



An Autonomous Institute
Shree Warana Vibhag Shikshan Mandal's
**Tatyasaheb Kore Institute of
Engineering And Technology,
Warananagar**

Department of Computer Science & Engineering

**T. Y. B. Tech.
Computer Science & Engineering
2022-23**

B. Tech. in Computer Science & Engineering
Syllabus Structure and Curriculum under Autonomy

Vision

To become center of excellence in the field of Computer Science and Engineering and develop competent IT technocrats

Mission

- To develop engineering graduates with high degree of professional excellence
- To excel in academics and research through contemporary and real world problems
- To enhance graduate employability through work based learning in social entrepreneurship
- To encourage industrial and nationally recognized institutes collaboration
- To create an environment to nurture lifelong learning

Quality Policy

To promote excellence in academic and training activities by inspiring students for becoming competent professionals to cater industrial and social needs.

Program Educational Objectives

Graduates will be able to,

- [1] Able to design and develop computing system using modern technologies by adapting business intelligence and challenges
- [2] Able to acquire capabilities with aptitude for higher education and entrepreneurship
- [3] Able to function effectively as professionals having excellent interpersonal skills with ethical and social obligations.
- [4] Able to work efficiently in multidisciplinary and multicultural environment
- [5] Able to lead in their respective domain and contribute positively to the needs of society

Program Outcomes

After completion of the Program, graduates will have,

- [1] Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- [2] Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- [3] Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
- [4] Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- [5] Modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- [6] Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- [7] Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- [8] Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- [9] Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- [10] Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- [11] Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- [12] Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

- [1] Identify, design and develop solution for real world problems by implementing phases of software development process model
- [2] Analyze and apply the computer science engineering solutions in societal and human context
- [3] Demonstrate the skills and knowledge of contemporary issues in the field of Computer science and Engineering

Tatyasaheb Kore Institute of Engineering and Technology, Warananagar
(An Autonomous Institute affiliated to Shivaji University, Kolhapur)

Abbreviations

Sr. No.	Acronym	Definition
1	ISE	In-Semester Examination
2	ISE-I	In-Semester Examination-I
3	ISE-II	In-Semester Examination-II
4	ESE	End-Semester Examination
5	ISA	In-Semester Assessment (Term Work)
6	L	Lecture
7	T	Tutorial
8	P	Practical
9	CH	Contact Hours
10	C	Credit

Course/ Subject Categories

Sr. No.	Acronym	Definition
1	BSC	Basic Science Course
2	HSC	Humanity Science Course
3	ESC	Engineering Science Course
4	PCC	Professional Core Course
5	OEC	Open Elective Course
6	MC	Mandatory Course
7	PEC	Professional Elective Course
8	PW	Project Work (Mini and Major Project)
9	II	Industrial Internship

Course/ Subject Code

C	S	E	5	0	1
Branch Code			Semester	Course Number	

Course Term work and POE Code

C	S	E	5	0	1	T/P / A
Branch Code		Semester	Course Number			T - Term Work P - POE A - Audit Course H - Honours Course

Third Year B. Tech.
(Computer Science & Engineering)
Semester - V
Detailed Syllabus



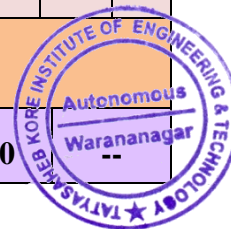
SWVSM's
Tatyasaheb Kore Institute of Engineering and Technology, Warananagar
 Third Year B.Tech. (Computer Science & Engineering)

Semester-V

(To be implemented from 2022 - 23)

Curriculum Structure, Credit Scheme and Evaluation Scheme

Course Code	Category	Course Title	Teaching and Credit Scheme					Examination & Evaluation Scheme			
			L	T	P	CH	C	Component	Marks	Min for Passing	
CSE501	PCC	Object Oriented Modeling and Design	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE502	PCC	System Software and Compiler Design	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE503	PCC	Operating Systems-II	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE504	PCC	Computer Algorithms	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE505	OEC	Linux Administration	2	--	--	2	2	ESE	60	24	40
CSE506		Cyber Security and Cyber Laws						ISE	40	16	
CSE504T	PCC	Computer Algorithms	--	1	--	1	1	ISA	25	10	
CSE505T	OEC	Linux Administration	--	1	--	1	1	ISA	25	10	
CSE506T		Cyber Security and Cyber Laws									
CSE502P	PCC	System Software and Compiler Design	--	--	2	2	1	ESE(OE)	50	20	30
								ISA	25	10	
CSE503P	PCC	Operating System-II Laboratory	--	--	2	2	1	ESE(OE)	50	20	30
								ISA	25	10	
CSE507P	PCC	Python Programming	2	--	4	6	4	ESE(POE)	50	20	30
								ISA	50	20	
CSE508A		Audit Course-V : Business and Technical English	1	1	--	2	--	--			
TOTAL			17	3	8	28	22	--	800	--	



