. Witten, Ian and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Second Edition, Morgan Kaufmann.
3. Big Data: A Revolution That Will Transform How We Live, Work, and Think by Viktor Mayer-Schönberger, Kenneth Cukier
4. Hadoop: The Definitive Guide (Paperback) by Tom White

   e-books:

   1. Hadoop in Action - by Chuck Lam
   2. Hadoop : The definitive guide - Orielly

   Additional Reference Books:-
5. Han and Kamber, Data Mining: Concepts and Techniques, Second Edition, Morgan Kaufmann, 2006& Longman, Introduction to Database Systems, Pearson Education
6. http://aws.amazon.com/publicdatasets/

Mapping of Course outcome with Program Outcomes

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

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

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

Special Instructions if any: Nil

Design By
1. Prof V. P. Gaikwad
2. Prof. S. M. Chavan
3. Prof. K. R. Sarode

IT 443 : Compiler Construction	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits :04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT 352- Theory of Computation

Course description: This course will introduce the concepts of the design and implementation of language processors. It consists of topics like lexical and syntax analysis, context handling, and code generation and optimization. Students will also learn algorithms for the implementation of some of the mechanisms.

Course Objectives:

To provide introduction to the concept of language translation and compiler design.
To give the knowledge of phases in compiler ant their uses
To familiarize with the various stages of compiler like parser, code optimization, machine code generation, and use of symbol table
To impart practical programming skills necessary for constructing a compiler

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

CO1	Illustrate the knowledge of different translators and modern compiler
CO2	Apply the knowledge of patterns, tokens & regular expressions for solving a problems for appropriate solutions
CO3	Create lexical rules and grammars for a programming language
CO4	Demonstrate code optimization techniques to improve the performance of a program
CO5	Interpret the use of symbol tables for each stage of compiler

Detailed Syllabus:

Unit 1	Introduction to compilers, Compilers and translators, Structure of a compiler, Lexical Analysis: Lexical Analysis Role of Lexical Analyzer, Design of Lexical analyzers, Finite automata, Lexical analyzer generator LEX. Implementation of Lexical Analyzer, Programs using LEX,The syntactic specification of programming languages: Context free grammars, derivations & parse trees, capabilities of context free grammar, Parser, Basic parsing techniques, Automatic construction of efficient parsers,
Unit 2	Syntax Directed Translation, SDT Schemes, Implementation of SDT, Intermediate code, Postfix notations, Parse trees and syntax trees, Three address code, Quadruples and triples, Translation of assignment statements, Boolean expressions, Array references in Arithmetic expressions, procedure calls, declarations, CASE statements, Record

	structures. Symbol tables
Unit 3	Run-Time Storage Administration**:** Implementation of Simple Stack allocation Schemes, Implementation of Block Structured Languages, Storage allocation in Block Structured Languages, Error detection and recovery
Unit 4	Code Optimization: Introduction, Principle Sources of Optimization, Loop Optimization, DAG representation of Basic Blocks, value numbers and algebraic laws, Global data flow analysis, Dominators, Reducible flow graphs, DFS
Unit 5	Code Generation: Object programs, problems in code generation, Machine model, Simple code generator, Register allocation and assignments, Code generation from DAGs, peephole optimization

Text and Reference Books

1. A.V. Aho, J.D. Ullman , "Principles of Compiler Design" – (NAROSA)
2. D. M. Dhamdhere, "Compiler Construction – Principles & practices"
3. A V Aho, R. Sethi, J D Ullman, "Compilers: Principles, Techniques, and Tools", Pearson Education, ISBN 81 – 7758 – 590 – 8

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1					2					
CO2		3								
CO3										
CO4			2		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	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	K4	K3	K2
	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. C.M. Gaikwad
2. Prof. K. R. Sarode
3. Prof. A. N. Ghule

IT 444 : Cyber Security	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits: 4**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: Computer Network, Cryptography and Network Security, Cyber Ethics and Cyber Security

Course description: This is to provide in-depth information about cyber threats and cyber securities offering the much –needed awareness and discussion on various cybercrime and cyber security laws. It is to cover all dimensions of cyber security including cyber forensics, Cybercrime and Cyberterrorism: Social Political, Cybercrime

Course Objectives:

To recognize cyber threats
To make students aware of cyber crimes and tools and methods used in Cybercrime
To give in-sight of computer Forensics, Phishing , Phishing and Identity Theft

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

CO1	Identify the cyber threats
CO2	Explain security challenges in Mobile and Wireless Devices
CO3	Illustrate tools and methods used in Cyber crime
CO4	Make use of information and data to serve as digital evidence
CO5	Discuss organizational Implications of cybercrime

Detailed Syllabus:

Unit 1	Introduction: Cybercrime and Information Security, Cybercriminals, Classifications of Cybercrimes Cyberoffenses How Criminals Plan the Attacks, Social Engineering, Cyberstalking, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector
Unit 2	Mobile and Wireless Devices:· Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era
Unit 3	Tools and Methods Used in Cybercrime:· Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft, Phishing, Identity Theft (ID

	Theft)
Unit 4	Computer Forensics: Digital Forensics Science, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Setting up a Computer Forensics Laboratory: Understanding the Requirements, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques Forensics Auditing, Antiforensics
Unit 5	Forensics of Hand-Held Devices Understanding Cell Phone Working Characteristics Hand-Held Devices and Digital Forensics, Toolkits for Hand-Held Device Forensics, Forensics of iPods and Digital Music Devices Cybersecurity: Organizational Implications Cybercrime: Illustrations, Examples and Mini-Cases

Text and Reference Books

1. Nina Godbole, Sunit Belapure, "Cyber Security", Wiley India, New Delhi
2. Nina Godbole, "Information Systems Security", Wiley India, New Delhi
3. Kennetch J. Knapp, "Cyber Security & Global Information Assurance", Information Science Publishing.
4. William Stallings, "Cryptography and Network Security", Pearson Publication

Mapping of Course outcome with Program Outcomes

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

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) Study of cloud architecture, services 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	10
K2	Understand	10	05	25
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	K3	K2	K2	K3	K6
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	05	04	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	10	25	10	15	00

Special Instructions if any: Nil

Designed by

1. Prof. K. R. Sarode
2. Prof. S. S. Laddha
3. Prof. A. N. Ghule

IT 445 : Soft Computing	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits: 4**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT342 Computer Algorithm

Course description: After completing this course, students will have fundamental understanding of soft computing. Topics include types of neural networks, genetic algorithms, and Fuzzy logic. These soft computing tools will help students to carry out the research.

