



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

		THEORY COURSES											
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			
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	IT-443	Elective –III Compiler Construction	2,3,5,10	4			4	20	20	60			100
	IT-444	Cyber Security	2,3,4,6,7,10										
	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	IT-450	Elective –III 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

		THEORY COURSES											
S. No.	Course Code	Subject		Scheme of Teaching (Hrs/Week)			Cr edits	Scheme of Evaluation (Marks)					
				L	T	P		Theory			Ter m Wor k	Prac tical/ Viva -voce	Tota l
			PO					Test	TA	ESE			
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	Elective –IV Distributed System	1,2,3,4, 5,8	4			04	20	20	60			100
	IT-459	E-Business Intelligence	2,3,4,5, 6,7										
	IT-460	Linux Operating System	2,3,4,5, 9										
		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	Lab: Elective –II Distributed System	1,2,4,5, 7,8,10			2	01				25	-	25
	IT-465	E-Business Intelligence	2,4,5,9										
	IT-466	Linux Operating System	1,2,3,4, 5										
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
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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 – 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) 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
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	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	HDFS: 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 HDFS-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 and 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 be able to:

CO1	Illustrate the knowledge of different translators and modern compiler
CO2	Apply the knowledge of patterns, tokens & regular expressions for solving a problem 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, Parser Generator YACC, programs using YACC
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. Dhamdhare, “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
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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
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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. Kenneth 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 – 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	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
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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, Vijayalakshmi 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
S5	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
S5	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
S5	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
S5	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
S5	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-assembly (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 Schulz, "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. Kumaraswamy, S. Latif (SPD, O'REILLY)
16. Cloud Computing : A Practical Approach, Anthony 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

	<p>Communication.</p> <p>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.</p>
UNIT-3	<p>Distributed Shared Memory</p> <p>Introduction, General Architecture of DSM Systems, Design and implementation Issues of DSM placement strategy, Thrashing ,Advantages of DSM.</p>
UNIT-4	<p>Synchronization Clock Synchronization, Event Ordering, Mutual exclusion, Deadlock, Election Algorithms.</p> <p>Resource Management: Features of Good Global Scheduling Algorithm, Task Assignment Approach, Load-Balancing Approach, Load- Sharing Approach , Process Migration and Threads</p>
UNIT-5	<p>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.</p> <p>Security: Cryptography, Authentication, Access control and Digital Signatures.</p> <p>Case study: CORBA.</p>

Text and Reference Books

<ol style="list-style-type: none"> 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-Business*, 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
S5	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
S5	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
S5	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
S5	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
Total	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
S5	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