

Sardar Patel Institute of Technology

(Autonomous Institute Affiliated to University of Mumbai)



Bachelor of Engineering/Technology (B.E./B.Tech)

in

Information Technology

Third Year Engineering

(Sem. V and Sem. VI)

Effective from Academic Year 2017 -18



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

Preamble:



Concept of academic autonomy is based on the argument that Institutions can undertake the work expected of them by all stakeholders such as Students , Parents , University , Industry , Society in general, only if they have freedom of choice and action.

We at S.P.I.T. would like to believe that this freedom of choice and action as far as academics is concerned will make us more Proactive in our offerings.

An academic autonomy is as good as its Curricula and execution of it is as well as its faculty. S.P.I.T. is confident of succeeding on both the fronts.

In the first offering we have tried to pro-actively bridge the ever discussed “Industry-academic gap” by way of our SCOPE program. The issue about sensitizing students to social needs is being addressed by special activity based courses. Liberal arts courses have been introduced to enhance functionality of both sides of brain. In all this the professional core has not been overlooked. Thus the curricula are designed to achieve multi dimensional outcomes.

The evaluation mechanism is tuned for assessing the attainment of the designed outcomes and is designed as a fair mechanism.

As our learning cycle begins from July 2017, I wish to place on record that entire S.P.I.T. staff and faculty will work with singular focus and commitment towards the success of this endeavour.

Dr. Prachi Gharpure
Principal, S.P.I.T.



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From the Desk of Dean Academics



Greetings and congratulations to all the students, teaching and supporting staff of Sardar Patel Institute of Technology for getting autonomous status to the institute from the year 2017-18. We look towards autonomy as a great opportunity to design and implement curriculum sensitive to needs of Indian Society and Industries.

In the proposed curriculum we have made an attempt to provide opportunity for students to develop themselves as competent engineering graduates with knowledge, skill and ethical behavior required for global career. Curriculum is designed to provide multiple learning opportunities for students to acquire and demonstrate competencies for rewarding careers. The curriculum model is outcome based that focuses on learning by doing. This is achieved through activity based learning, minor projects, problem solving and innovative styles of pedagogy. Various steps are taken to transform teaching-learning process to make learning a joyful experience for students. Special laboratory based courses are introduced to give more practical exposure to the students.

To create socially responsible citizen curriculum offers courses like Constitution of India, Environmental Studies and Human Health Systems Approach. Also various activity based learning modules like 'Building Automation, Fire Safety and Electronic Security', 'Occupational Safety & Legal Studies for Engineers', 'Technical Presentation Skills', 'Technical Paper and Patent Drafting', 'Engineering Solution for Environmental Problems' and 'Financial Planning, Taxation Policies and Investment' are introduced. For overall development of the learner, various elective courses like Yoga Vidya, Music Appreciation, Dramatics, Industrial and Organizational Psychology, Law for Engineers, French Language, German Language etc. are introduced. To encourage interdisciplinary studies institute level Open Elective courses are offered.

One of the special feature of this curriculum is Skill development programme called SCOPE (Skill Certification for Outcome-Based Professional Education) planned to enhance employability, innovation and research culture in the institute. Every department is offering six domain specific tracks, each track containing six courses. Student will have an opportunity to enroll for more than 140 courses in any of the department of his choice. Some of the courses under SCOPE will be delivered in co-ordination with industries.

We believe that this curriculum will raise the bar of academic standards with the active involvement and cooperation from students, academic and administrative units. Faculty of S.P.I.T. deserves a special appreciation for their relentless efforts in designing curriculum and assessment instruments which will bring transformation in the quality and transparency in assessment of learners.

Looking forward for your active cooperation and constructive feedback to create vibrant and joyful learning environment at Sardar Patel Institute of Technology.

Dr. Surendra Singh Rathod
Professor and Dean Academics



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Message from Head of the Department



Change is the only constant thing in the Information Technology arena. In order to adapt to those changes curriculum design needs to be holistic. Curriculum comprising of Basic Science and Engineering, Professional core and electives are essential. Apart from this, knowledge of other multi-disciplinary domains give a broad outlook. Contemporary issues can have innovative solutions if the problems are seen in different perspectives. Hence open elective courses, liberal arts, legal, ethical practices are included as mandatory courses. To bridge the gap between industry and academia skill development courses are introduced.

Information Technology Curriculum follows the five pillars suggested by ACM as basic streams in our Professional core and electives with strong Information Technology foundation courses. Programming, Networking, Human Computer Interaction, Databases and Web systems are the pillars, all under the umbrella of Information assurance and security.

