



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 - VI
Detailed Syllabus



Course Code	Category	Course Title	Teaching and Credit Scheme					Examination & Evaluation Scheme			
			L	T	P	CH	C	Component	Marks	Min for Passing	
CSE601	PCC	Database Engineering	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE602	PCC	Advanced Computer Architecture	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE603	PCC	Machine Learning	3	--	--	3	3	ESE	60	24	40
								ISE	40	16	
CSE604	PEC	Information Security	3	--	--	3	3	ESE	60	24	40
CSE605		Software Testing and Quality Assurance						ISE	40	16	
CSE606	OEC	Free and Open Source Software	2	--	--	2	2	ESE	60	24	40
CSE607		Internet of Things						ISE	40	16	
CSE604T	PEC	Information Security	--	1	--	1	1	ISA	25	10	
CSE605T		Software Testing and Quality Assurance									
CSE606T	OEC	Free and Open Source Software	--	1	--	1	1	ISA	25	10	
CSE607T		Internet of Things									
CSE601P	PCC	Database Engineering Lab	--	--	2	2	1	ESE(POE)	50	20	30
								ISA	25	10	
CSE603P	PCC	Machine Learning Lab	--	--	2	2	1	ISA	25	10	
CSE608P	PCC	Java Programming	2	--	4	6	4	ESE(POE)	50	20	30
								ISA	25	10	
CSE609P	PW	Mini Project – II	--	--	2	2	1	ESE(OE)	50	20	30
								ISA	25	10	
CSE610A		Audit Course – VI Extra Co-curricular Activity	--	--	--	--	--	--			
TOTAL			16	2	10	28	23	--	800	--	



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

1	To understand fundamental concepts and algorithms of Database Systems
2	To familiarize students with SQL and DBMS
3	To learn database design techniques

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Describe the fundamentals of database management systems	Understand
CO2	Design appropriate database for a given problem	Create
CO3	Write SQL queries to design & manage the database	Apply
CO4	Illustrate Transactions, Concurrency and Recovery apply to database system	Understand

Course Description :

This Course is designed to understand the internals of Database System, with elaboration from Database Design, Using Relational Database (using SQL) and the transaction concepts

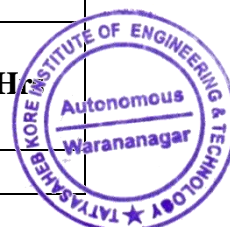
Prerequisites :	1	Set Theory
	2	Operating System
	3	Data Structures

Section – I

Unit-1	Introduction to Databases	6 Hrs
	Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Specialty Databases, Database Users & Administrators, Structure of Relational Databases, Database Schema, Keys, Relational Query Languages, Relational Operations	
Unit-2	Database Design	7 Hrs
	2.1 E-R Model: The Entity-Relationship Model, Constraints, Entity-Relationship Diagrams, Reduction to Relational Schemas 2.2 Normalization: Data Redundancies & Update Anomalies, Functional Dependencies, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form	
Unit-3	Structured Query Language (SQL)	6 Hrs
	Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Aggregate Functions, and Nested sub Queries, Modification of Databases	

Section – II

Unit-4	Data Storage & Indexing	7 Hrs
	File Organization, Organization of records in File, Data Dictionary Storage, Basic Concepts indexing & hashing, Ordered Indices, B+ Tree Index files, Static Hashing	
Unit-5	Transaction Management	



	Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Lock-Based Protocols, Deadlock Handling, Timestamp-Based Protocols, Validation-Based Protocols	7 Hrs
Unit-6	Recovery System	
	Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Failure with Loss of Non-volatile Storage, Remote Backup Systems	6 Hrs

Mapping of POs & COs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	If applicable		
													PSO 1	PSO 2	PSO 3
CO1	2		2	-	-	-	-	-	-	-	-	1			
CO2	2	3	2	-	-	-	-	-	-	-	-	-			
CO3		1	1	3	-	-	-	-	-	-	-	-			
CO4	1		1		2	-	-	-	-	-	-	-			

References

Text Books :

1	Database System Concepts, A. Silberschatz, H.F. Korth, S. Sudarshan, 6th Edition, Mc Graw Hill Education [for Unit No. I, 2.1, III,IV,V,VI]
2	Database Systems - A practical approach to Design, Implementation and Management Thomas Connolly, Carolyn Begg, 3rd Edition, Pearson Education [for Unit No. II, 2.2]

Reference Books :

1	Database Systems – Design, Implementation and Management, Rob & Coronel 5th Edition, Thomson Course Technology
2	Fundamentals of Database Systems, Ramez Elmasri, Shamkant B. Navathe, 4th Edition, Pearson Education

SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)

1	https://nptel.ac.in/courses/106105175 [IIT, Kharagpur]
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Teaching Scheme**Lectures** : 3 Hrs/Week**Credits** : 3**Evaluation Scheme****ISE** : 40 Marks**ESE** : 60 Marks**Course Objective :** The objective of this course is

1	To provide knowledge of computer various architecture designs
2	To provide knowledge of hardware-based techniques for exploiting available parallelism
3	To introduce memory organizations and its optimization
4	To introduce knowledge used for building high performance multiprocessor systems

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Describe the different concepts of computer architecture	Remember
CO2	State common GPU programming models and architectures	Remember
CO3	Understand the various techniques to enhance a processors ability to utilize data level parallelism	Understand
CO4	Identify the significance of parallelism available at different level in both uniprocessor and multiprocessor architectures	Apply

Course Description :

This course will introduce students to advanced aspects of processor architecture and specifically focus on Pipeline Computers, Array Processors, GPU, and Multiprocessor architectures.