Teaching Scheme**Lectures** : 3 Hrs/Week**Credits** : 3**Tutorials** : --**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To understand the Object Based View of the System
2	To design Problems using Object Oriented Analysis and Design Techniques
3	To Understand UML notations and compare with OMT
4	To inculcate necessary skills to handle complexities in Software Design

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Explain the modeling as a design technique	Remember
CO2	Explain the Object, Dynamic & Functional Modeling	Understand
CO3	Describe Structure and Behavior Modeling using UML	Understand
CO4	Analysis, Design and Implementation with UML case studies	Analyze

Course Description :

This course is designed to understand the Object Oriented Modeling, Analysis and Designing methodologies used during Software design and development

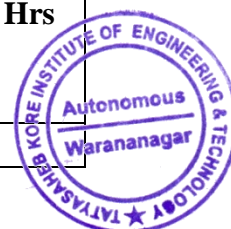
Prerequisites : 1 Software Engineering

Section – I

Unit-1	Introduction: Ability to analyze and model software systems	8 Hrs
	Object oriented themes, modeling as a design technique. Object Modeling: Object, classes, Link & association, advanced link & Association concepts, generalization & Inheritance, grouping constructs, aggregation, abstract classes, generalization as extension & restriction, multiple inheritance, metadata, candidate key & constraints	
Unit-2	Dynamic & Functional Modeling	7 Hrs
	Dynamic modeling: Events & states, operations, nested state diagrams, concurrency, advanced dynamic modeling concepts & simple dynamic model, relation of object dynamic models. Functional Modeling: Functional model, data flow diagrams, specifying operations, constriction, a simple functional model, relation of functional to object & dynamic model	
Unit-3	Introducing the UML	7 Hrs
	An overview of the UML, Conceptual Model of UML, Architecture of UML Structure modeling Using UML: Classes, Relationship, Diagrams, and Class Diagrams	

Section – II

Unit-4	Behavioral Modeling	7 Hrs
	Interactions, Use Cases, Use Case Diagram, and Interaction diagrams, Activity diagrams, Events & Signals, State Machines, Process & Threads, Time & Space, State chart diagrams	
Unit-5	Analysis and Design	



	Process Overview, System Conception, Domain Analysis, Application Analysis	5 Hrs
Unit-6	Implementation Modeling	
	Overview, Fine-tuning Classes, Fine-tuning Generalizations, Realizing Associations, Testing, Example Case Studies: ATM, Library Management System	5 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO 1	PSO 2	PSO 3
CO1	3	2	2	-	-	-	-	-	-	-	-	-			
CO2	3	-	-	1	1	-	-	-	-	-	-	-			
CO3	-	3	2	2	2	-	-	-	-	1	-	-			
CO4	-	-	-	2	3	2	-	-	-	-	-	-			

References	
Text Books :	
1	Object-Oriented Modeling & Design, James Rumbaugh, Michael Blaha, William Premerlani, Frederick Eddy, and William Lorensen PHI Publication (Units I and II)
2	The Unified Modeling Language User Guide, Grady Booch, James Rumbaugh and Ivar Jacobson, 2nd Edition, Pearson (Addison Wesley) Publication (Units III and IV)
3	Object-Oriented Modeling & Design with UML, Michael Blaha and James Rumbaugh, 2nd Edition, Pearson Publication (Units V and VI)
Reference Books :	
1	Object Oriented Analysis & Design, Atul Kahate, Tata McGraw-Hill Publication
2	Object Oriented analysis & Design, Andrew High, Tata McGraw-Hill Publication
3	Practical Object Oriented Design with UML, Mark Priestley, McGraw-Hill Education
SWAYAM Courses (Operational Timestamp: Sat, 16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.nptel.ac.in/noc19_cs48/preview [IIT Kharagpur]
2	https://nptel.ac.in/courses/106105153 [IIT, Kharagpur]



CSE502 - System Software and Compiler Design[Click Syllabus Structure](#)**Teaching Scheme****Lectures** : 3 Hrs/Week**Credits** : 3**Tutorials** : --**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To expose the students to the fundamentals of various language processors like compiler, assembler, linker, Macro pre-processor and loader
2	To introduce the fundamentals of compiler and its phases
3	To design and implement Analysis phases of compiler
4	To design and implement Synthesis phases of compiler

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able	Bloom's Taxonomy
CO1	To identify the role of system programs and application programs	Remember
CO2	To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and debugger	Understand
CO3	To design and implement lexical analyzer, syntax analyzer and semantic analyzer	Understand
CO4	To identify appropriate code optimizing transformations and issues Code Generation	Analyze and Understand

Course Description :