Dr. Radha Shankarmani

Head of Information Technology Department



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Scheme for B.E./B.Tech. Information Technology (SEM. V & VI)

SEM. V					
Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits
		L	T	P	Total
TEITC501	Computer Graphics And Virtual Reality	4	--	--	4
TEITC502	Operating Systems	4	--	--	4
TEITC503	Microcontroller and Embedded Systems	4	--	--	4
TEITC504	Advanced Database Management Systems	4	--	--	4
TEITC505	Open Source Technologies	3	--	--	3
TEITC506	Business Communication & Ethics *	--	--	2**+2	2
TEITL501	Computer Graphics And Virtual Reality	--	--	2	1
TEITL502	Operating Systems	--	--	2	1
TEITL503	Micro-controller and Embedded System	--	--	2	1
TEITL504	Advanced Database Management Systems	--	--	2	1
TEITL505	Open Source Technologies	--	--	2	1
Total		19	--	12	26

* Common for all programs.

** Theory class to be conducted for entire class.



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SEM. VI					
Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Total
		L	T	P	
TEITC601	Software Engineering	4	--	--	4
TEITC602	Distributed Systems	4	--	--	4
TEITC603	System And Web Security	4	--	--	4
TEITC604	Data Mining & Business Intelligence	4	--	--	4
TEITC605	Advanced Internet Technology	4	--	--	4
TEITL601	Software Engineering	--	--	2	1
TEITL602	Distributed Systems	--	--	2	1
TEITL603	System and Web Security	--	--	2	1
TEITL604	Data Mining and Business Intelligence	--	--	2	1
TEITL605	Advance Internet Technology	--	--	2	1
	Total	20	--	10	25



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Semester V



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC501	Computer Graphics And Virtual Reality	4	-	2	4	-	1	5
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Identify and demonstrate display primitives: point, line, circle and curves.
	CO2 Demonstrate clip portion that are not of immediate interest.
	CO3 Represent two and three-dimensional objects and projection.
	CO4 Illustrate the fundamentals of animations and virtual reality.
	CO5 Illustrate the various technologies and modeling techniques used in Virtual Reality.

Module No.	Topics	Ref.	Hrs.
1	Introduction to Computer graphics and Output primitives: Introduction, Display Devices, Bitmap and Vector based graphics, Overview of Coordinate system, Scan Conversion of: point, line using Digital differential analyzer & Bresenham's algorithm, circle using midpoint approach, Curve Generation : Bezier and B-Spline curves. Introduction to fractals: generation procedure, classification, dimension and Koch Curve	1,2	10
2	Area Filling and Two Dimensional Transformations: Area filling: Inside/Outside Test, Scan line Polygon Fill Algorithm, Boundary Fill and Flood Fill algorithm. Basic Geometrical 2D transformations: Translation, Rotation, Scaling, Reflection, Shear, their homogeneous Matrix representation and Composite transformation.	1,2	8
3	Two Dimensional Viewing: Introduction, Viewing Pipeline, View Coordinate reference frame, Window to viewport transformation, Point clipping, Line Clipping: Cohen Sutherland Algorithm, Liang Barsky algorithms, Polygon clipping: Sutherland Hodgeman polygon clipping and Weiler Atherton. Text Clipping.	1,2	6
4	Three Dimensional Transformation, Viewing and Projection: Three Dimensional transformations: Translation, Scaling, Rotations, Composite. Three Dimensional object representation: Polygon Surfaces, Tables, Meshes. Three Dimensional Viewing Pipeline, Viewing transformation,	1,2	6



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	Projections : Parallel(Oblique and orthographic), Perspective (one Point)		
5	Introduction to Animation Key Frame Animation, Animation Sequence, Motion Control Methods, Morphing, Warping(only Mesh Warping).	2	2
6	Introduction to Virtual Reality Virtual Reality : Basic Concepts , Classical Components of VR System , Types of VR Systems, Three Dimensional Position Trackers, Navigation and Manipulation Interfaces, Gesture, Interfaces, Graphical Display, Sound displays, and Haptic Feedback . Input Devices , Graphical Rendering Pipelin , Haptic Rendering Pipeline, Open GL rendering pipeline. Applications of Virtual Reality.	2	8
7	Modeling Geometric Modeling: Virtual Object Shape, Object Visual Appearance. Kinematics Modeling: Object Position, Transformation Invariants, Object Hierarchies, Physical Modeling: Collision Detection, Surface Deformation, Force Computation. Behavior Modeling.	2	4
8	Introduction to VR programming Introduction , Programming through VRML :Defining and Using Nodes and Shapes , VRML Browsers , Java 3D :Visual Object Definition by Shape 3D instances , Defining personal visual object class, ColorCube Class, Geometric – Utility Classes, Geometry Classes , Attributes.	2	4
	Total hours of instructions		48

References:

1. Donald Hearn and M. Pauline Baker, “*Computer Graphics*”, Pearson Education.
2. R. K Maurya, “*Computer Graphics with Virtual Reality*”, Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC502	Operating Systems	4	-	2	4	-	1	5
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes		
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Describe the functions of Operating Systems.
	CO2	Compare and contrast common algorithm used for preemptive and non preemptive scheduling.
	CO3	Demonstrate potential run time problems arising from the concurrent operations and many separate tasks.
	CO4	Defend the different ways of allocating memory tasks.
	CO5	Demonstrate file system operations.