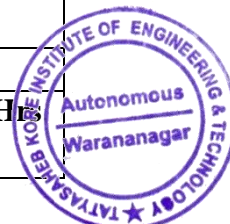
Prerequisites :	1	Digital systems and microprocessors, computer organization and architectures, Operating Systems
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Section – I

Unit-1	The Concept of Computer Architecture and Fundamentals of Quantitative Design and Analysis	
	Parallel Processing Mechanisms, Parallel Computer Structures: Pipeline Computers, Array Processors, Multiprocessor Systems, Architectural classification Schemes: Multiplicity of Instruction-Data Streams	07 Hrs
Unit-2	Principles of Pipeline	
	Principles of linear pipeline, Classification of Pipelined Processors, Interleaved memory organization, Hazard detection and resolution, Basic compiler Techniques for Exposing ILP	06 Hrs
Unit-3	Memory Hierarchy Design	
	Introduction, Ten Advanced optimizations of cache performance	05 Hrs

Section – II

Unit-4	Data Level Parallelism in Vector and SIMD	
	Vector Processing requirement: Characteristics of vector processing, Multiple vector Task dispatching, Pipelined vector processing methods, Associative Array Processing: Associative Memory Organization, Associative processors (PEPE and STARAN), Data Level Parallel in Vector: Introduction, Vector Architecture	07 Hrs
Unit-5	Data Level Parallelism in SIMD and GPU Architecture	
	SIMD ARRAY PROCESSORS: SIMD Computer organization, Masking and Data Routing Mechanism, SIMD Instruction set extension for	07 Hrs



	Multimedia, Graphics Processing Units : Programming the GPU, NVIDIA GPU Computational structures, NVIDIA GPU Instruction set Architecture, Conditional Branching in GPU, NVIDIA GPU Memory Structure	
Unit-6	Multiprocessor Architecture Introduction, Multiprocessor Architecture: Issues and Approach, Challenges of parallel processing, Centralized shared memory Architecture: Multiprocessors, Cache coherence, Basic schemes for enforcing coherence, Snooping Coherence Protocols, Distributed shared memory and directory based coherence, Directory Based cache coherence protocol	07 Hrs

Mapping of POs & COs:

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

References	
Text Books :	
1	Computer Architecture and Parallel Processing- Kai Hwang and Faye A Briggs (Tata McGraw-Hill)
2	Computer Architecture: A Quantitative Approach- John L. Hennessy and David A. Patterson (Morgan Kaufmann)
Reference Books :	
1	Advanced Computer Architecture- Kai Hwang & Naresh Jotwani (McGraw Hill)
2	Advanced Computer Architecture- Dezső Sima, Terence Fountain & Peter Kacsuk (Pearson Education)
3	Parallel Programming Techniques & Applications using Networked Workstations & Parallel Computers- Barry Wilkinson & Michael Allen (Pearson Education)



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 the fundamentals of Machine Learning
2	To Understand various Machine Learning Algorithms
3	To expose students to real world problems where machine learning can provide solutions

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Analyze and Implement Regression techniques	Analyze
CO2	Design and Implement solutions for Classification problem	Design
CO3	Understand and Apply Unsupervised learning algorithms	Understand

Course Description :

This course specifically make student able to learn algorithms used in machine learning techniques for solving real world problems and developing new applications based on Machine Learning

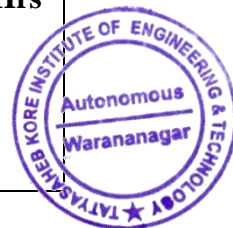
Prerequisites :	1	Basics of computer science including algorithms, data structure, Basic Linear algebra and Probability theory
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Section – I

Unit-1	Introduction to Machine Learning	06 Hrs
	Introduction to Machine Learning Process, Data Visualization: Line Chart, Bar Chart, Pie Chart, Histograms, Scatter Plots, Box Plots	
Unit-2	Regression	06 Hrs
	Simple Regression, Multiple Regression, Model assessment, Non-Parametric Regression: K-Nearest Neighbor Regression, Kernel Regression	
Unit-3	Classification	06 Hrs
	Linear Classifiers, Logistic regression, Decision Tress: Tree Terminology, Decision Tree Learning, Decision Boundaries.	