This course is designed to understand the various system software and also study in detail about design of compiler

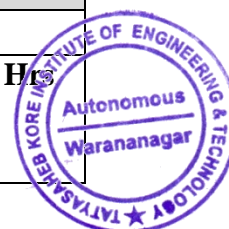
Prerequisites :	1	Operating System
	2	Finite Automata
	3	Microprocessor

Section – I

Unit-1	Language Processors: Assembler	
	Language Processor, Elements of Assembly Language Programming, Advanced assembler directives, Pass-I of the assembler, Intermediate code forms, Pass-II of the assembler	6 Hrs
Unit-2	Macros, Linkers and Loaders	
	Introduction, Macro definition and call, Macro Expansion, Nested macro call, Advanced macro facilities, Relocation and Linking concept, Self-Relocating Programs, Loaders	7 Hrs
Unit-3	Compilers: Lexical Analysis	
	Structure of Compiler, Lexical Analysis: Role of Lexical Analyzer, Lexical Errors, Lexeme, Tokens and Patterns, Input Buffering, Transition Diagram, Lexical Analyzer Generator: LEX	7 Hrs

Section – II

Unit-4	Syntax Analysis	
	Introduction, Context Free Grammar (CFG), Top-Down Parsing: Recursive Descent Parsing Technique and Predictive Parsing Technique: LL (1), Bottom up Parsing: LR(0), SLR (1).	7 Hrs



Unit-5	Syntax Directed Translation and Intermediate code generation	
	Syntax directed translation: Introduction, SDD, SDT, Attributes, Synthesized attributes, Inherited attributes, S-Attributed definition, L-Attributed definition, Intermediate code generation: Introduction, Triple and Quadruples, Three Address Instructions, Three Address Code for Boolean expression and Assignment Statements	7 Hrs
Unit-6	Code Optimization and Code Generation	
	Introduction to Code Optimization, Principle Sources of Optimization, Peephole Optimization, Introduction to code generation, Issues in code generation	6 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	-	-	1			
CO2	3		2	-	1	1	-	-	-	-	-	1			
CO3	3	2	3	-	2	1	-	-	-	-	-	2			
CO4	3	1	1	-	-	1	-	-	-	-	-	2			
CO5	3	-	-	-	-	1	-	-	-	-	-	1			
CO6	3	-	2	-	1	1	-	-	-	-	-	1			

References	
Text Books :	
1	System Programming and Operating System, D. M. Dhamadhere, 2 nd Edition-McGraw Hill Education India.(Unit I & II)
2	Compilers: Principles, Techniques and Tools, Jeffery D. Ullman, Alfred V Aho, Ravi Sethi-Pearson Education India.(Unit III, IV, V & VI)
Reference Books :	
1	Compiler Construction, D.M. Dhamdare, Mc-Millan
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.nptel.ac.in/noc20_cs13/preview [IIT, Kharagpur]



CSE503 - Operating System-II[Click Syllabus Structure](#)**Teaching Scheme**

Lectures : 3 Hrs/Week
Credits : 3
Tutorials : --

Evaluation Scheme

ISE : 40 Marks
ESE : 60 Marks

Course Objective : The objective of this course is

1	To provide knowledge to the students about Fundamental architecture of UNIX/Linux operating system fundamentals
2	To understand File subsystem and related functions (system calls)
3	To understand Process Control subsystem and related functions (system calls) and memory allocation
4	To understand the Unix/Linux process and Inter Process Communication using pipes, signals
5	To provide a comprehensive introduction to Shell programming

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	To understand Unix fundamental components like files, directories, basic I/O functions and Processes	Understanding
CO2	To Demonstrate various UNIX commands, system calls(functions) for file subsystem	Apply
CO3	To Demonstrate various UNIX commands for Process subsystem and IPC	Apply
CO4	Analyze a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem	Analyze and Apply

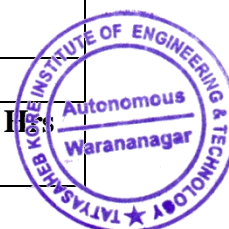
Course Description :

This course provides understanding of the Unix, GNU Linux operating system and describes the application programming interface of the UNIX family of operating systems programming environment.