Module No.	Topics	Ref.	Hrs.
1	Overview of Operating System Operating system objectives and functions, Evolution of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations.	1,2	4
2	Process Management Process description: Process, Process States, Process Control Block (PCB), Threads, Thread management. Process Scheduling: Types, Comparison of different scheduling policies	1,2,4,5	10
3	Process Co-ordination Principles of Concurrency, Race condition and critical section, Mutual Exclusion- Hardware and Software approaches, Semaphores, Monitors, Message Passing, Producer Consumer Problem. Deadlock: Principles of Deadlock, Deadlock Detection, Deadlock Avoidance, Deadlock Prevention.	1,2	10
4	Memory Management Memory Management Requirements, Memory Partitioning, Virtual memory: Paging; Segmentation; Page replacement policies, page faults.	1,2	6



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5	Input Output Management I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling and disk scheduling algorithms, Disk cache.	1,2	6
6	File Management: Overview, File Organization, File Sharing; Record Blocking; Secondary Storage Management.	1,2	6
7	Case Studies Producer Consumer Problem, Multithreading, RAID, File systems of Windows and Linux , Overview of Android OS.	1,2,3	6
	Total hours of instructions		48

References:

1. Silberschatz A., Galvin P., Gagne G. “*Operating Systems Principles*”, Willey Eight edition.
2. William Stallings “*Operating System-Internal & Design Principles*”, Pearson.
3. Andrew S. Tanenbaum, “*Modern Operating System*”, Prentice Hall.
4. Maurice J. Bach “*The Design of Unix Operating System*”, Prentice Hall.
5. B. M. Harwani “*Unix and Shell Programming*” by Oxford.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC503	Microcontroller and Embedded Systems	4	-	2	4	-	1	5
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	IT42 (Computer Organization and Architecture)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Demonstrate the basics of embedded systems
	CO2 Analyze the basics of organizational and architectural issues of a microcontroller
	CO3 Experiment the programming techniques used in microcontroller.
	CO4 Demonstrate basic concept of ARM processor
	CO5 Illustrate fundamentals of embedded/real time operating system

Module No.	Topics	Ref.	Hrs.
1	Introduction to Embedded Systems: Overview of Embedded System Architecture, Application areas, Categories of embedded systems, specialties of embedded systems. Recent trends in embedded systems. Brief introduction to embedded microcontroller cores CISC, RISC, ARM, DSP and SoC	3,W1	6
2	The Microcontroller Architecture: Introduction to 8051 Microcontroller, Architecture, Pin configuration, Memory organization, Input /Output Ports, Counter and Timers, Serial communication, Interrupts	1,W1	8
3	Assembly Language Programming of 8051: Instruction set, Addressing modes, Development tools, Assembler Directives, Programming based on Arithmetic & Logical operations, I/O parallel and serial ports, Timers & Counters, and ISR	1,W1	10
4	ARM 7 architecture: Architectural inheritance, Detailed study of Programmer's model, ARM Development tools, Instruction set: Data processing, Data transfer, Control flow. Addressing modes. Writing simple assembly language programs. Pipelining, Brief introduction to exceptions and interrupts handling.	5,W1	10



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5	Embedded / Real Time Operating System: Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem. Off-the-Shelf Operating Systems, Embedded Operating Systems, Real Time Operating System (RTOS) and Handheld Operating Systems.	3,4	8
6	Embedded System - Design case studies: Digital clock, Battery operated smart card reader, Automated meter reading system, Digital camera.	W1	6
Total hours of instructions			48

References:

1. M. A. Mazidi, J. G. Mazidi, R. D. McKinlay, "The 8051 microcontroller & Embedded systems", Pearson.
2. Kenneth J. Ayala, Dhananjay V. Gadre, "The 8051 microcontroller & Embedded systems", Cengage Learning
3. Dr. K.V. K. K. Prasad, "Embedded / real – time systems: concepts, design & programming", Black Book, Reprint edition 2013, Dreamtech press,
4. Shibu K. V., "Introduction to embedded systems", McGraw Hill
5. Steve Furber, "ARM System on chip Architecture", 2nd edition, Pearson.
6. Laya B. Das, "Embedded systems an integrated approach", Third impression, 2013, Pearson,
7. Andrew N. Sloss, Dominic Symes, Chris Wright, "ARM system developer's guide", Morgan Kaufmann Publishers.
8. Frank Vahid, Tony Givargis, "Embedded system design A Unified hardware/software Introduction", Wiley
9. ARM Technical Reference manual.

WEB REFERENCE:

W1: www.nptel.ac.in



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC504	Advanced Database Management Systems	4	-	2	4	-	1	5
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	IT43 (Database management System)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Construct complex queries using SQL to retrieve and manipulate information in a database.
	CO2 Design and implement real life applications integrated with database systems
	CO3 Apply Security controls to avoid any type of security incidents on vital database systems.
	CO4 Describe Distributed databases concepts and Object oriented database concepts.
	CO5 Correlate the importance of enterprise data and be able to organize data to perform analysis on the data and take strategic decisions.