Section – II

Unit-4	UnSupervised Learning	06 Hrs
	Difference between Supervised and Un Supervised Learning, Clustering, K Means Clustering: Problem with Random assignment of Cluster centroid, Finding value of K, Hierarchical Clustering: Distance Matrices, Linkage	
Unit-5	Text Analysis	06 Hrs
	Basic Text Processing with Python, Regular Expression, Natural Language Processing, Text Classification.	
Unit-6	Neural Network and Recommendation System	09 Hrs
	Vectorization, Neural Network: Gradient Descent, Activation function, Parameter Initialization, Optimizer, Loss Function. Recommendation System: Popularity based Recommender Engines, Content Based Recommendation Engine, and Classification Based Recommendation Engine.	



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			
CO2	2	3	2	-	1	-	-	-	-	-	-	-			
CO3	-	1	1	3	-	-	-	-	-	-	-	-			

References

Text Books :

- 1 Machine Learning with Python- An Approach to Applied ML, by Abhishek Vijayvargia, (First Ed.) BPB Publication

Reference Books :

- 1 Machine Learning (McGraw-Hill International Editions Computer Science Series) by Tom M. Mitchell
- 2 Machine Learning Using Python, Manaranjan Pradhan and U Dinesh Kumar.(First Edition: 2019) WILEY

SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)

- 1 https://onlinecourses.nptel.ac.in/noc20_cs29/preview [IIT 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	Explain different types of symmetric and asymmetric security techniques
2	Compare different types of cryptographic algorithms to ensure data integrity
3	Explain different types of security protocols in TCP/IP protocol suite
4	Understanding different types of security threats for computer system

Course Outcomes :

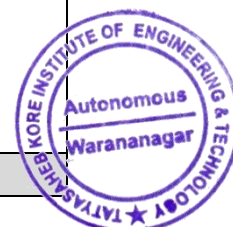
COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Explain the use of Cryptographic algorithms to ensure data protection and integrity	Remember
CO2	Illustrate the different Network and Internet security protocols in TCP/IP Stack	Understand
CO3	Apply the knowledge of cryptographic techniques to solve the problems on security	Apply
CO4	Analyze the security facilities designed to provide System security.	Analyze

Course Description :

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

Prerequisites : 1 Basic knowledge of Communication system**Section – I**

Unit-1	Classical Encryption Techniques	05 Hrs
	Overview – The OSI Security Architecture, Security Attacks, Services and Mechanism, A Model for Network Security, Symmetric Cipher Model Classical Encryption Techniques – Substitution Techniques, Transposition Techniques. Case Study 1.1: Perform Encryption and Decryption using crypt tool.	
Unit-2	Symmetric and Asymmetric Key Cryptography	07 Hrs
	Block Ciphers and the Data Encryption Standard: Block Cipher Structure, Data Encryption Standard (DES), A DES Example, Strength of DES, Block Cipher Design Principles. Public Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Other Public key Cryptosystems - Diffie-Hellman Key Exchange.	
Unit-3	Cryptographic Authentication Functions	08 Hrs
	Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA) Message Authentication Code: Message Authentication Requirements, Message Authentication Functions, Requirements for MAC and Security of MACs, MACs Based on Hash Functions. Digital Signatures: Digital Signatures, ElGamal Digital Signature Scheme, Schnorr Digital Signature Scheme, Digital Signature Standard (DSS) Case Study 3.1: Working of Digital signature software tool Sign server	

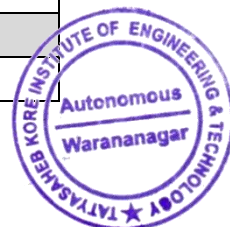
Section – II

Unit-4	Key Management and User Authentication	
	Key management : Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key ,Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public Key Infrastructure. User Authentication Protocol: Remote User-Authentication Principles, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User Authentication Using Asymmetric Encryption	07 Hrs
Unit-5	Internet Security Protocols	
	Transport-Level Security : Web Security Issues, Secure Sockets Layer (SSL), Transport Layer Security(TLS), SSH. Electronic Mail Security: Pretty Good Privacy (PGP), SET. IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload. Case Study 5.1: Perform surveillance through packet sniffer tool like Wireshark & TCP Dump.	6 Hrs
Unit-6	System Security	
	Intruders: Intrusion Detection, Password Management. Malicious Software: Viruses and Related Threat, Countermeasures, DoS. Firewalls : Firewall Design Principles, Trusted Systems Case study 6.1: Run Online Scanners like Virus Total, Jotti and No VirusThanks	6 Hrs

Mapping of POs & COs:

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

References	
Text Books :	
1	Williams Stallings – Cryptography and Network Security Principles and Practices Pearson Education (LPE), 6th Edition (For Unit I to V)and 4th Edition(For Unit VI)
Reference Books :	
1	Cryptography & Network Security, B.A. Forouzan Mc Graw Hill
2	Cryptography and Network security, Atul Kahate (TMGH)
3	Handbook of Applied Cryptography, Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, CRC Press
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.swayam2.ac.in/cec22_cs15/preview [MGC,Kerala]