Prerequisites :	1	Data Structures and Algorithms
	2	Operating System Course (CSE404)
	3	Concepts of Operating System Process

Section – I

Unit-1	UNIX System Overview	
	Introduction, UNIX Architecture, Logging, Files and Directories, Input and Output, Programs and Processes, User Identification	6 Hrs
Unit-2	File I/O, Files and Directories	
	File I/O : Introduction File Descriptors, <i>open()</i> , <i>read()</i> , <i>write()</i> , <i>creat()</i> , <i>close()</i> , <i>lseek()</i> , File Sharing, <i>dup()</i> . Files and Directories : Introduction <i>stat()</i> , <i>fstat()</i> , File Types, Set-User-ID and Set-Group-ID, File Access Permissions, <i>chmod()</i> , Sticky Bit, <i>chown()</i> , File Systems, Symbolic Links, <i>mkdir()</i> , <i>rmdir()</i> , <i>chdir()</i> , <i>getcwd()</i> Advanced I/O : Record locking	7 Hrs
Unit-3	Process Environment, Control	
	Process Environment : Introduction, <i>main()</i> function, Process Termination, Command-Line arguments, Environment List, Memory Layout of 'C'	6 Hrs



	Program, Shared Libraries, Memory Allocation. Process Control: Process Identifiers, <i>fork()</i> , <i>vfork()</i> , <i>exit()</i> , <i>wait()</i> , <i>exec()</i> , Changing User IDs and Group IDs, Process Times	
Section – II		
Unit-4	Process Relationships and IPC	
	Process Relationships : Terminal Logins, Linux Terminal Logins, Network Logins, Linux Network Login, Job Control. IPC : Pipes, FIFOs	6 Hrs
Unit-5	Signals and Threads	
	Signals : Signal Concepts, Signal Function, <i>kill()</i> , <i>raise()</i> , <i>alarm()</i> , <i>pause()</i> . Threads : Thread Concepts, Thread Identification, Thread Creation, Thread Termination	6 Hrs
Unit-6	Essential Shell Programming	
	Shell Scripts, read : Making Scripts Interactive, Using Command-Line Arguments, exit and Exit Status of Command, The Logical Operators && and , The if conditional, Using test and [] to Evaluate Expressions, The case Conditional, expr : Computation and String Handling, \$0 : Calling a Script by Different Names, while : Looping, for : Looping with a List, set and shift , The Here Document, trap : Interrupting a Program	7 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	1	-	-	1			
CO2	2	1	-	-	1	-	-	-	2	-	-	1			
CO3	2	1	-	-	1	-	-	-	2	-	-	1			
CO4	2	2	2	-	-	-	-	-	2	-	-	3			

References	
Text Books :	
1	Advanced Programming in the UNIX Environment, W.Richard Stevens, 2 nd Edition, Pearson
2	Unix Concepts and Applications, Sumitabha Das, 3 rd Edition, Tata McGraw Hill
Reference Books :	
1	The Design of UNIX Operating System, Maurice Bach, PHI
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.nptel.ac.in/noc22_cs78/preview [IIT, Madras]
2	https://onlinecourses.swayam2.ac.in/cec22_cs23/preview [University of Madras]



Teaching Scheme**Lectures** : 3 Hrs/Week**Credits** : 3**Tutorials** : --**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To introduce algorithm design methods / techniques with analysis
2	To devise algorithm for given problem statement
3	To introduce complex computational problems

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Understand and demonstrate algorithm design methods with analysis	Demonstrate
CO2	Devise algorithm for given problem statement and analyze its space and time complexity by using recurrence relation	Analyze
CO3	Categorize the problem to determine polynomial and non-polynomial based on its nature	Analyze

Course Description :

This Course is designed to understand the various key aspects and algorithm design techniques to solve the real world problems

Prerequisites :	1	Data Structures
	2	Discrete Mathematics
	3	Engineering Mathematics
	4	Programming Concepts

Section – I

Unit-1	Divide and Conquer	
	What is algorithm, Algorithm Specification, Recurrence relations, Performance Analysis, Divide and Conquer: The General Method, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Analysis of Divide and Conquer algorithms Case Study 1.1 : Standard Performance Profiling Tools(prof, gprof)	9 Hrs
Unit-2	The Greedy Method	
	The General Method, Knapsack Problem, Job sequencing with deadlines, Minimum-Cost Spanning Trees – Prim's and Kruskal's Algorithms, Optimal Storage on tapes, Optimal Merge Patterns- Huffman code, Single Source Shortest Paths	8 Hrs
Unit-3	Dynamic Programming	
	The General Method, Multistage Graphs, All Pair Shortest Paths, Reliability design, Traveling Sales Person Problem	8 Hrs

Section – II

Unit-4	Basic Traversal and Search Techniques	
	Techniques for Binary Trees, Techniques for Graphs – Breadth First Search & Traversal, Depth First Search & Traversal and Spanning Trees	6 Hrs
Unit-5	Backtracking	
	The General Method, Sum of Subsets, n-queen problem, Hamiltonian Cycle	5 Hrs



	and Graph Coloring	
Unit-6	NP Hard and NP Complete	
	Basic Concepts, P, NP, NP-Complete, NP-Hard Problems, Introduction to NP Hard Graph Problems	3 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	2	1	-	-	1	-	-	-	-	-	2			
CO2	3	3	3	1	1	-	-	-	-	-	1	2			
CO3	2	2	2	3	-	-	1	-	-	-	-	1			