Module No.	Topics	Ref.	Hrs.
1	Introduction Reviewing basic concepts of a relational database, Basic SQL	2,5	1
2	Advanced SQL Complex Retrieval Queries using Group By, Recursive Queries, nested Queries ; Specifying Constraints as Assertions; Event Condition Action (ECA) model (Triggers) in SQL; Creating and working with Views in SQL; Database Programming: Embedded SQL, Dynamic SQL and SQLJ, Database Programming with Function Calls: JDBC; Stored Procedures in SQL, Embedded SQL, Dynamic SQL.	1,2	6
3	Advanced Transaction Processing & Recovery Review of ACID properties and Serializability ; Multiversion Concurrency Control Techniques; Granularity of Data Items and Multiple Granularity Locking ; Advanced Database Recovery techniques like Write Ahead Logging (WAL), ARIES, Checkpoints.	1,2	6
4	Data Security Introduction to Database Security Issues; Discretionary Access Control Based on Granting and Revoking Privileges; Mandatory Access Control and Role-Based Access Control for Multilevel Security;	1,2,6	4



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	SQL Injection; Introduction to Statistical Database Security Introduction to Flow Control		
5	Storage and Indexing Operation on Files; hashing Techniques; Types of Single-Level Ordered Indexes; Multilevel Indexes; Dynamic Multilevel Indexes Using B-Trees and B+-Trees; Indexes on Multiple Keys.	1,2	4
6	Distributed Databases Types of Distributed Database Systems; Distributed Database Architectures; Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design; Query Processing and Optimization in Distributed Databases; Overview of Transaction Management in Distributed Databases; Overview of Concurrency Control and Recovery in Distributed Databases.	1,8	6
7	Object Based Databases Overview of Object Database. Concepts; Object-Relational Features; Object Database Extensions to SQL; The Object Definition Language ODL; Object Database Conceptual Design; The Object Query. Language OQL.	1,2	5
8	Introduction to Data warehousing The Need for Data Warehousing; Increasing Demand for Strategic Information; Inability of Past Decision Support System; Operational Vs Decisional Support System; 1.3 Data Warehouse Defined; Benefits of Data Warehousing ; Features of a Data Warehouse; The Information Flow Mechanism; Role of Metadata; Classification of Metadata; Data Warehouse Architecture; Different Types of Architecture; Data Warehouse and Data Marts; Data Warehousing Design Strategies.	3,4,7	2
9	Dimensional Modeling Data Warehouse Modeling Vs Operational Database Modeling; Dimensional Model Vs ER Model; Features of a Good Dimensional Model; The Star Schema; How Does a Query Execute? The Snowflake Schema; Fact Tables and Dimension Tables. The Fact less Fact Table; Updates To Dimension Tables: Slowly Changing Dimensions, Type 1 Changes, Type 2 Changes, Type 3 Changes, Large Dimension Tables, Rapidly Changing or Large Slowly Changing Dimensions, Junk Dimensions, Keys in the Data Warehouse Schema, Primary Keys, Surrogate Keys & Foreign Keys; Aggregate Tables; Fact Constellation Schema or Families of Star.	3,4,7	6
10	ETL Process Challenges in ETL Functions; Data Extraction; Identification of Data Sources; Extracting Data: Immediate Data Extraction, Deferred Data Extraction; Data Transformation: Tasks Involved in Data Transformation, Data Loading: Techniques of Data Loading, Loading the Fact Tables and Dimension Tables Data Quality; Issues in Data Cleansing.	3,4,7	4



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11	Online Analytical Processing (OLAP) Need for Online Analytical Processing; OLTP vs OLAP; OLAP and Multidimensional Analysis; Hypercubes; OLAP Operations in Multidimensional Data Model; OLAP Models: MOLAP, ROLAP, HOLAP, DOLAP;	3,4,7	4
	Total		48

References:

1. Elmasri and Navathe, “*Fundamentals of Database Systems*”, 6th Edition, PEARSON Education.
2. Korth, Slberchatz, Sudarshan, ”*Database System Concepts*”, 6th Edition, McGraw – Hill
3. Theraja Reema, “*Data Warehousing*”, Oxford University Press, 2009.
4. Paulraj Ponniah, “*Data Warehousing: Fundamentals for IT Professionals*”, Wiley India.
5. C. J. Date, A. Kannan, S. Swamynathan “*An Introduction To Database Systems*”, 8th Edition ,Pearson Education.
6. Raghu Ramakrishnan and Johannes Gehrke, “*Database Management Systems*” 3rd Edition - McGraw Hill
7. Ralph Kimball, Margy Ross, “*The Data Warehouse Toolkit: The Definitive Guide To Dimensional Modeling*”, 3rd Edition. Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC505	Open Source Technologies	3	-	2	3	-	1	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Distinguish the concept of open Source Software ,close software and proprietary software
	CO2 Illustrate the working of Linux Environment
	CO3 Construct Shell Programming
	CO4 Develop android applications