Course Objectives:

- Select models of ANN and Fuzzy Logic
- Apply models in practice for solving problems
- Use Neural networks, GA, Fuzzy techniques

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

CO1	Describe artificial neural networks and different learning algorithms to formulate computing requirements
CO2	Identify soft computing techniques and their role in professional engineering practice
CO3	Apply fuzzy logic and reasoning to handle uncertainty in engineering problems
CO4	Make use of genetic algorithms to solve optimization problems
CO5	Demonstrate applications of soft computing

Detailed Syllabus:

Unit 1	Introduction to soft computing, structure and working of a biological neural network, artificial neural network, terminology, models of neurons, Basic learning laws, functional units for ANN for Pattern Recognition Task
Unit 2	Supervised Learning, Perceptron Learning Algorithms, Multilayered Network Architectures, Back propagation Learning Algorithm, Applications of feed forward neural networks, Feedback Neural Networks & Self Organizing Feature Map
Unit 3	Basic concepts of Fuzzy Logic, linguistic variables, possibility distributions, fuzzy rules, Fuzzy sets, Operations on fuzzy sets, properties, geometric representation of fuzzy sets, possibility theory
Unit 4	Fuzzy Logic in database and Information systems, fuzzy relational data models, operations in fuzzy relational data Models, fuzzy object oriented databases, Fuzzy

	information retrieval and web search
Unit 5	Basics of Genetic algorithm, Design issues, Case studies and industrial applications

Text and Reference Books

1) B. Yegnanarayana , "*Artificial Neural Networks*", PHI publications

2) Satish Kumar, "*Neural Networks- A classroom Approach*", TMH Publication

3) John Yen, Reza Langari, "*Fuzzy Logic*", Pearson Education

4) S. Rajasekaran, Vijaylakshmi Pari, "Neural networks, Fuzzy Logic and Genetic Algorithms-Synthesis and Applications", PHI publication.

5) Lotfi A. Zadeh, "Soft computing and Fuzzy Logic",World Scientific Publishing Co., Inc. River Edge, NJ, USA.

6) J.S.R.Jang, C.T.Sun and E.Mizutani, .Neuro-Fuzzy and Soft Computing., PHI, 2004, Pearson Education 2004.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		1								
CO2						2				
CO3				3						
CO4			2							
CO5					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) Simulation
2) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Study of Industry processes and its presentation

Recommended 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	K4
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	06	06	04	04	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	15	20	10	15	00

Special Instructions if any: Nil

Designed by

1. Prof. K. S. Gandle
2. Prof. S. S. Laddha
3. Prof. C. M. Gaikwad

IT 446 Lab: Android Programming	
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 GUI application in Android
CO2	Construct an applications with database connectivity
CO3	Create an application which interacts with real time data
CO4	Design gaming applications
CO5	Create application using modern tools

List of Practical

Sr. No.	Details
1	Design simple GUI application with activity and intents e.g. calculator.
2	Create an application to handle address book.
3	Create an application to handle images and videos according to size.
4	Design a client server application to communicate with database server.
5	Design a gaming application
6	Develop an android application to show nearby police station/ Hotels
7	Design an application to locate the user and to show map information
8	Design a pages with Ajax support

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 – Low

Assessment Table

Assessment Tool	S4	S4	S3/ S4	S1	S1
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	05	05	03	03
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	06	05
S2	Manipulation	--	05
S3	Precision	03	05
S4	Articulation	06	05
S5	Naturalization	10	05
Total		25	25

Preparation (S1)	02	00
Conduct of Experiment (S2)	08	07
Observation and Analysis of Results (S3)	05	03
Record (S2)	03	05
Mini-Project / Presentation/ Viva-Voce (S3)	07	10
Total	**25**	**25**

IT 447 Lab: Information Retrieval	
Teaching Scheme **Practical: 2 Hrs/Week** **Credits:01**	**Examination Scheme** **Term Work : 25 Marks**

Laboratory Course Outcomes

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

CO1	Explore Conflation Algorithm & Document Representative.
CO2	Practice Clustering using single pass algorithm
CO3	Analyze Indexing, Inverted Files and searching with the help of inverted file
CO4	Summarize working of Web Crawler
CO5	Explore recent papers on IR

List of Experiments

Sr. No.	Details
1	To implement Conflation Algorithm using File Handling
2	To implement single pass algorithm for clustering
3	To implement a program Retrieval of documents using inverted files.
4	To implement a simple Web Crawler in Java.
5	To implement a program for feature extraction in 2D colour images (any features like colour, texture etc.)
6	To study recent papers on IR / search engine / Digital Libraries/ content management system for document

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

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

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	04
S2	Manipulation	07
S3	Precision	14
S4	Articulation	00
S5	Naturalization	00
Total		25

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

IT 448	Lab: Data Mining
Teaching Scheme **Practical: 2 Hrs/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	Evaluate models/algorithms with respect to their accuracy.
CO2	Discover and measure interesting patterns from different kinds of database
CO3	Demonstrate capacity to perform a self directed piece of practical work that requires the application of data mining techniques
CO4	Develop hypotheses based on the analysis of the results obtained and test them
CO5	Plan, design and deploy the necessary data mining technologies to support a software system

List of Experiments

Sr. No.	Details
1	Develop an application to implement defining subject areas, design of fact and dimension tables, data marts.
2	Develop an application to implement OLAP, roll-up, drill-down, slice, and dice operations
3	Develop an application to construct a multidimensional data
4	Develop an application to implement data generalization and summarization techniques
5	Develop an application to extract association mining rules.
6	Develop an application for classification of data.
7	Develop an application for implementing one of the clustering technique
8	Develop an application for implementing Naïve Bayes classifier
9	Develop an application for Decision tree classifier
10	Installation of Hadoop

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2		1							
CO2		2		1	2					
CO3					1	2			2	
CO4								2		3
CO5					1	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	06
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**

IT 448: Lab Advanced programming Lab	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work : 25 Marks** **Practical Examination & Viva Voce: : -- Marks**

Laboratory Course Outcomes

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

CO1	Demonstrate Hibernate
CO2	Use Hibernate framework to persist java objects into a database table
CO3	Create different types of persistent classes
CO4	Develop an applications using Hibernate
CO5	Develop web based applications

List of Experiments

Sr. No.	Details
1	Introduction to Hibernate framework
2	Develop Simple Hibernate Program
3	Develop GUI for placement registration and write a Persistent class and Hibernate file to store details of student in database
4	Develop a GUI based hibernate application to add Voter's data. Assume suitable table structure with at least five fields.
5	Develop a Hibernate application to store Feedback of Website Visitor in MySQL Database.
6	Develop a Hibernate application to store customer complains in table and display resolved complaints, for Telephone Department. (Assume suitable table structure)
7	Develop a Hibernate program to search a student record by accepting roll number from user. If student found then display roll number, student name, address and contact number. Otherwise display message as "Student not found"
8	Develop a GUI to accept Employee ID, name and city. Accept the details from the user and insert these details into the employee database in a button click using Hibernate
9	Web based Mini Project 1
10	Web based Mini Project 2