References	
Text Books :	
1	Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni, Sanguthevar Rajasekaran, 2 nd Edition, University Press
2	Introduction to Algorithms, Thomas Cormen, Charles Leiserson, Ronald Rivest, Clifford Stein, 3 rd Edition, PHI
Reference Books :	
1	Introduction to The Design and Analysis of Algorithms”, Anany Levitin, 3 rd Edition, Pearson.
2	Fundamentals of Algorithms Gilles Brassard, Paul Bratley Pearson Education
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.nptel.ac.in/noc22_cs71/preview [CMI]
2	https://onlinecourses.swayam2.ac.in/cec22_cs13/preview [UoK]
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://docs.oracle.com/cd/E19059-01/stud.10/819-0493/OtherTools.html
2	http://www.uniquecareer.in/computer-algorithm/ [TKIET]



CSE505 (OEC) - Linux Administration[Click Syllabus Structure](#)**Teaching Scheme****Lectures** : 2 Hrs/Week**Credits** : 2**Tutorials** : --**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To understand the basic functionality of Linux architecture and kernel
2	To understand administrating, configuring and upgrading the Linux System
3	To understand how to deal with Command Line Interface
4	To Manage User, groups and files permissions

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Explain the basic concepts, components of Linux such as Kernel	Remember
CO2	Understand the various network related Services	Understand
CO3	Perform essential Linux commands such as installation, searches and manipulating files.	Apply
CO4	Manage system storage by using partitions, logical volumes, physical volumes, ACLs	Apply

Course Description :

This course will actively engage students in task focused activities, lab-based knowledge checks, and facilitative discussions to ensure maximum skill transfer and retention

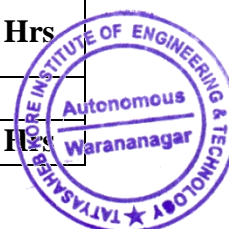
Prerequisites : 1 Operating System

Section – I

Unit-1	Introduction to Linux	3 Hrs
	Architecture, Kernel, difference between Linux and windows, introduction to various flavors of Linux	
Unit-2	User Administration and Managing Permissions	5 Hrs
	Create and delete user, Setting up password policy, resetting password, creating group and adding user in a group, applying set uid, set gid, sticky bit, ACL, change ownership of files and directories. Dealing with files and directory permissions	
Unit-3	Process Management & SSH	4 Hrs
	Monitoring Process, Working on server load, killing of the processes, SSH setup, generating keys	

Section – II

Unit-4	Package and Service Management	4 Hrs
	Installing, removing and reinstalling the packages, update and upgrade of packages, rollback Activity and Configuring Yum Server	
Unit-5	LVM and Network Management	4 Hrs
	What is LVM, need of LVM, Adding, removing logical volume, reduce and extend LVM, Network Services, Firewall management	
Unit-6	Introduction to Ansible: Automation Management Tool	5 Hrs
	Introduction, how to write playbook, YAML, Working on variable, loop,	



	hash loop, nested loop, tags and working on adhoc commands	
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Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	1	2	-	-	1	-	-	-	-	1	1			
CO2	2	3	1	-	-	-	-	1	-	-	-	-			
CO3	2	1	-	-	2	-	-	1	-	-	-	-			
CO4	2	3	2	2	2	-	-	1	-	-	-	1			

References

Text Books :

1 | Linux System administration - Tom Adelstein, Bill Lubanovic – O'reilly Media Inc

Reference Books :

1 | Red Hat Linux Administration Beginner's Guide - Michael Turner, Steve Shah



Teaching Scheme**Lectures** : 2 Hrs/Week**Credits** : 2**Tutorials** : --**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer network
2	To examine secure software development practice
3	To understand key terms and concepts in Information Technology Act
4	To incorporate approaches for incident analysis and response

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Explain the cyber security concepts	Remember
CO2	Describe the cyber security vulnerabilities and prevention techniques	Remember
CO3	Understand the different rules and regulations under I.T. Act	Understand
CO4	Analyze the concepts of digital forensics & incident management	Analyze

Course Description :

This Course is designed to understand the fundamentals of Information and Network security

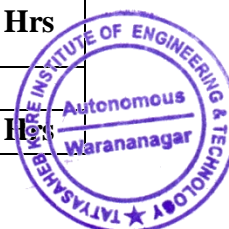
Prerequisites :	1	Fundamental knowledge of Data Communication
	2	Networking and Information Security