Module No.	Topics	Ref.	Hrs.
1	Over View of Open Source Software Need of Open Sources –Advantages of Open sources –Applications-FOSS – FOSS usage –Free Software Movement – Commercial Aspect of Open Source Movement – Licensing – Certification – Open Source Software Development Model – comparison with close source / Proprietary software – Free Software – Open source vs source –available –Widely used open source software license :Apache License, BSD license, GNU General Public License, GNU Lesser General Public License, MIT License, Eclipse Public License and Mozilla Public License.	1,2,3	4
2	Open Source Operating System Installation of Linux (Redhat-CentOS): Theory about Multiboot Enviroment, Hardisk Partitioning, Swap space, LVM, and Bootloader Command Line: Basic File System Management Task, Working with files, Piping and Redirection, Working with VI editor, use of sed and understanding FHS of Linux	1,2,3	4
3	Open Source Operating System: system Administrator task Job management, Process Management, MountingDevices and file system working with Linux, Backup, working with user, group and permission, Managing Software. Understanding Boot process and relatedfiles, Common kernel Management Task	1,2,3	4
4	Open source Operating System: Network and Security Administration Basic networking commands, Configuration of Apache Web servers, DNS servers, DHCP servers, mail Servers, NFS, FTP servers. Securing servers with IP tables. Setting up cryptographic services, SSL,	1,2,3	6



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	Managing Certificate with Open SSL, working with the GNU Privacy guard		
5.	Open Source Operating System: Shell Programming Bash Shell Scripting, Executing Script, Working with Variables and Input, Using Control Structures, Script control, handling with signals, Creating functions, working sed and gawk. Working with web using shell script: Downloading web page as formatted text file and parsing for data, working cURL etc.	1,2,3	8
6.	Open source Tools Only in LAB Version Control using RCS and CVS (hands on RCS in single Machine) Content management : Understanding working of Drupal (Basic Drupal components) Security assessment : OpenVAS IDE :Working of Eclipse	5	-
7	Open Source Mobile Programming Android programming: Setting up Android Environment (using Eclipse for android development), Activities and Intents, User Interface, Designing UI using views, Data Persistence, Content Providers, messaging and networking, Location-based Services, Publishing Android Applications	4	10
	Total hours of instructions		36

References:

1. Redhat Linux 6.0 Administration Wiley
2. Linux Shell scripting Cookbook: Sarath Lakshman PACKT
3. Linux Lab - Open source Technology : Ambavade -Dreamtech
4. Beginning Adnorid Development Wrox Press
5. Drupal guide to Planning and Building Web Site: Wrox Pres



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC506	Business Communication and Ethics	--	--	4	--	--	2	2
		Examination Scheme						
		ISE		Practical		Oral		Total
		50		-		-		50

Pre-requisite Course Codes		
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Communicate effectively in both verbal and written form and demonstrate knowledge of professional and ethical responsibilities
	CO2	Participate and succeed in Campus placements and competitive examinations like GATE, CET.
	CO3	Possess entrepreneurial approach and ability for life-long learning.
	CO4	Have education necessary for understanding the impact of engineering solutions on Society and demonstrate awareness of contemporary issues.

Module No.	Unit No.	Topics	Ref.	Hrs.
1		Report Writing		08
	1.1	Objectives of report writing		
	1.2	Language and Style in a report		
	1.3	Types of reports		
	1.4	Formats of reports: Memo, letter, project and survey based		
2		Technical Proposals		02
	2.1	Objective of technical proposals		
	2.2	Parts of proposal		
3		Introduction to Interpersonal Skills		08
	3.1	Emotional Intelligence		
	3.2	Leadership		
	3.3	Team Building		
	3.4	Assertiveness		
	3.5	Conflict Resolution		
	3.6	Negotiation Skills		
	3.7	Motivation		
4		Meetings and Documentation		02
	4.1	Strategies for conducting effective meetings		
	4.2	Notice		
	4.3	Agenda		



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	4.4	Minutes of the meeting		
5		Introduction to Corporate Ethics and etiquettes		02
	5.1	Business Meeting etiquettes, Interview etiquettes, Professional and work etiquettes, Social skills		
	5.2	Greetings and Art of Conversation		
	5.3	Dressing and Grooming		
	5.4	Dinning etiquette		
	5.5	Ethical codes of conduct in business and corporate activities (Personal ethics, conflicting values, choosing a moral response, the process of making ethical decisions)		
6		Employment Skills		06
	6.1	Cover letter		
	6.2	Resume		
	6.3	Group Discussion		
	6.4	Presentation Skills		
	6.5	Interview Skills		
			Total	26

References:

1. Fred Luthans, “*Organizational Behavior*”, Mc Graw Hill, edition
2. Huckin and Olsen, “*Technical Writing and Professional Communication*”, Mc Graw Hill
3. Wallace and Masters, “*Personal Development for Life and Work*” 12th edition, Thomson Learning.
4. Heta Murphy, “*Effective Business Communication*”, McGraw Hill.
5. B N Ghosh, “*Managing Soft Skills for Personality Development*”, Tata McGraw
6. Bell Smith, “*Management Communication*” Wiley India Edition, 3rd edition.
7. Dr.K.Alex , “*Soft Skills*”,S Chand and Company