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 software testing and quality assurance as a fundamental component of software life cycle
2	To understand the fundamentals of software verification
3	To efficiently perform Testing & QA activities using modern software tools
4	To understand and compare testing web applications and desktop applications

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Understand fundamental component of software life cycle	Remember
CO2	Apply and use the modern software testing tools	Remember
CO3	Compare and analyze the web and desktop application testing	Understand
CO4	Explore newer software project assessment methods	Apply

Course Description :

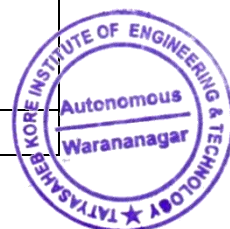
This course is designed to understand the fundamentals of software testing concepts

Prerequisites : 1 Software Engineering, Data Structures, OOPS concepts**Section – I**

Unit-1	Introduction	08 Hrs
	Some Software Failures, Testing Process, Some Terminologies, Limitations of Testing, The V Shaped software life cycle model	
Unit-2	Software Verification	06 Hrs
	Verification Methods, SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit Creating test cases from SRS and Use cases: Use Case Diagram and Use Cases, Generation of test cases from use cases, Guidelines for generating validity checks, strategies for data validity, Database testing	
Unit-3	Regression and Object oriented Testing	06 Hrs
	What is regression testing?, Regression Test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization techniques , Object oriented testing: What is Object orientation?, What is object oriented testing? Path testing, State based testing, Class testing.	

Section – II

Unit-4	Software Testing Tools	06 Hrs
	Selecting and Installing Software Testing tools, Automation and Testing Tools, Load Runner, Win runner and Rational Testing Tools, Silk test, Java Testing Tools Selenium – Advantages of Automation, Architecture, Locators, WebDriver Methods, Web Element Methods, ListBox, parameterization, Screenshot, Action Classes	
Unit-5	Testing Process	



	Seven Step Testing Process: Overview of the Software Testing Process, Organizing of Testing, Developing the Test Plan, Verification Testing, Validation Testing.	05 Hrs
Unit-6	Testing Web applications	05 Hrs
	What is web testing? Functional testing, UI testing, Usability testing, configurations and compatibility testing, security testing, performance testing, database testing, post deployment testing, web metrics. Automated Test data generation: Automated Test Data generation Approaches to test data generation, Test data generation tools	

Mapping of POs & COs:

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

References

Text Books :

1	Software Testing : Yogesh Singh, Cambridge University Press, First Edition (Unit-I,II,III,VI)
2	Effective Methods for Software Testing, William E. Perry, Third Edition, Wiley India, 2009 (Unit –IV,V)
3	Software Testing – Principles and Practices Naresh Chauhan, Oxford University Press, 2010 (Unit –IV)

Reference Books :

1	Foundations of Software testing: Aditya P. Mathur, Pearson, Second Edition
2	Software Testing : Ron Patton, Pearson (SAMS), Second Edition
3	Software Quality, Mordechai Ben Menachem, Garry S. Marliss, BS Publications



CSE606 (OEC) - Free and Open Source Software[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	Understand the concept and evolution of FOSS with examples
2	Realize the significance of FOSS Communities and the FOSS development process
3	Learning contemporary FOSS operating system and open cloud
4	Understand Open Source initiatives and FOSS adoption in India

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	To illustrate FOSS movement and philosophy of FOSS	Understand
CO2	To outline community based Software Development and FOSS Licenses	Understand
CO3	Installation, Configuration, and utilization of FOSS tools	Apply
CO4	To evaluate FOSS scenarios and initiatives in India	Evaluate

Course Description :

This course provides foundation of the history, key concepts, technologies and practices associated with modern free and open source software(FOSS)

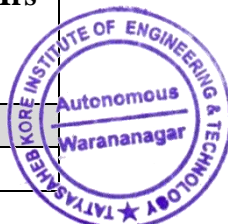
Prerequisites : 1 | Introductory knowledge of Operating System(Linux), Android

Section – I

Unit-1	An Introduction to OSS (Open Source Software)	04 Hrs
	Introduction, Need for an Open Source Applications, History, Meaning and Extraction of the Terms Free Software and Open Source Software, Free Software Foundation and Open Source Initiative Presentation, Security and Reliability, Economical Aspects and Adoption, Applications of OSS Case Study 1.1 : Any OSS in Computer Networks Case Study 1.2 : Any OSS for 3D Modeling and Animation Case Study 1.3 : Any OSS/platform for AI & ML Case Study 1.4 : FOSS in Chemical/Civil/CSE/Electronics/Mechanical Engineering (Listing, downloading, installation, configuration, utilization)	
Unit-2	Philosophy of Free and Open Source Software	04 Hrs
	Notion of community, guidelines for effectively working with FOSS community, benefits of community based software development, FOSS licensing models, copyleft movement, popular FOSS licenses (GPL, LGPL, BSD, etc.), implications of FOSS license for developer and user.	
Unit-3	Introduction to Linux	07 Hrs
	Introduction, Kernel/User Mode, Process, Advanced Concept-Scheduling, Personalities, Cloning, Signals, Development with Linux, Library Functions and System Calls, System Calls when working with Files and Directories (OPEN, READ, WRITE, CLOSE, LSEEK, LINK, UNLINK, CHMOD, EXIT) System Calls Vs. Library Functions	