Section – I

Unit-1	Introduction to Computer Security	
	Introduction, Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches	2 Hrs
Unit-2	Cyber Stalking, Fraud, and Abuse	
	Introduction to Cyber Security, Cyber Stalking, Fraud, and Abuse: Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself Against Cyber Crime.	4 Hrs
Unit-3	Denial of Service Attacks and Malware	
	Introduction, DoS, Illustrating an Attack, Malware: Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack. The Sasser Virus/Buffer Overflow, Spyware, Other Forms of Malware, Detecting and Eliminating Viruses and Spyware	4 Hrs

Section – II

Unit-4	Techniques Used by Hackers	
	Introduction, Basic Terminology, The Reconnaissance Phase, Actual Attacks, Malware Creation, Penetration Testing	5 Hrs
Unit-5	The Legal Perspectives of Cyber Crime	
	Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario In India	5 Hrs
Unit-6	Introduction to Forensics	
	Introduction, General Guidelines, Finding Evidence on the PC, Finding	6 Hrs



	Evidence in System Logs , Getting Back Deleted Files, Operating System Utilities, Mobile Forensics: Cell Phone Concepts	
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Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	3	-	-	-	-	2	-	2	-	-	-	-	-	-	-
CO2	1	-	-	2	2	2	-	1	-	1		1			
CO3	2		2	1		2	1	2	1	-	-	1			
CO4	1	2	2	1	2	1		1	-	-	-	2			

References	
Text Books :	
1	Computer Security Fundamentals - Chuck Easttom, Pearson, Third edition(Unit I to IV & VI)
2	Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.(Unit V)
Reference Books :	
1	Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014
2	Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3	Handbook of Applied Cryptography - Menezes, an Oorschot, and S.A. Vanstone
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.swayam2.ac.in/cec22_cs21/preview [AIHSHEW, Coimbatore]
2	https://onlinecourses.swayam2.ac.in/nou22_ge67/preview [DBAOU,Gujrat]
3	https://onlinecourses.swayam2.ac.in/nou22_cs07/preview [UOU,Haldwani]



Teaching Scheme**Tutorials** : 1 Hr/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks**Term Work & Tutorial**

It should consist of minimum 10-12 assignments based on following guidelines

1	A batch of students will be assigned different algorithms and expected to analyze the algorithms in terms of time and space complexity
2	Solve different exercise problems in text book mentioned in syllabus
3	Student need to perform at least 6 programs from the syllabus. Perform Priori Analysis and Posteriori Measurement on the same



Teaching Scheme**Tutorials** : 1 Hr/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

List of Assignments	
Assignment -1	Installation of Red Hat Linux.
Assignment -2	Creation of Users, Groups, Delete user and Groups.
Assignment -3	Managing file Ownership and Permissions.
Assignment -4	Installation of various Packages and Service using RPM Repository.
Assignment -5	Create, Delete, Extend Large Volume Management.
Assignment -6	Applying Sticky Bit and ACL to Files and Directories.
Assignment -7	Install and Configure YUM Server.
Assignment -8	Install and Configure SSH using Putty, Mobaxterm.
Assignment -9	Write simple playbook for install, restart and remove packages using Ansible Automation Tool.
Assignment -10	Write a sample Playbook using various loops (Simple, nested and Hash)



Teaching Scheme**Tutorials** : 1 Hr/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks**Term Work & Tutorial**

It should consist of minimum 8-10 assignments based on following guidelines

1	Enlisting Indian Information Technology Act and Cyber crime scenario
2	Faculty can conduct additional relevant tutorials related to subject



Teaching Scheme**Practical** : 2 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks**ESE(OE)** : 50 Marks

Sr. No.	Experiment	Bloom's Taxonomy
1	Study of LEX and YACC	Understand
2	Write Lex Program to Identify and Count Number of Vowels and Consonants From a Given Input String	Apply
3	Write a Lex Program to Identify Letter and Word From a Given Input String	Apply
4	Write a Lex Program to Identify Positive Number, Negative Number, Positive Fraction Number and Negative Fraction Number From a Given Input String	Apply
5	Write a Lex Program to Convert Printf and Scanf Statements into Write and Read using File Handling Concept.	Apply
6	Write a Lex Program to Identify Positive Number, Negative Number, Positive Fraction Number and Negative Fraction Number Using File Handling Concept.	Apply
7	Write a Lex Program to Identify Special Characters, Arithmetic Operators, and Digits From a Given Input String	Apply
8	Write a YACC Program to Convert Infix to Postfix Expression.	Apply
9	Write a YACC Program to Check Whether the Given Input String is Palindrome or Not.	Apply
10	Write a YACC Program to implement a Calculator and Recognize a Valid Arithmetic Expression.	Apply
11	Study of LEX and YACC	Understand
12	Write Lex Program to Identify and Count Number of Vowels and Consonants From a Given Input String	Apply



Teaching Scheme**Practical** : 2 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks**ESE(OE)** : 50 Marks