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITL501	Computer Graphics And Virtual Reality Lab	--	--	2	--	--	1	1
		Examination Scheme						
		ISE		ESE		Total		
				Practical	Oral			
		40	10	10	60			

Pre-requisite Course Codes	TEITC501 (Computer Graphics And Virtual Reality)
After successful completion of the course, student will be able to:	
CO1	Construct display primitives: line and circle.
CO2	Represent two and three-dimensional objects.
CO3	Demonstrate clip portion that are not of immediate interest.
CO4	Create Animation movie and objects using Java 3D

Exp. No.	Experiment Details	Ref.	Marks
1	Write a menu driven program to draw (dashed, thick, normal) Line using DDA line drawing algorithm and Bresenham's line drawing algorithm	1,2	5
2	Write a program to draw concentric circles using midpoint circle algorithm. Let each circle be of different color. Also add delay.	1,2	5
3	Write a program to Fill an object using Flood Fill and Region filling Algorithm.	1,2	5
4	Write a menu driven program to perform 2D translation, scaling and reflection, shearing on a Object. Color the transformed object.	1,2	5
5	Write a program to Clip a line using Cohen-Sutherland Line clipping algorithm.	1,2	5
6	Write a program to Clip a polygon using Sutherland-Hodgeman polygon clipping algorithm.	1,2	5
7	To create an animated movie by adding button event using macromedia flash.	2	5
8	To create object using Java 3D.	2	5
Total Marks			40

References:

1. Donald Hearn and M. Pauline Baker, "Computer Graphics", Pearson Education.
2. R. K Maurya, "Computer Graphics with Virtual Reality", Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL502	Operating Systems Lab	--	--	2	--	--	1	1	
		Examination Scheme							Total
		ISE		ESE			Total		
		40		Practical	Oral	10		10	
				10	10	60			

Pre-requisite Course Codes	ITL-36 (Open Source Operating System Lab) TEITC502 (Operating Systems)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Compare performance of various CPU scheduling algorithm.
	CO2	Demonstrate deadlock detection and avoidance algorithm.
	CO3	Create processes and implement IPC
	CO4	Demonstrate file and memory allocation strategies.
	CO5	Demonstrate process synchronization.

Exp. No.	Experiment Details	Ref.	Marks
1	Implement CPU scheduling algorithm.	1,2	5
2	Implement file allocation strategies-Sequential, Indexed and Linked.	1,2	5
3	Implement Producer consumer problem using Semaphore.	1,2,3	5
4	Implement bankers algorithm for deadlock avoidance.	1,2	5
5	Implement threading and synchronization application.	1,2,3	5
6	Implement system calls for mv,cp.	4,5	5
7	Implement disk scheduling algorithm	1,2	5
8	BIOS CMOS and BOOT process : Study BIOS setting security	4,5	5
Total Marks			40

References:

1. Silberschatz A., Galvin P., Gagne G. "Operating Systems Principles", Willey Eight edition.
2. William Stallings, "Operating System-Internal & Design Principles", Pearson.
3. Andrew S. Tanenbaum, "Modern Operating System", Prentice Hall.
4. Maurice J. Bach, "The Design of Unix Operating System", Prentice Hall.
5. B. M. Harwani, "Unix and Shell Programming", Oxford.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL503	Micro-controller and Embedded System Lab	--	--	2	--	--	1	1	
		Examination Scheme							Total
		ISE		ESE		Total			
		40		10			10		60

Pre-requisite Course Codes	IT42 (Computer Organization & Architecture) TEITC503 (Micro-controller and Embedded System)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Demonstrate the basics of embedded systems
	CO2	Analyze the basics of organizational and architectural issues of a microcontroller.
	CO3	Experiment the programming techniques used in microcontroller.
	CO4	Demonstrate basic concept of ARM processor
	CO5	Illustrate fundamentals of embedded/real time operating system
	CO6	Demonstrate the conceptual embedded system design

Expt. No.	Experiment Description	Ref	Marks
1	Write program in assembly language for 8051 to perform arithmetic operations such as: 1-Addition, a) Prog. for addition of 2-8bit no's b) Prog. for addition of 2-16bit no's c) Prog. for addition of 2-BCD no's 2-Subtraction, 3-Multiplication, 4-Division	5	5
2	Assembly language programs for different addressing modes 1-Transfer the contents of Register A, R0, R1 of Bank0 to Register B, R0,R1 of bank1 using stank operations 2-WAP in assembly language for 8051 to copy of 55H into RAM memory locations 40H to 44H using register indirect addressing mode. 3-Assume that word "TUV" is burned into ROM location starting at 400H and that the Program is burned into ROM location starting at zero. WAP to read this data into Internal RAM locations starting from address 60H	1	5
3	8051 Timer programming 1-Write an assembly language program to generate a square wave with 50% duty cycle on p1	1,2	5