Section – II

Unit-4 | **Android**



	Introduction, Open Source Android Platform, History, Android Architecture, Features of Android Architecture, Android Versions, DVM, Android Virtual Device or Emulator (AVD), File System Hierarchy, Building APK Expansion Files. Case Study 4.1 : Android Sample/Basic Apps	05 Hrs
Unit-5	Open Source Cloud	
	Introduction, FOSS Cloud Software Environments, Eucalyptus, Open Nebula, Open Stack	04 Hrs
Unit-6	Open Source Initiatives in India	
	National Resource Center for FOSS (NRCFOSS), C-DAC Free/Open Source Software (eMulaZim, BOSS, EduBOSS), Free and Open Source Software Initiatives-Dept. of Electronics & Information Technology MEITY-FOSS Products (BOSS, EduBOSS, BOSS Server, Meghdoot, SwarSuchak, GEM, Anuman, ALVIC, Creative Computing at Schools, ILMS) Case Study 6.1 : BOSS Linux (Indigenous Operating System for India based on GNU/Linux)	03 Hrs

Mapping of POs & COs:

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

References

Text Books :

- 1 | Fundamentals of Open Source Software, M.N.Rao, PHI

Reference Books :

- 1 | Linux Labs and Open Source Technologies, Prof. Dayanand Ambawade, Deven Shah, Dreamtech Press

Reference Web Links (Operational Timestamp: Sat, 16-Jul-2022 on 7:00 AM)

- 1 | <https://www.gnu.org/philosophy/>
- 2 | <https://www.meity.gov.in/content/foss-products>



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 learn Internet of Things Technology
2	To know the basics of RFID, Sensor technologies
3	To know the basics of IoT systems like Raspberry Pi, Arduino, and Banana Pi
4	To aware students about wireless communication technologies and IoT applications

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	To understand basic concepts of IoT	Understand
CO2	To learn and implement RFID technology in various applications	Apply
CO3	To write programs for basic applications	Apply
CO4	To understand different communication technologies in IoT systems	Understand

Course Description :

This course provides understanding and insights of Internet of Things and its hardware

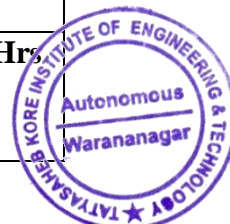
Prerequisites :	1	Fundamentals of Computer Network and Internet
	2	Basics of C / C++ programming language

Section – I

Unit-1	Introduction	04 Hrs
	IoT, Objects / Things, IoT definitions, IoT frame work, Identification technologies, Internet in IoTs	
Unit-2	Fundamental of IoT mechanisms	06 Hrs
	Identification of IoT objects and services, Traffic characteristics, scalability and interoperability, security and privacy, Communication capabilities, Mobility support and device power, Sensor technology, RFID technology and satellite technology	
Unit-3	Radio Frequency Identification Technology	06 Hrs
	RFID, IoT objects and services, principles of RFID, Components of an RFID system, RFID reader, Tags, middleware, Sensor nodes, connecting nodes, networking nodes.	

Section – II

Unit-4	IoT systems	08 Hrs
	Hardware and Software: Introduction to Raspberry Pi, Familiar with Raspberry Pi hardware, study of I/O ports, Programming with Raspberry Pi: Study of operating system, simple programs in C / C++, Introduction with Python programming.	
Unit-5	Communication Technologies	06 Hrs
	WPAN Technologies: Introduction to IEEE 802.15.4 standard, Bluetooth, Zigbee, IEEE 802.15.6; WBANS, NFC, IEEE 802.11 WLAN, Cellular and mobile technologies	



Unit-6	IoT Application Examples	
	Smart Metering, advanced metering infrastructure, e-health / Body Area Network, City Automation (Smart City), Automotive Application, Environmental Applications, Home Automation, Control Applications	06 Hrs

Mapping of POs & COs:

References	
Text Books :	
1	The Internet of Things - Connecting objects to the web, Hakima Chaouchi, Wiley Publications
2	Building the Internet of Things, Daniel Minoli, Wiley Publications
3	Raspberry Pi Beginner's Guide, Gareth Halfacree, Raspberry Pi Press
4	Introduction to Wireless Telecommunications systems and Networks, Gary J. Mullett, Cengage Learning (India Edition)
Reference Books :	
1	Raspberry Pi for Dummies, Sean McManus, Mike Cook, A Wiley Brand
2	Architecting the Internet of Things, Bernd Scholz, Reiter, Springer
SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)	
1	https://onlinecourses.nptel.ac.in/noc22_cs95/preview [IIT Kharagpur]
2	https://onlinecourses.nptel.ac.in/noc22_cs96/preview [IIT Kharagpur]
3	https://onlinecourses.swayam2.ac.in/arp20_ap03/preview [IIT, Patna]