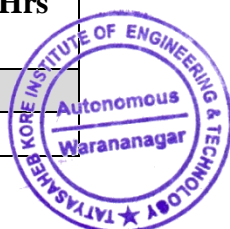
Sr.No.	Experiment	Bloom's Taxonomy
1	Installing, partitioning, and configuring GNU/Linux OS distribution	Understand & Apply
2	Essential Linux/Unix commands (a) General Purpose Utilities (b) File System (file handling) Commands (c) Directory related commands (d) Process control commands (e) Text Processing commands (f) Filtering using Regular Expression (g) Networking Commands	Apply
3	Implementation of various operations on Files (creat, open, read, write, append, fstat, dup)	Apply
4	Implementation of various system call (OPEN,READ,WRITE)	Apply
5	Study and implementation of pipe() system call (Reading and Writing through Named and Unnamed Pipe)	Apply
6	Signal Handling	Apply
7	Use of fork() and exec()	Apply
8	Shell Scripting Scenario 1	Apply
9	Shell Scripting Scenario 2	Apply
10	Shell Scripting Scenario 3	Apply



Teaching Scheme**Lectures** : 2 Hrs/Week**Practical** : 4 Hrs/Week**Credits** : 4**Evaluation Scheme****ISA** : 50 Marks**ESE(POE)** : 50 Marks

Course Objective : The objective of this course is		
1	To learn and understand Python programming basics and paradigm	
2	To learn and understand python looping, control statements and string manipulations	
3	To acquire Object Oriented Programming skills and concepts of file handling, exception handling and database connectivity	
4	To learn various data analysis and visualization techniques	
Course Outcomes :		
COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	To recall concepts of Python programming Language in problem solving scenario	Remember
CO2	Utilize of key concepts in the file handling, string handling, exception handling of strings and functions	Apply
CO3	To adapt object oriented concepts in various real time problems	Apply
CO4	To build different visualization patterns using various Python libraries /packages	Apply

Course Description :		
This course is designed to understand the fundamentals of python programming language		
Prerequisites :	1	Basic Programming skills in C and C++
Section – I		
Unit-1	Introduction to Python Programming	
	Basics of Python Programming: Features of Python, History and Future of Python, Writing and executing Python program, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions Decision Control Systems: Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements. Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop. Nested loops, The break, continue, pass, else statement used with loops	5 Hrs
Unit-2	Functions & Modules	
	Definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.	3 Hrs
Unit-3	Python Strings & Data Structures	
	Python Strings: Concatenating, appending & multiplying strings, built in string functions, slicing, comparing strings Data Structures: Sequence, Lists, Tuples, Set, Dictionaries	6 Hrs
Section – II		
Unit-4	Classes	

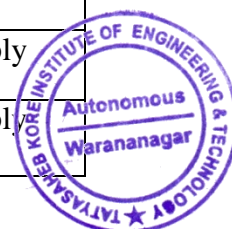


	Creating and Using a Class, Working with Classes and Instances, Inheritance & Polymorphism	3 Hrs
Unit-5	Exception Handling & File handling	
	Exception Handling: Introduction to Errors & Exceptions, handling exceptions, multiple except blocks. File Handling: Introduction, File path, Types of files, Opening and Closing files, Reading and Writing files	4 Hrs
Unit-6	Data Analysis & Visualization	
	Numpy: Creating Arrays, Array indexing, Array Slicing & Built-in Functions Pandas: Series, Framework, Built-in Functions of pandas Matplotlib: Plotting, marker, labels, grid, scatter, bars, histograms, pie charts	5 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	If applicable		
													PSO1	PSO2	PSO3
CO1	2	-	2		2				2	2		3			
CO2	2	-	-		2				2	1		3			
CO3	2		2		2				2	1		3			
CO4	2		2		2				2	1		3			

References		
Text Books :		
1	Python Programming Using Problem Solving Approach, Reema Thareja, Oxford University Press. Unit [1,2,3,4]	
2	Python Crash Course A Hands-On Project-Based Introduction to Programming, Eric Matthes. Unit [5,6]	
Reference Books :		
1	Core Python Programming, R. Nageswara Rao, Dreamtech Press; Second edition	
2	Learning Python, Romano Fabrizio, Packt Publishing Limited	
3	Head First Python- A Brain Friendly Guide, Paul Barry, SPD O'Reilly, 2nd Edition	
4	Python: The Complete Reference, Martin C. Brown, McGraw Hill Education	
Sr. No.	Experiment	Bloom's Taxonomy
1	[Basic] Handling of different data types and arithmetic operations	Apply
2	[Control Flow] Handling various loops, control statements	Apply
3	[Control Flow] Performing various operation on String (String Handling)	Apply
4	[Data Structure] Handling Python Data Structures	Apply
5	[File] Different File handling operations	Apply
6	[Functions] Concepts of function and its usage	Apply
7	[Object Oriented Programming] Concepts of constructor and Inheritance in Python	Apply