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

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

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	04
S2	Manipulation	07
S3	Precision	14
S4	Articulation	00
S5	Naturalization	00
Total		25

Preparation	04
Conduct of Experiment	04
Observation and Analysis of Results	08
Record	03
Mini-Project / Presentation/ Viva-Voce	06
Total	**25**

IT450 Lab: Compiler Construction	
Teaching Scheme **Practical: 2 Hrs/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 lexical rules using a LEX utility to find a solution
CO2	Implement YACC tools to create a parser to interpret data
CO3	Formulate semantic rules into a parser using appropriate techniques
CO4	Use code optimization techniques to improve speed & space requirement of the program
CO5	Identify Intermediate code generation methods

List of Experiments

Sr. No.	Details
1	Program to generate lexical tokens
2	Study of LEX tool
3	Program to generate a parse tree
4	Design of a Predictive parser
5	Study of YACC
6	Program to compute FIRST of non terminals
7	Program to compute FOLLOW of non terminals
8	Program to remove left factoring

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	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

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	05	05
S2	Manipulation	08	10
S3	Precision	12	10
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**

IT 460: Lab-Cyber Security	
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	Use different tools for cyber security
CO2	Characterize port scanner
CO3	Simulate different attacks
CO4	Implement Information Security
CO5	Develop an understanding Intrusion Detection System

List of Experiments

Sr. No.	Details
1.	Study chkrootkit security audit tool
2.	Study Nessus network vulnerability audit tool
3.	Study of Nmap port scanner
4.	Install a proxy server and scan the user activities.
5.	Simulate DOS attack using your favorite programming language.
6.	Simulate IP spoofing attack
7.	Write a program to hide text data in image file(Steganography)
8.	Study tool for Intrusion Detection System to detect attacks
9.	Study different security features of SNORT

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S3	S4	S1	S2	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	08	06	03
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	08	05
S2	Manipulation	06	05
S3	Precision	07	10
S4	Articulation	04	05
55	Naturalization	00	00
Total		25	25

Preparation	05	03
Conduct of Experiment	04	03
Observation and Analysis of Results	10	06
Record	03	03
Mini-Project / Presentation/ Viva-Voce	03	10
Total	**25**	**25**

IT 452 Lab: Soft Computing Laboratory	
Teaching Scheme **Practical: 2 Hrs/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	Apply basics of neural network, fuzzy logic to find solutions to problems PO2
CO2	Construct neural network models to interpret data PO3
CO3	Select genetic algorithms methods to optimize resources PO4
CO4	Experiment with fuzzy sets to meet desired needs PO5
CO5	Solve case studies to engage in continuing professional development PO9

List of Experiments

Sr. No.	Details
1.	Write a program to calculate union, intersection, complement and difference of two fuzzy sets
2.	Program to display the Gaussian membership function
3.	Program to display the triangular membership function
4.	Implement different types of generalized bell membership functions
5.	Program for McCulloch-Pitts neurons that implement logical NOT, AND and OR gates
6.	Write a program to implement Roulette wheel and ranking selection method.
7.	Write a program to maximize a function subject to the constraints
8.	Write a program to calculate addition and subtraction of fuzzy sets
9.	Case studies

Implementation of the programs is to be done using MATLAB platform.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	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	07	10
S3	Precision	14	10
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**

IT 453 Seminar	
Teaching Scheme **Practical: 2 Hrs/Week** **Credits: 01**	**Examination Scheme** **Term Work : 50 Marks**

Course description: After completing this course, students will develop the life-long learning habit of archiving, assessing, and sharing their learning by creating a portfolio to honor, understand, and connect their learning from self to global society for the betterment of both. The seminar will cover topics of current interest or provide in-depth coverage of selected topics.

Course Objectives:

To survey selected topics addressing issues of science in society today
To familiarize with scientific literature
To collect information on each topic
To assimilate, synthesize and integrate information
To organize the information on each topic into an analysis structured in this manner
To discuss the information and present work in prescribed formats

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

CO1	Identify and compare technical and practical issues related to the area of program specialization.
CO2	Outline annotated bibliography of research demonstrating scholarly skills.
CO3	Prepare a well organized report employing elements of technical writing and critical thinking.
CO4	Demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 – Low

Recommended Assessment Table

Assessment Tool	S1	S2	S3	S2	S3
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	10	10	10	10	10

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	10
S2	Manipulation	10
S3	Precision	20
S4	Articulation	00
55	Naturalization	00
Total		50

Preparation (S1)	10
Observation and Analysis (S3)	10
Record (S3)	10
Presentation/ Viva-Voce (S3)	20
Total	**50**

IT 454 Project Part –I	
Teaching Scheme **Practical: 4 Hrs/Week** **Credits: 02**	**Examination Scheme** **Term Work : 50 Marks** **Practical Examination & Viva Voce: : 50 Marks**

Course description:
This course is to makes students to acquire thorough knowledge and develop skills to formulate computing requirements for the solution.

Course Objectives:
To accustom with the process of undertaking literature survey/industrial visit and identifying the problem
To practice the process of solving the problem in a team
To select and use engineering fundamentals and modern IT tools
To apply management principles and testing techniques

CO1	Work efficiently and constructively in a project team
CO2	Review literature to identify gaps and define objectives & scope of the work.
CO3	Get experiences of using obtained knowledge, and learn how to use certain tools used in the IT-community
CO4	Synthesize and integrate information for designing modules
CO5	Design innovative idea for solving the problem

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Recommended Assessment Table

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

Recommended Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	10	10
S2	Manipulation	20	20
S3	Precision	20	20
S4	Articulation	00	00
55	Naturalization	00	00
Total		50	50

Preparation (S1)	10	10
Literature Review (S2)	10	10
Observation and Analysis of Results (S2)	10	10
Record (S3)	10	10
Mini-Project / Presentation/ Viva-Voce (S3)	10	10
Total	**50**	**50**

Project I should be assessed based on following points

1. Quality of problem selected
2. Clarity of Problem definition and feasibility of problem solution
3. Relevance to the specialization
4. Clarity of objective and scope
5. Breadth and depth of literature survey
6. Project I should be examined through a presentation by the student project group to a panel of examiners appointed by the DBOS

IT-455 Cryptography and Network Security	
Teaching Scheme **Lectures: 3 Hrs/Week** **Tutorial : 1 Hr/Week** **Credits:04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT -353 Computer Networks

Course description: After completing this course, students will have a broad and fundamental understanding of Cryptography and Network Security. First and second unit addresses basic issues in Network Security. It gives conventional encryption algorithms and design principles. Third unit explores Authentication codes, Digital Signatures and e-mail security field. Fourth unit focuses on IP Security and Web Security. Fifth unit looks at system level security issues.