Teaching Scheme**Tutorial** : 1 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

Tutorials should include the implementation and use of the following mechanisms / Algorithms / Tools /Techniques

1	Substitution/Transposition/ Product Cipher and their Analysis
2	Single round of DES algorithm
3	RSA Algorithm to provide Confidentiality and Authentication services or any other Public-Key Algorithm
4	Diffie–Hellman or any other key exchange Algorithm.
5	Implementation and use of any authentication functions / algorithm
6	Generation and use of Digital Signature for real world situation
7	Usage of PGP security package and S/MIME features
8	Demo and usage of network traffic analysis tools
9	Study of authentication mechanism in Kerberos



Teaching Scheme**Tutorial** : 1 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

- Minimum of 10 Tutorials to be done from the list given below.
- It should include the demonstration and use of the Tools /Techniques

1	Software Testing Process, its need and limitations
2	Verification at different phases of SDLC for particular case study (SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit etc.)
3	Creating test cases from SRS and Use cases for particular case study
4	Generation of validity checks for particular case study
5	Regression testing with Test cases selection / Regression testing with reducing the number of test cases / Regression testing with code coverage prioritization techniques
6	Generation of test cases using Path testing/ State based testing/Class testing for particular case Study
7	Measurement in Software Engineering
8	Software Metrics: Object oriented Metrics used in testing
9	Calculation of Software Quality attributes using different prediction models
10	Measurement of Internal / External Product Attributes
11	Generation of test cases in different key areas of Web application testing
12	Automated test data generation



Teaching Scheme**Tutorial** : 1 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

Student should refer below mentioned web resources and to complete following tutorials

<https://www.includehelp.com/foss/>

<https://fossee.in/>

1	Definition of Open Source and Free Software and essential software freedoms
2	Enlisting the FOSS operating systems, programming languages, software needed for each branch
3	Scenario of FOSS in India (Articles/Research Papers)
4	FOSS adoption strategy in India
5	CDAC BOSS Operating System



Teaching Scheme**Tutorial** : 1 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

Term Work & Tutorial	
1	Student should understand basics of IoT essentials
2	Basics of IoT hardware. Comparative study of available IoT components
3	Raspberry Pi (Configuration, installation, GPIO pins, ports)
4	Arduino (Configuration, installation, ports)
5	Basics Programming with Raspberry Pi and Arduino



Teaching Scheme

Practical : 2 Hrs/Week
Credits : 1

Evaluation Scheme

ISA : 25 Marks
ESE(POE) : 50 Marks

Practical		Bloom's Taxonomy
1	Draw an E-R Diagram of any organization.	Analyze
2	Reduce above mentioned E-R Diagram into tables	Analyze
3	Normalize any database from first normal form to Boyce-Codd Normal Form (BCNF)	Understand
4	Use DDL Queries to create, alter (add, modify, rename, drop) & drop Tables	Understand
5	Use DML Queries to insert, delete, update & display records of the tables.	Analyze
6	Create table with integrity constraints like primary key, check, not null and unique	Analyze
7	Create table with referential integrity constraints with foreign key, on delete cascade and on delete set null	Understand
8	Display the results of set operations like union, intersections & set difference.	Understand
9	Display the results of Join Operations like cross join, self join, inner join, natural join, left outer join, right outer join and full outer join.	Understand
10	Display the records using Aggregate functions like min, max, avg, sum & count. Also use group by, having clauses	Understand
11	Display the results using String operations.	Apply
12	Demonstrate use of SQL Sub Queries.	Apply
13	Create & Update views (materialized and non materialized) for any created table.	Apply
14	Create indices using SQL	Apply
15	Study of B+ tree indexing.	Apply



Teaching Scheme**Practical** : 2 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks

Practical		Bloom's Taxonomy
1	Scikit Learn Introduction and Installation What is Scikit Learn, Origin of Scikit, and Installation	Analyze
2	Modeling Process in ML Demonstrate the following using Boston House Prices Dataset. 1. Dataset loading. 2. Splitting the dataset and 3. Train the model.	Analyze
3	Data Representation in ML Demonstrate data as Table by downloading iris dataset in form of a panda's data frame with the help on python Seaborn library	Understand
4	Linear Regression Write a Python program to implement Simple Linear Regression. Select appropriate data set for your experiment and draw graphs.	Understand
5	Multiple Linear Regression Write a Python program to implement Multiple Linear Regression for House Price Prediction using sklearn.	Analyze
6	K- Nearest Neighbor Regression Write a Python program to implement k-Nearest Neighbor algorithm to classify the data from data set. Print both correct and wrong predictions	Analyze
7	Logistic Linear Regression Write a Python program to implement Logistic Linear Regression algorithm to classify the data from data set Select appropriate data set for your experiment and draw graphs	Understand
8	Decision Tree Learning Write a Python program to demonstrate the working of the decision tree. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample	Understand
9	K Means Clustering Write a Python program to demonstrate the working of the K Means clustering. Use an appropriate data set for building the decision tree and apply this knowledge to cluster a new sample	Understand
10	Neural Network Write a Python program to demonstrate a predictive system using Neural Network. Use an appropriate data set.	Understand & Apply