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	2-Write an assembly language program to generate a square wave with 3ms ON time and 10ms OFF time on p1		
4	8051- UART programming for serial communication 1-WAP to transfer message "ENGINEER" serially at baud rate 4800 in mode1	1,2	5
5	Looping programs 1-To write an assembly language program to calculate sum of 'N' numbers. 2-To write a program in Assembly Language for 8051 to find out the largest/ smallest element from a block of data	1,2	5
6.	8051 Interfacing programs 1-To interface and write a program to blink LED connected on Port3.4 { led1.a51 } 2-To Implement parallel interface to 8 LEDs { led8.a51 } 3-Interface 16*2 text to 89c51 microcontroller and write a program to display string on LCD{ lcd_8bit_2.a51 } and a Character{ lcd_8bit_1.a51 }	1,2	5
7	ARM interfacing program and assembly language program 1-steps followed in flash magic to burn ARM program in interfacing board 2-Architecture of ARM 7 processor 3- Write an assembly language program to get gcd of no. for ARM7 processor 4- execute all possible instruction execution from arm7 instruction set	1,2	5
8	Design Case study on 1-Battery operated smart card reader 2-AUTOMATIC METER READING SYSTEM 3- Digital Camera	1,2	5
	Total Marks		40

References:

1. M. A. Mazidi, J. G. Mazidi, R. D,"*The 8051 microcontroller &Embedded systems*" McKinlay, Pearson
2. Kenneth J. Ayala, Dhananjay V. Gadre,"*The 8051 microcontroller &Embedded systems*" Cengage Learning
3. Laya B. Das," *Embedded systems an integrated approach*",Pearson, Third impression, 2013
4. Andrew N. Sloss, Dominic Symes, Chris Wright," *ARM system developer 's guide*", Morgan Kaufmann Publishers
5. Frank Vahid, TonyGivargis, "*Embedded system design A Unified hardware/software Introduction*", Wiley.
6. ARM Technical Reference manual.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL504	Advanced Database Management Systems Lab	--	--	2	--	--	1	1	
		Examination Scheme							Total
		ISE		ESE		Total			
				Practical	Oral				
		40	10	10	60				

Pre-requisite Course Codes	IT43 (Database Management Systems) TEITC504 (Advanced Database Management Systems)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Solve complex queries using SQL to retrieve and manipulate information in a database.
	CO2 Demonstrate Distributed databases concepts and Object oriented database concepts.
	CO3 Analyze the importance of enterprise data and be able to organize data to perform analysis on the data and take strategic decisions.
	CO4 Design and implement real life applications integrated with database systems

Exp. No.	Experiment Details	Ref.	Marks
1	Perform practical by using Basic SQL statements and joining tables	1,2	5
2	For a given problem implement the Vertical and Horizontal Fragmentation.	1,2	5
3	Perform a practical for database security using SQL Injection.	1,2	5
4	Demonstrate the Transaction and concurrency control	1,2	5
5	Perform Practical using Object oriented queries.	1,2	5
6	Perform practical to understand the concepts of Data Replication	5	5
7	Study of OLAP tools and perform OLAP operations.	3,4	5
8	Mini Projects	1,2,5	5
Total Marks			40

References:

1. Elmasri and Navathe, "Fundamentals of Database Systems", 6th Edition, PEARSON Education.
2. Korth, Silberchatz, Sudarshan, "Database System Concepts", 6th Edition, McGraw – Hill
3. Theraja Reema, "Data Warehousing", Oxford University Press, 2009
4. Ralph Kimball, Margy Ross, "The Data Warehouse Toolkit: The Definitive Guide To Dimensional Modeling", 3rd Edition. Wiley India.
5. M. Tamer Ozu "Principles of Distributed Database Systems", Pearson Education



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL505	Open Source Technologies lab	3	--	2	3	--	1	4	
		Examination Scheme							Total
		ISE		ESE		Total			
		40		20			-	60	

Pre-requisite Course Codes	TEITc505 (Open Source Technologies)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Demonstrate the installation process of open source operating systems.
	CO2	Use different Linux commands to manage files and directories
	CO3	Demonstrate responsibilities performed by the system administrator.
	CO4	Identify and use UNIX/Linux utilities to create and manage Linux Processes
	CO5	Use common decision constructs in shell scripts effectively
	CO6	Develop a Customized Linux Kernel

Exp. No.	Experiment Details	Ref.	Marks
1	Installation of open source operating systems	3,4	5
2	Exploring Linux file system commands-1: Viewing Files and Directories, Displaying the Contents of Text Files, Searching for Text Within Files, Finding Files and Linking Files.	1,3,4	5
3	Exploring Linux file system commands-2:I/O redirection, filters, awk.	2,3,4	5
4	Exploring Linux System Administration task and managing Linux processes	2,3,4	5
5	Techniques for Compression, System Backup, and Package management	1,2,3,4	5
6	Configure DHCP and FTP server	2,3,4	5
7	Configure Apache	1,2,3,4	5
8	Study and configure open vas, rcs, cvs, drupal	1,2,3,4	5
9	Configure DNS server	1,2,3,4	5
10	Program based on shell scripting	2,3,4	5
Total Marks			40