Course Objectives:

To provide classical and modern encryption algorithms
To accustom with public key cryptography
To explore the use of cryptographic algorithms and security protocols to provide security over network
To deal with security facilities designed to protect a system

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

CO1	Summarize classical and modern symmetric key and public key algorithms
CO2	Demonstrate Encryption and Decryption using public key algorithm
CO3	Explain use of authentication codes and security protocols
CO4	Analyze algorithms for difficulty of attacking
CO5	Examine intruders , access control, password management, malicious software issues

Detailed Syllabus:

Unit 1	**Introduction and Symmetric Key Ciphers** **Introduction to Network security**: Security attacks, Security Services and Security Mechanisms. **Symmetric Ciphers**: Symmetric Cipher Model, Classical encryption techniques like Substitution and Transposition. Block cipher Principle: The Data Encryption Standard, Linear and Differential Cryptanalysis, triple DES, Linear and Differential Cryptanalysis
Unit 2	**Number Theory and Public Key Encryption** **Introduction to Number Theory**: Fermat's and Euler's Theorem, The Chinese Remainder Theorem, Euclidean Algorithm, Extended Euclidean Algorithm. **Public Key Cryptosystem**: Encryption Principles, the RSA Algorithm, Key Management, Diffie- Hellman Key Exchange

Unit 3	**Authentication and Network Security Applications** Authentication Requirements, Authentication Functions, Digital Signatures, Authentication Protocols, Digital Signature Standards. Kerberos, X.509 Authentication service, E- mail Security: Pretty Good Privacy, S/MIME.
Unit 4	**IP Security and Web Security** IP Security: Overview, IP security architecture, Authentication header, Web Security: Web security requirements, Secure Socket Layer (SSL): Functionality, Transport layer security TLS, Secure electronic Transactions TES.
Unit 5	**System Security** Intruders, Intrusion Detection, Password Management, Viruses, Virus countermeasures. Firewalls: Firewall Design Principles, Trusted Systems

Text and Reference Books

1. William Stallings, "Cryptography and Network Security" Pearson Education, Fourth Edition
2. Behrouz A. Forouzan & Debdeep Mukhopadhyay, "Cryptography and Network Security" Mc Graw Hill Publication , 2nd Edition
3. Robberta Bragg, Mark Phodes-Ousley &Keith Strassberge "The Complete Reference Book of Network Security", Tata McGraw-Hill Publication
4. Neal Krawetz, "Introduction to Network Security", Cengage Learning Pub

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		2								
CO2			2							
CO3						2				
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) Mini projects

Recommended Assessment pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	18
K2	Understand	10	05	24
K3	Apply	05	10	12
K4	Analyze	00	05	6
K5	Evaluate	00	00	00
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	10	05	00	00
Teachers Assessment (20 Marks)	00	00	05	10	05
ESE Assessment (60 Marks)	18	18	12	06	06

Special Instructions if any: Nil

Designed by

1. Prof. A. N. Ghule
2. Prof. V. P. Gaikwad
3. Prof. Prof. S. M. Chavan

IT 454 : Cloud Computing	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits:04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: Computer Network, Operating Systems

Course description: After completing this course, students will have fundamental understanding of cloud computing. In addition, students will also learn common cloud terminologies, tools used in industry, and career options available within this field

Course Objectives:

To recognize Cloud Technologies
To understand the design and development of Cloud applications
To prepare for the challenges and security aspects of Cloud Computing

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

CO1	Demonstrate the cloud computing models according to computing requirements
CO2	Illustrate Cloud Computing services for engineering practice and responsibilities
CO3	Select the most appropriate cloud architecture
CO4	Identify the security aspects in cloud computing
CO5	Explain Cloud Computing Security challenges with concern to social, ethical ad legal issues

Detailed Syllabus:

Unit 1	**Evolution of Model Computing :** Evolution of sharing on the Internet, Cluster Computing, Grid Computing, Parallel Computing and Distributed Computing, Introduction of Cloud Computing: Definition of cloud, Cloud Deployment Models, Cloud Service Models, Key Characteristics, Benefits and Risks in Cloud Computing, Service oriented architecture (SOA) and Cloud Computing Reference Architecture by IBM
Unit 2	**Services Delivered from the Cloud** Model architecture, Benefits and Drawbacks: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Business-Process-as-a-service (BPaaS), Identity-as-aservice (IDaaS), Communication-as-a-service (CaaS), Monitoring-as-a-service (MaaS), Storage as a service: Traditional storage versus storage cloud, Cloud Service providers: Infrastructure as service: Amazon EC2, Platform as Service: Google App Engine, Force.com.

Unit 3	**Cloud Technologies** Web services: SOAP and REST, SOAP VS REST, Virtualization, Desktop and Application Virtualization, Storage and Network Virtualization., QoS [Quality of Service] of Cloud
Unit 4	**NoSQL data stores.** Table-based: Google BigTable, Amazon Dynamo, Cassandra, Document-based, sCouchDB, MongoDB Batch cloud computing: MapReduce and Hadoop. Applications in NoSQL data stores.
Unit 5	**Security in the Cloud** Cloud Security Challenges, Infrastructure Security: Network, Host and Application level, Data security and Storage, Security Management in the cloud, Data Privacy, Life cycle of Data, Key Privacy concerns in cloud and Disaster Recovery.