8	To demonstrate working of classes and objects b) To demonstrate constructors c) To demonstrate class method and static method	Apply
9	Concept of polymorphism in python (method overloading and overriding)	Apply
10	Concepts of Data Analysis and Visualization	Apply



Teaching Scheme**Lectures** : 1 Hr/Week**Tutorials** : 1 Hr/Week**Credits** : 3**Evaluation Scheme****ISA** : 25 Marks**Audit Point** : 25 Marks**Course Objective :** The objective of this course is

1	Increase their knowledge of key business concepts worldwide
2	Write and read basic business reports, letters, e-mails etc
3	Expand vocabulary related to general business situations
4	Develop confidence to deal with people and basic issues in the business world

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Learn to communicate with others in practical, business oriented situations	Apply
CO2	Learn to express themselves in English with greater fluency, accuracy and confidence	Understand
CO3	Learn to handle themselves in English in a variety of business contexts, from negotiating, to using the telephone, to making presentations, to socializing	Understand
CO4	Enhance the skills of listening, speaking, pronunciation skills, as well as business vocabulary	Understand
CO5	Acquire the communicative competencies crucial for appropriate workplace behavior	Apply

Course Description :

This course provides proficiency in various Business and Technical English aspects

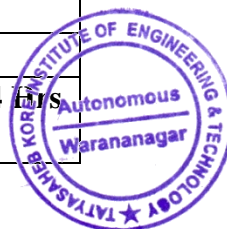
Prerequisites :	1	Knowledge of functional grammar and vocabulary in English
	2	Importance of business English in their career path
	3	Linguistic competence and understand intricacies involved in technical communication

Section – I

Unit-1	Getting acquainted with professional culture	
	First day at work, Induction program, Company hierarchy, Behaviour pruning	4 Hrs
Unit-2	Vocabulary building and Reading comprehension	
	Reading techniques and comprehension skills, Synonyms and antonyms, One-word substitution, Prefixes and Suffixes, Idioms and phrases, Homonyms and homographs, Irregular verbs like (write, wrote, written), Situational vocabulary	6 Hrs
Unit-3	Effective Vocal Communication	
	Effective Meetings, Video Conferencing, Effective Telephonic Communication, Breaking Bad news	4 Hrs

Section – II

Unit-4	Effective written Communication	
	Business letters, Resume Writing, E-mail writing, Report writing, Minutes of meeting, Speeches & Paragraph writing	6 Hrs
Unit-5	Public speaking and Presentation Skills	
	Preparing and conducting presentation, Body language, Best practices to overcome stage fear, Interviewing and being interviewed	4 Hrs



Unit-6	Miscellaneous	
	Group Discussion, Handling Complaints, Negotiation Skills, Business Etiquettes, Team Work, Work Delegation	4 Hrs

List of Assignment

Sr.No.	Assignment
1	Case study of organizational hierarchy
2	Match the following on antonyms & synonyms
3	Irregular verb list (like choose, chose, chosen)
4	Word building by using prefixes suffixes (eg. ir-regular, im-possible)
5	Minutes of Meeting – writing
6	Report writing (any report)
7	Comprehension/paragraph writing
8	Business letter / resume writing / email writing
9	PPT presentation on any non-technical topic. PPT handout should be attached
10	Do's & Don'ts of group discussion & Business etiquettes

References

Text Books :

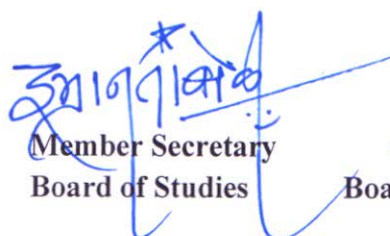
1	Technical Communication, Ashraf Rizvi, Tata McGraw Hill, 2005 (I,II,III,IV,VI)
2	Effective Business Communication, M. V Rodriques, Concept Publishing Company Pvt. Ltd. 2013 (I,II,III,IV,VI)
3	English for Technical Communication, K. R. Laxminarayan, SCITECH, 2nd Edition, 2014 (II,III,IV)
4	Technical English, Dr. M. Hemamalini, Wiley, 2014 (II,III,IV,V)
5	Business English, T. Thomson, Heinle & Heinle, 2004 (I,III,V,VI)


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1	https://onlinecourses.swayam2.ac.in/nou22_cm21/preview [IGNOU, New Delhi]
2	https://onlinecourses.swayam2.ac.in/nou22_lb28/preview [IGNOU, New Delhi]


Term Work & Tutorial

1	Individual Performance or Presentation to be Evaluated Continuously
2	Group Activity Performance evaluated in batch. Assignments or Write up (Minimum 10)


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