Teaching Scheme

Lectures : 2 Hrs/Week
Practical : 4 Hrs/Week
Credits : 4

Evaluation Scheme

ISA : 25 Marks
ESE(POE) : 50 Marks

Course Objective : The objective of this course is to

1	To introduce the concept of object oriented programming using java
2	To learn implementation of reliable and secure application using exception handling and package concept
3	To prepare student's ability to write program to perform file operations
4	To demonstrate designing components with Swing API and multithreading
5	To understand database connectivity through JDBC and learn the collection framework and explore the concept of networking

Course Outcomes :

COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Articulate the principles of object oriented programming.	Remember
CO2	Illustrate multithreading, code reusability, security and abstraction using inheritance, package and interface.	Understand
CO3	Develop reliable and user friendly applications using exception handling and file handling.	Apply
CO4	Create desktop applications using SWING and event handling.	Apply
CO5	Use JDBC & collection framework and network programming concept.	Apply

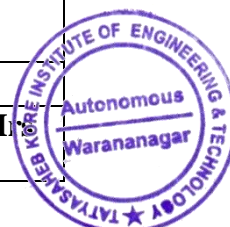
Course Description :

This Course is designed to understand the fundamentals of Object oriented programming concepts and different features of Java

Prerequisites :	1	Concepts of Object oriented programming
	2	Programming in C++

Section – I

Unit-1	Fundamental Programming in Java	
	Fundamental Programming in Java: The Java Buzzwords, The Java Programming Environment- JVM, JIT Compiler, Byte Code Concept, HotSpot, A Simple Java Program, Source File Declaration Rules, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays-Jagged Array. Objects and Classes: Object-Oriented Programming Concepts, Declaring Classes, Declaring Member Variables, Defining Methods, Constructor, Passing Information to a Method or a Constructor, Creating and using objects, Controlling Access to Class Members, Static Fields and Methods, this keyword, Object Cloning, Class Design Hints.	4 Hrs
Unit-2	Inheritance, Interface	
	Inheritance: Definition, Super classes, and Subclasses, Overriding and Hiding Methods, Polymorphism, Inheritance Hierarchies, Super keyword,	4 Hrs



	Final Classes and Methods, AbstractClasses and Methods, casting, Design Hints for Inheritance, Nested classes & Inner Classes, finalization and garbage collection. Interfaces: Defining an Interface, Implementing an Interface, Using an Interface as a Type, Evolving Interfaces, and Default Methods.	
Unit-3	Packages and Exception	
	Packages: Class importing, Creating a Package, Naming a Package, Using Package Members, Managing Source and Class Files. Developing and deploying (executable) Jar File. Exception: Definition, Dealing with Errors, The Classification of Exceptions, Declaring Checked Exceptions, Throw an Exception, Creating Exception Classes, Catching Exceptions, Catching Multiple Exceptions, Re-throwing and Chaining Exceptions, finally clause, Advantages of Exceptions, Tips for Using Exceptions.	4 Hrs
Section – II		
Unit-4	I/O Streams and Multithreading	
	I/O Streams: Byte Stream – Input Stream, Output Stream, DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, Character Streams, BufferedStream, Scanner, File, RandomAccessFile. Multithreading: Processes and Threads, Runnable Interface and Thread Class, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Thread States, Thread Properties, Joins, Synchronization	4 Hrs
Unit-5	Graphical User Interfaces using Swing and Collections	
	Graphical User Interfaces using Swing: Introduction to the Swing, Swing features, Swing Top Level Containers Creating a Frame, Positioning a Frame, Displaying Information in a Panel, The Model-View-Controller Design Pattern, The JComponent Class. Layout Management: Introduction to Layout Management, APIs for Border Layout, Flow Layout, Grid Layout Event Handling: Basics of Event Handling, The AWT Event Hierarchy, Semantic and Low-Level Events in the AWT, Low-Level Event Types. User Interface Components: Text Input, Choice Components, Menus, Dialog Boxes Setting the Look and Feel of UI, Introduction to JApplet. Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework, Lambda Expressions and Annotations	5 Hrs
Unit-6	Database Programming and Networking	
	Database Programming: The Design of JDBC, The Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Metadata, Row Sets, Transactions Networking: Overview of Networking, Networking Basics, Working with URLs, Creating a URL, Parsing a URL, Reading Directly from a URL, Connecting to a URL, Reading from and Writing to a URL Connection, Sockets, Reading from and Writing to a Socket, Writing the Server Side of a Socket, Datagrams, Writing a Datagram Client and Server	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		3	-	-	-	1	-	1	-	-			
CO2	-	2	2	-	2	-	-	1	-		-	-			
CO3	-	-	-	2	2	1	1	1	-	1	-	1			
CO4	2	2	3	-	2	-	-	1	-		1	1			
CO5	-	2	-	1		-	2	-	-	1	-	-			