Text and Reference Books

1. Cloud computing Bible by Barrie Sosinsky, Wiley India Pvt Ltd (2011)
2. Enterprise Cloud Computing: Technology, Architecture, Applications by Gautam Shroff, Cambridge University Press.
3. Cloud Computing Implementation, Management, and Security By John W. Rittinghouse,James F. Ransome , CRC Press.
4. Mastering Cloud Computing Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi
5. Dr. Kumar Saurabh,"Cloud Computing", Wiley Publication
6. Borko Furht, "Handbook of Cloud Computing", Springer
7. Venkata Josyula,"Cloud computing – Automated virtualized data center", CISCO Press
8. Greg Schulr,"Cloud and virtual data storage networking",CRC Press
9. Mark Carlson,"Cloud data management and storage", Mc Graw hill
10. Lizhe Wang, " Cloud Computing:Methodology, System and Applications", CRC Press
11. Cloud computing: Data Intensive Computing and Scheduling by Chapman Hall/CRC
12. Christopher M. Moyer, Building Applications in the Cloud: Concepts, Patterns, and Projects
13. IBM smart storage cloud Red paper by Larry Coyne Mark Bagley Gaurav Chhaunker
14. Google Apps by Scott Granneman,Pearson
15. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
16. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
17. Stefano Ferretti et.al.,‖QoS–aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		1								
CO2						2				
CO3				1						
CO4			2							
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) Study of cloud architecture, services 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	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	K4	K5
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	00	05	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	15	20	10	15	00

Special Instructions if any: Nil

Designed by

1. Prof. K.S. Gandle
2. Prof. S. S. Laddha
3. Prof. C.M. Gaikwad

IT457 : Multimedia Processing	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits:04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: GE 253 Mathematics IV, IT 243 Digital Circuits, IT 251 Data Structures

Course description: This course will make students learn how to collect, and combine multiple medias on computers with the issues concerned to capturing, compressing, processing, manipulating, searching, indexing, storing, and retrieving the data. Also they will learn to work with animations

Course Objectives:

To provide a understanding of fundamental multimedia processing system
To use image enhancement techniques like histogram equalization, spatial domain filtering
To understand text, audio, video file formats and compression techniques
To familiarize with animation techniques

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

CO1	Demonstrate multimedia systems architecture, applications and storage for engineering practice
CO2	Illustrate image enhancement in spatial domain using principles of mathematics
CO3	Explain audio and audio compression models to analyze audio data
CO4	Identify video signal formats and transmission standards to meet desired needs in the environmental context
CO5	Interpret animation and various techniques of animation to enhance their careers in other diverse areas

Detailed Syllabus:

Unit 1	Introduction: What is multimedia, Multimedia presentation and production, multimedia applications, Multimedia architecture, Windows multimedia support, hardware support, distributed multimedia applications, streaming technologies, multimedia database systems, Multimedia authoring tools, overview of multimedia software tools, multimedia Document Architecture, Text: Types of text, Text compression
Unit 2	Digital Image Processing: Image fundamentals, Image data types, image File formats, Image acquisition, storage processing, Communication, and display, Image enhancement- Enhancement by point processing, Spatial filtering, Image compression- Types of compression: lossy & lossless, intra frame & inter frame, Types of redundancies, Lossless statistical compression technique, Lossy compression techniques

Unit 3	Audio and audio compression Nature of sound waves, characteristics of sound waves, psycho-acoustic, and elements of audio systems, CD formats. Audio file formats
Unit 4	Video signal formats, Video transmission standards, digitization of video, video recording systems, Video file formats
Unit 5	Animation-Uses of animation, types of animation, principles of animation, Techniques of animation, animation on the web, 3D animation

Text and Reference Book

1. Ranjan Parekh, "Principles of Multimedia", TMH, ISBN 0-07-058833-3
2. Ralf Steinmetz and Klara Nahrstedt "Multimedia Computing, Communication and Applications", Pearson Education.
3. Gonzalez, Woods, "Digital Image Processing" Addison Wesley
4. A. K. Jain,"Fundamentals of Digital Image Processing", PHI

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1				2						
CO2	1									
CO3			2							
CO4					3					
CO5							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) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution

Recommended Assessment pattern

Assessment Pattern Level No.	Knowledge Level	Test	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	00	10
K2	Understand	05	05	20
K3	Apply	10	10	20
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
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	05	00	00
Teachers Assessment (20 Marks)	00	05	05	05	05
ESE Assessment (60 Marks)	10	10	15	15	10

Special Instructions if any: Nil

Designed by

1. Prof. C. M. Gaikwad
2. Prof. K.R. Sarode
3. Prof. A. N. Ghule

IT-458 Distributed Systems (Elective –IV)	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits:04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisites: IT-353: Computer Network, IT-361: Operating Systems

Course Description:

The course introduces the main principles underlying distributed systems: processes, communication, naming, synchronization, consistency, fault tolerance, and security. On the completion of the unit, students will understand the fundamentals of distributed computing and be able to design and develop distributed systems and applications.

Course Educational Objectives:

To expose the fundamentals of distributed computer systems; describe important characteristics of distributed systems and the salient architectural features of such systems

Select an appropriate implementation paradigm to satisfy given design requirements for a distributed system

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

CO1	Identify the core concepts of distributed systems: the way in which several machines orchestrate to **correctly** solve problems in an **efficient**, **reliable** and **scalable** way.
CO2	Examine how existing systems have **applied the concepts** of distributed systems in designing large systems, and will additionally apply these concepts to develop sample systems.
CO3	Understand the system constraints, trade-offs and techniques in distributed systems to best serve the computing needs for different types of data and applications.
CO4	Create simple models of distributed systems.
CO5	Apply different techniques learned in the distributed system.

Detailed Syllabus:

UNIT-1	**Introduction to Distributed Computing System** Distributed computing system definition, Evolution, Distributed computing system models, Why are Distributed computing systems gaining popularity, Distributed Operating Systems: Definition, Design Issues, Introduction to Distributed Computing Environment.
UNIT-2	**Message Passing** Desirable features of a Good Message Passing System, Issues in IPC by message passing, Synchronization, Buffering, Multi datagram messages, Encoding and Decoding of Message Data, Process Addressing, Failure Handling, Group

	Communication. **Remote Procedure Call:** RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling arguments and results, Server management, Parameter passing semantics, Call semantics, Communication protocols for RPCs, Client-Server binding, Exception handling, Security, RPC in Heterogeneous Environments, Optimizations for Better Performance.
UNIT-3	**Distributed Shared Memory** Introduction, General Architecture of DSM Systems, Design and implementation Issues of DSM placement strategy, Thrashing ,Advantages of DSM.
UNIT-4	**Synchronization** Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock, Election Algorithms. **Resource Management**: Features of Good Global Scheduling Algorithm, Task Assignment Approach, Load-Balancing Approach, Load- Sharing Approach , Process Migration and Threads
UNIT-5	**Distributed File Systems:** Desirable features of Good Distributed file system, file models, File Accessing models, File-Sharing Semantics, File Caching Schemes, File replication, Fault tolerance, Atomic transactions, and Design principles. **Security**: Cryptography, Authentication, Access control and Digital Signatures. **Case study: CORBA**.

Text and Reference Books

1. Pradeep. K. Sinha, "Distributed Operating Systems: Concepts and Design**"**, PHI, 2007.
2. Andrew S. Tanenbaum and Maarten van Steen, "Distributed Systems, Principals And Paradigms",PHI
3. George Coulouris, Jean Dollimore, Tim Kindberg. "Distributed Systems, Concepts and Design."
4. A.D. Kshemkalyani, M. Singhal, "Distributed Computing: Principles, Algorithms, and Systems." ISBN: 9780521189842, paperback edition, Cambridge University Press, March
5. HagitAttiya, Jennifer Welch , "Distributed Computing: Fundamentals, Simulations, and Advanced Topics"**,**Wiley.

Mapping of Course outcome with Program Outcomes:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3									
CO2		1	3							
CO3				1	2					
CO4		1	1	1	1			2		
CO5			3		2			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 of case studies.
3) Question & answer
4) 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	10	10	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	K1	K1	K2	K5	K3
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	10	05	00	00
Teachers Assessment (20 Marks)	00	00	05	05	10
ESE Assessment (60 Marks)	20	20	10	00	10

Special Instructions if any: Nil

Designed by

1. Prof. K.R. Sarode
2. Prof. A. N. Ghule
3. Prof. S. S. Laddha

IT459: E- Business Intelligence(Elective IV)	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits :04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Course description: After completing this course, students will have to build applications and technologies for gathering, storing, analyzing, and accessing information for better business decision making. Topics range from an overview of e- commerce to e business development. Topics covered include best practices in BI requirement gathering; BI project management; data warehousing; ETL (extract, transform, and load); data mining, predictive analytics, online analytical processing, BI application development, BI implementation, and production support.

Course Objectives:

Understand E-business engineering practice with analysis, design, operation and management.

Study concepts of Business Process.

Understand the technology and processes associated with Business Intelligence framework.

Enable students to understand various types of processes involved in Business

Know the technology and the actual processes used in Business.

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

CO1	Analyze the differences between e-Commerce and E business development.
CO2	Apply Information systems and their use in computing, and impact on, the organization from the E-Business perspective.
CO3	Understand the impact of information technologies on the enterprise and the competitive environment, using information systems design as a basis for sustainable development.
CO4	Evaluate the use of Business tools for critical assessments and discuss constructively, examples of real life business cases with effective communication.
CO5	Create the use of professional engineering practice of business processes in social and legal issues in diverse areas.

Detailed Syllabus:

Unit 1	**Introduction to E Commerce and e-business**, defining E Commerce, Advantages of e-business, Information Management Concepts, The role of mathematical models, Business intelligence architectures ,Enabling factors in business intelligence, Development of a business intelligence system, Ethics and business intelligence, Frameworks for Business Architecture, E-Business Models: B2C. B2B, B2G, C2C,C2B, Role of Data Warehousing in BI, BI Infrastructure Components- BI Process, BI Technology, BI Roles & Responsibilities.
Unit 2	**E-business Design:** Self-diagnosis, Reverse the value chain, Choose a focus, Execute flawlessly. Dependability and integration of ERP, SCM and E-commerce with BI. Commercial BI vendors and their comparison, Introduction to Business Metrics and KPIs, Creating Cubes using SSAS. OLAP operations, Techniques to handle changing dimensions, families of fact tables, fact less fact table. Decision Support Representation of the decision-making process, Definition of decision support system, Development of a decision support system.
Unit 3	**Data mining and business Applications:** development of OLAP technology Data mining for business Applications like Clickstream Mining, Market Segmentation,retail industry,telecommunications industry, banking & finance CRM etc, Enterprise Applications BPM Life-cycle Practice - BPM Technology, BI Applications , Website Development, Design and Content: Commercial web presence, Website development, Design and Content, Design tips for increasing web sales, on-line sales promotions. Service-Oriented Architecture (SOA)
Unit 4	**Data Integration :** E-blueprint Formulation: Basic phases of e-blueprint planning, communication, The serious business of e-blueprint planning Benefits and limitations of outsourcing the operations study of any one BI tool like Oracle BI, SPSS, Clementine, and XLMiner etc. Basics of Data Integration (Extraction Transformation Loading) Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications, Data Cleaning,Reduction and Transformation operators,Commercial ETL tools
Unit 5	**Basics of Enterprise System:** Introduction to Enterprise Reporting, Concepts of Dashboards, Balanced Scorecards, Introduction to SSRS Architecture, enterprise reporting using SSRS. Types of Enterprise Reports, Components of Reporting System. Securing E-Business: Risk management, Security Audits and penetration Testing Supporting e-business components Customer Relationship management (CRM) Content Management Systems (CMS)- Knowledge Management Systems (KMS)

Text and Reference Books

1. Business Intelligence for the Enterprise, Mike Biere, Pearson Education, 2003 Edition.
2. Business intelligence Roadmap, Larissa Terpeluk Moss, Shaku Atre, Pearson Education, 2003 Edition.
3. R. Radhakrishnan and S. Balasubramanian, *Business Process Reengineering: Text cases,* PHI
4. Ravi Kalakota, Marcia Robinson, *e-Business 2.0- Roadmap for Success*, Pearson Education
5. H. Albert Napier, JB Napier, Ollie N Rivers, Stuart W. Wagner, *Creating a Winning E-Bisiness*, Cengage Learning Pun.
6. Business Intelligence: Data Mining and Optimization for Decision Making by Carlo Vercellis, Wiley India Publications

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		2	2							
CO2		1	2							
CO3					1	2				
CO4				1			2			
CO5						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	00	00	00
K2	Understand	05	05	15
K3	Apply	05	05	15
K4	Analyze	05	05	10
K5	Evaluate	05	00	10
K6	Create	00	05	10
Total		20	20	60

Assessment table

Assessment Tool	K4	K3	K2	K5	K6
	C01	C02	C03	CO4	CO5
Class Test (20 Marks)	05	05	05	05	
Teachers Assessment (20 Marks)	05	05	05		05
ESE Assessment (60 Marks)	10	15	15	10	10

Designed By:

1. Prof. S. M. Chavan
2. Prof. C. M. Gaikwad
3. Prof. K.S. Gandle

IT 460 Linux Operating System	
Teaching Scheme **Lectures: 4 Hrs/Week** **Credits: 04**	**Examination Scheme** **Test : 20 Marks** **Teachers Assessment : 20 Marks** **End Semester Exam : 60 Marks**

Prerequisite: IT355 Operating system

Course description: This course provides students with major functions and principles of operating Systems. Using Linux as a sample operating system. Main topics include the overview of operating systems, process management, memory management, storage management, essential Linux utilities and commands, shell scripting, and system programming.

Course Objectives:

Understand the relationship between the UNIX and Linux Operating Systems

Create, delete, move and rename files and directories

Several simple commands in order to produce more powerful operations

Analyze the knowledge of simple operating system.