References

Text Books :

1	Core Java- Volume I Fundamentals - Cay Horstmann and Gary Cornell, Pearson, Eight edition
2	JAVA-The Complete Reference - Herbert Schildt - McGraw Hill, Oracle Press Tenth edition

Reference Books :

1	Head First Java - Eric Freeman Elisabeth Robson Bert Bates Kathy Sierra - O'Reilly Publication - 3 rd edition
2	Core Java An Integrated Approach (Black Book) by Dr. R. Nageswara Rao
3	Programming with Java: A Primer by Balagurusamy 6 th Edition

SWAYAM Courses (Operational Timestamp: Sat,16-Jul-2022 on 7:00 AM)

1	https://onlinecourses.nptel.ac.in/noc22_cs47/preview [IIT Kharagpur]
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CSE609P (PW) – Mini Project-II[Click Syllabus Structure](#)**Teaching Scheme****Practical** : 2 Hrs/Week**Credits** : 1**Evaluation Scheme****ISA** : 25 Marks**ESE(OE)** : 50 Marks**Course Objective :** The objective of this course is to

1	To expose the students to solve the real-world problems
2	To utilize the techniques, skills and modern Engineering tools for building the mini project
3	To follow the methods and tasks as per SDLC Approach
4	To effectively demonstrate and present the ideas, methodology and technology used for the project

Course Outcomes :

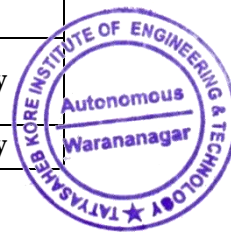
COs	At the end of successful completion of the course, the students will be able to	Bloom's Taxonomy
CO1	Define the problem statement by analyzing the gathered requirement	Understand
CO2	Design the various modules of proposed system and construct different kinds of diagrams	Analyze
CO3	Implement and test the solution for the proposed system	Apply
CO4	Effectively work in team and present the ideas, methodology and technology used for the project	Apply

Course Description :

Implementation of Mini Project using Programming Languages learned

Prerequisites :	1	Data Structures
	2	Data Structures Lab
	3	Problem Solving using C Programming
	4	Java

Activity		
Activity 1	Choosing your area of Mini Project Understand	Understand
	Students must choose the area to solve different kinds of problems	
Activity 2	Problem Identification	Apply
	Students must identify the problem to solve from chosen area	
Activity 3	Requirement elicitation	Understand
	Students must elicit the requirement for identified problem	
Activity 4	Design Methodology and Modeling	Analyze
	Students must determine the data structures and algorithms suitable to solve identified problem and build the required models	
Activity 5	Module Implementation	Apply
	Students must choose the technology and use it for implementation of functional modules	
Activity 6	Test Cases	Apply
	Students must prepare test cases for the testing the system	
Activity 7	System Integration	Apply



	Students must integrate the different functional modules to build whole system.	
Activity 8	Conclusion and Future Enhancement	Analyze
	Students must draw the conclusions and mention how system can be enhanced in future	
Activity-9	Mini Project Report Preparation	Apply
	Students must integrate the different functional modules to build whole system	
Activity-10	Final Presentation	Apply
	Students must present their mini project work in front of panel of examiner.	

Mapping of POs & COs:

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



CSE610A- Audit Course-VI[Click Syllabus Structure](#)**Teaching Scheme**

Practical : --
Credits : Non-Credit
Tutorials : --

Evaluation Scheme

ISE : 40 Marks

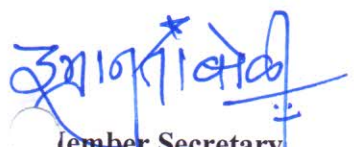
Audit Point : 2

Course Objective : The objective of this course is to


In today's highly competitive world, students have to bear a lot of mental stress to overcome from this they have to get involved in various extracurricular activities help us get mental rest and also stay physically fit. It helps students to maintain social interaction, healthy recreation, self-discipline and self-confidence. And it is very essential for students to succeed in their future career

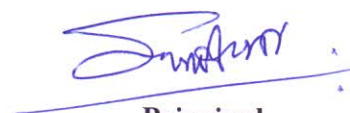
Course Particulars : Any one extracurricular activity participation

1	Sports Activity
2	Cultural Activity
3	Social Activity
4	NSS Participation etc.
5	(No semester bounding to Complete)


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TKIET, Warananagar


Principal
TKIET, Warananagar



Seal of the Institute