Understand the relationship between the UNIX and Linux Operating Systems

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

CO1	Understand specifications, scripts and programs.
CO2	Create and use UNIX/Linux utilities to create and manage simple file processing operations, organize directory structures with appropriate security, and develop shell scripts to perform more complex tasks.
CO3	Apply the use the UNIX/Linux system to accomplish typical personal, office, technical, and software development tasks.
CO4	Analyze use software development tools including libraries, preprocessors, compilers, linkers and make files, Comprehend technical documentation, prepare simple readable user documentation.
CO5	Develope capability in problem solving using the tools presented.

Detailed Syllabus:

Unit 1	**Introduction:** Introduction to the Linux Kernel, Monolithic Kernel Versus Microkernel Designs Linux Kernel Versions, Obtaining the Kernel Source, Installing the Kernel Source, The Kernel Source Tree, Building the Kernel, Configuring the Kernel, Installing the New Kernel, GNU C, Inline Functions, Synchronization and Concurrency, Importance of Portability
Unit 2	**Process Management**: The Process, Process Descriptor and the Task Structure, Allocating the Process Descriptor, Storing the Process Descriptor, Process State, Process Context, Process Creation, Copy-on-Write, Forking, The Linux Implementation of Threads, Creating Threads, Kernel Threads, Process Termination, Removing the Process Descriptor, Process Scheduling, Multitasking, Linux's Process Scheduler, The Scheduling Policy in Action, The Linux Scheduling Algorithm, Fair Scheduling, The Linux Scheduling Implementation, The Scheduler Entry Point, Sleeping and Waking Up, Preemption and Context Switching, User and kernel Preemption, Real-Time Scheduling Policies
Unit 3	**System Calls and Kernel Data Structures:** Communicating with the Kernel, APIs, POSIX, and the C Library, Syscalls, System Call Numbers, System Call Performance, System Call Handler, System Call Implementation, System Call Context, Linked Lists, Manipulating Linked Lists, QueuesMaps, Binary Trees, What Data Structure to Use, When, Algorithmic Complexity, Time Complexity
Unit 4	**Interrupts and Interrupt Handlers:** Interrupts, Interrupt Handlers, Top Halves Versus Bottom Halves, Registering an Interrupt Handler, Writing an Interrupt Handler, A Real-Life Interrupt Handler, Interrupt Context, Implementing Interrupt Handlers, /proc/interrupts, Interrupt Control, An Introduction to Kernel Synchronization, Critical Regions and Race Conditions, Locking, Causes of Concurrency, Deadlocks, Contention and Scalability, Atomic Operations, Spin Locks, Reader-Writer Spin Locks, Semaphores, Reader-Writer Semaphores, Mutexes.
Unit 5	**Memory Management**: Pages, Zones, Getting Pages, kmalloc(),vmalloc(),Slab Layer, Statically Allocating on the Stack, High Memory Mappings, Per-CPU Allocations, The New percpu Interface, Reasons for Using Per-CPU Data, Picking an Allocation Method, The Virtual File system, Common File system Interface, File system Abstraction Layer, Unix File systems, VFS Objects and Their Data Structures, The Superblock Object and Operations, The Inode Object and Operations, The File Object and Operations, Data Structures Associated with File systems, Data Structures Associated with a Process.

Text and Reference Books

1. Linux Operating System" by "Robert Love
2. Linux: The Complete Reference", Petersen R. L., Tata McGraw Hill, ISBN: 0- 07-05849-7, 2003
3. LINUX with Operating System Concepts" by Richard Fox ISBN: 978-1-4822-3589-0

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1			1							
CO2		1	2	2						
CO3					1					
CO4				1						
CO5									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) 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	00	00	00
K2	Understand	05	05	20
K3	Apply	05	05	05
K4	Analyze	00	05	05
K5	Evaluate	00	00	00
K6	Create	10	05	30
Total		20	20	60

Assessment table

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

Designed by

1. Prof. S. M. Chavan
2. Prof. C. M. Gaikwad
3. Prof. K.S. Gandle

IT 461 Lab: Cryptography and Network Security	
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	Explore the use of Euclid's algorithm
CO2	Identify and formulate computing solution for symmetric key algorithms
CO3	Practice RSA and DH algorithm
CO4	Analyze the results of frequency of letters program
CO5	Summarize different modern tools used for system security

List of Experiments

Sr. No.	Details
1	Write a program for implementation of Euclid's Algorithm.
2	Demonstrate Caesar Cipher with the help of a program A. Sender's Side(Encryption) B. Receiver's Side(Decryption)
3	Formulate computing solution for Transposition Cipher A. Sender's Side(Encryption) B. Receiver's Side(Decryption)
4	Implement Key generation , Encryption and Decryption using RSA Algorithm
5	Write a program for implementation of DH Algorithm also find the solution for man – in- the middle attack
6	Write a program checking frequency of letters in a three different types of files and analyze the result
7	Write a program for implementation of Radix -64
8	Study of system security modern tools –CASE Study : Group Activity

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (25 Marks)	04	04	04	06	07
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	04	05
S2	Manipulation	04	05
S3	Precision	14	05
S4	Articulation	06	05
S5	Naturalization	07	05
Total		25	25

Preparation (S1)	04	00
Conduct of Experiment (S2)	10	07
Observation and Analysis of Results (S3)	04	03
Record (S2)	03	05
Mini-Project / Presentation/ Viva-Voce (S3)	04	10
Total	**25**	**25**

IT 462: Lab- Cloud Computing Laboratory	
Teaching Scheme **Practical: 2 Hrs/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	Create Virtual Machine images and to deploy them on a Cloud.
CO2	Characterize performance of cloud equipment.
CO3	Participate in a group atmosphere for the defining, planning, and execution of a cloud
CO4	Installation
CO5	Develop an understanding of economic issues related to cloud

List of Experiments

Sr. No.	Details
1.	Introduction to cloud computing.
2.	Implementation of SOAP Web services in C#/JAVA Applications.
3.	Implementation of RESTFul Web services in C#/JAVA Applications.
4.	Implementation of Para-Virtualization using VMWare's Workstation/ Oracle's Virtual Box and Guest O.S
5.	Implementation of Full-Virtualization using VMWare's ESXi and Guest O.S.
6.	Creating a Warehouse Application in SalesForce.com.
7.	Installation and Configuration of Single-Node Setup in Hadoop.
8.	Create any Application (Ex: Word Count) Using Hadoop Map/Reduce.
9.	To study Cloud security challenges.
10.	Case Study: PAAS (Face book, Google App Engine)
11.	Case Study : Amazon Web Services

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 – Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	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	07	10
S3	Precision	14	10
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**

Multimedia Processing Laboratory	
Teaching Scheme **Practical: 4 Hrs/Week** **Credits: 02**	**Examination Scheme** **Term Work : 50 Marks** **Practical Examination & Viva Voce: : 25 Marks**

Laboratory Course Outcomes

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

CO1	Make use of different tools for multimedia processing to formulate computing requirements PO2
CO2	Implement the mathematical principles of digital image enhancement PO1
CO3	Experiment with audio and video signals to interpret data in different forms PO3
CO4	Select and use appropriate image compression techniques necessary for practice PO4
CO5	Demonstrate practical applications animations to continue professional development PO9

List of Experiments

Sr. No.	Details
1	Study of various multimedia software tools
2	Study various tools to work with text
3	Implement text Compression
4	Program to perform arithmetical and logical operations on images
5	Program to perform various gray level transformations on images
6	Program to perform contrast stretching and thresholding
7	Program to find the histogram of an image
8	Program to perform histogram equalization of an image
9	Program to sharpen an image using high pass filter in spatial domain
10	Program to smoothen an image using low pass filter in spatial domain
11	Program for illustrating color image processing
12	Program for creation of watermarking
13	To convert between color models
14	Implement image compression
15	Implement Video compression
16	Study about morphing technique
15	Perform animation using animation software
16	Add sound to animation

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	10	10	15	10	05
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	15	05
S2	Manipulation	15	10
S3	Precision	20	10
S4	Articulation	00	00
55	Naturalization	00	00
Total		50	25

Preparation (S1)	05	05
Conduct of Experiment (S2)	20	07
Observation and Analysis of Results (S3)	10	05
Record (S2)	05	03
Mini-Project / Presentation/ Viva-Voce (S3)	10	05
Total	**50**	**25**

IT 462: Lab Distributed Systems	
Teaching Scheme **Practical: 2 Hrs/Week** **Credits:01**	**Examination Scheme** **Term Work : 25 Marks**

Course Outcomes Expected: On successful completion of this course, students will be able to:

CO1	Understand the concepts of distributed computing.
CO2	Characterize different implementation paradigms for distributed systems.
CO3	Select an appropriate implementation paradigm to satisfy given design requirements for a distributed system
CO4	Design and analyze parallel and distributed applications.
CO5	Develop a simple model of a distributed system

.

Suggestive List of experiments:

1	Design a Distributed Application using RMI for remote computation.
2	Design a Distributed Application using Message passing Interface for remote computation.
3	Design a Distributed application using socket.
4	Design distributed application which consists of a server and client using threads.
5	Implement distributed system using lock server.
6	Implement basic file server system.
7	Implement RPC mechanism for a file transfer across a network in 'C'.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

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

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	10
S2	Manipulation	10
S3	Precision	05
S4	Articulation	00
55	Naturalization	00
Total		25

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

IT 465	Lab- E- Business Intelligence
Teaching Scheme **Practical: 2 Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 25 Marks**

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

CO1	Use BI systems and technology to support decision making
CO2	Design and build BI applications based on users' needs
CO3	Identify business and technical requirements for a BI solution
CO4	Apply relevant theories, concepts and techniques to solve real-world BI problems and perform data analyses.
CO5	Analyze the results of data analyses

The term work shall consist of following practical

Sr. No.	
1	Case study of e commerce to E business development.
2	Case study of any one online shopping website.
3	Case study of Twitters Business website.
4	Case study of Business Intelligence tools like Excel, OLAP, Reporting tools.
5	Case study of Service oriented architecture (SOA).
6	Case study of design and implement SSAS.
7	Case study of design and implement SSAS with ETL process.
8	Case study of search engine optimization(SEO)
9	Create a small business module using any BI tool.
10	Create a module for small Business website using data mining tool.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

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

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	04
S2	Manipulation	04
S3	Precision	17
S4	Articulation	00
S5	Naturalization	00
Total		25

Preparation (S1)	04
Conduct of Experiment (S2)	02
Observation and Analysis of Results (S3)	11
Record (S2)	02
Mini-Project / Presentation/ Viva-Voce (S3)	06
Total	**25**

IT 466 Lab: Linux Operating System	
Teaching Scheme **Practical: 2 Hrs/Week** **Credits:01**	**Examination Scheme** **Term Work : 25 Marks**

Laboratory Course Outcomes

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

CO1	Develope essentail operating system skills including how to use, setup, configure, troubleshoot and maintain a current opearating system.
CO2	Identify program structures confidently in Unix/Linux environment.
CO3	Use shell scripts to automate various tasks.
CO4	Understand the basics of linux administration.

List of Experiments

Sr. No.	Details
1	Installation of Linux OS using different utilities.
2	Shell programs using loops.
3	Shell program using patterns, and expansions.
4	Shell program using substitution and I/O system calls.
5	AWK programming for student database.
6	AWK programming using different loops.
7	Use the vi editor to create and modify file content.
8	Use simple shell features such as pipes and I/O redirection.
9	Implement semaphores, mutex.
10	Implement reader's writer's problem.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S1	S3	S2	S3
	CO1	CO2	CO3	CO4
Term Work (25 Marks)	04	05	10	06

Recommended Assessment pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**
S1	Imitation	04
S2	Manipulation	10
S3	Precision	11
S4	Articulation	00
55	Naturalization	00
Total		25

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

IT 467 Project II	
Teaching Scheme **Practical: 6 Hrs/Week** **Credits:03**	**Examination Scheme** **Term Work : 50 Marks** **Practical Examination & Viva Voce: : 100 Marks**

Course description:
After completing this course, students will be able to develop solution for a practical problem with innovative ideas and thus enable them to have a practical exposure.

Course Objectives:
To accustom with the process of undertaking literature survey/industrial visit and identifying the problem
To practice the process of solving the problem in a team
To select and use engineering fundamentals and modern IT tools
To apply management principles and testing techniques

CO1	Develop team spirit among students in order to make them learn how to work with colleagues
CO2	Planning and follow-up of a complex project task, and taking care of run time and compile time errors that might occur
CO3	Integrate smaller modules into a larger one
CO4	Express ideas coherently & communicate effectively in both verbal and written form
CO5	Develop solution for the selected problem within stipulated time and test if it meets the requirements and prepare a report in proper format

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 - Low

Assessment Table

Assessment Tool	S2	S3	S4	S4	S5
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	05	15	10	10	10
Practical Examination & Viva Voce (100 Marks)	10	30	20	20	20

Recommended Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	00	00
S2	Manipulation	05	10
S3	Precision	15	30
S4	Articulation	20	40
55	Naturalization	10	20
Total		50	100

Preparation (S1)	00	00
Literature Review (S2)	05	10
Observation and Analysis of Results (S2)	15	30
Record (S3)	20	40
Mini-Project / Presentation/ Viva-Voce (S3)	10	20
Total	**50**	**100**