References:

1. William E. Shotts Jr ,”*The Linux Command Line: A Complete Introduction*”, 1st Edition
2. Peter Seebach, ”*Beginning Portable Shell Scripting: From Novice to Professional (Expert's Voice in Open Source) Paperback*” – November 20, 2008 ,
3. Jason W. Eckert, ” *Linux+ Guide to Linux Certification*”.
4. Michael Turner ,”*Red Hat Linux Administration: A Beginner's Guide (Beginner's Guide)*”, 1st Edition



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Semester-VI



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC601	Software Engineering	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Identify the process model of SDLC to be used to solve a real world application.
	CO2 Formulate the scope of the project and its effect on project cost and effort estimation.
	CO3 Apply design principal to design the candidate system and measure quality.
	CO4 Identify different types of risk, plan resource allocation and apply configuration management techniques.
	CO5 Design test cases to verify and validate the system

Module No.	Topics	Ref.	Hrs.
1	Introduction to Software Engineering Professional Software Development, Layered Technology, Process framework, CMM, Process Patterns and Assessment	1, 2	3
2	Process Models Prescriptive Models : Waterfall Model, Incremental, RAD Models Evolutionary Process Models: Prototyping, Spiral and Concurrent Development Model Specialized Models: Component based, Aspect Oriented development	1, 2	6
3	Agile Software Development Agile Process and Process Models, Adaptive and Dynamic system Development, Scrum, Feature Driven Development and Agile Modeling.	1, 2	3
4	Engineering and Modeling Practices Core Principles, Communication, Planning, Modeling, Construction and deployment. System Modeling and UML	1, 2	4
5	Requirements Engineering and Analysis Model Requirements Engineering Tasks, Elicitation, building analysis model, Data Modeling concepts, Object Oriented Analysis	1, 3	6
6	Design Engineering Design Concepts, Design Model – Data, Architecture, Interface, Component Level and Deployment Level design elements	1, 2	5
7	Testing strategies and tactics Testing strategies for conventional and Object Oriented architectures,	1, 2	6



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	Validation and system testing. Software testing fundamentals, Black box & white box testing, object oriented testing methods.		
8	Metrics for Process and Projects Process Metrics and Project Metrics, Software Measurement, Object Oriented Metrics, Software Project Estimation, Decomposition Techniques, LOC based, FP based and Use case based estimations, Empirical estimation Models	1, 3	6
9	Risk Management Risk strategies, Software risks, Risk Identification, Projection, RMMM	1, 2	3
10	Quality Management Quality Concepts, SQA activities, Software reviews, FTR, Software reliability and measures, SQA plan	1, 2	3
11	Change management Software Configuration Management, elements of SCM, SCM Process, Change Control	1, 2	3
Total hours of instructions			48

References:

1. Roger Pressman “*Software Engineering: A Practitioner’s Approach*” Sixth Edition.
2. Ian Sommerville, “*Software Engineering*”, Pearson.
3. Pankaj Jalote, “*Software Engineering : A Precise Approach*” Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC602	Distributed Systems	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	TEITC502 (Operating Systems)		
After successful completion of the course, student will be able to:			
Course Outcomes	CO1	Describe the fundamental concept of distributed system	
	CO2	Apply message communication technique and develop the applications.	
	CO3	Compare the clock synchronization algorithm in distributed system.	
	CO4	Use distributed system technologies like EJB, CORBA and .NET.	

Module No.	Topics	Ref.	Hrs.
1	Fundamentals Introduction, Distributed Computing Models, Software Concepts, Issues in designing Distributed System, Client – Server Model	1,2	4
2	Communication Message Passing , Introduction to Message Passing, Advantages and features of Message Passing, Message Format, Message Buffering, Multi Data gram Messaging ,Group Communication. Remote Procedure Call (RPC): Basic RPC Operations, Parameter Passing, Extended RPC Models. Remote Object Invocation: Distributed Objects, Binding a Client to an Object, Static Vs Dynamic RMI, Parameter Passing, Java RMI. Message Oriented Communication: Persistence and synchronicity in communication, Message Oriented Transient and Persistent Communications	1,2	8
3	Processes Threads, Code Migration: Approaches to Code Migration, Migration and Local Resources, Migration in Heterogeneous Systems	1,2	4



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4	Synchronization Clock Synchronization, Physical and Logical Clocks, Global State, Election Algorithms, Mutual Exclusion, Distributed Transactions, Deadlocks	1,2,6	8
5	Consistency and Replication Introduction Data-Centric Consistency Models, Client Centric Consistency Models, Distributed Protocols	1,2,4,6	8
6	Distributed Technologies and Frameworks Overview of EJB S/W Architecture, view of EJB Conversation, Building and Deploying EJB, Roles in EJB, Types of Enterprise Beans, Lifecycle of Beans , Developing Applications using EJB Framework.	3	5
	Introduction to CORBA, CORBA Components and architecture, Method Invocation, Static and Dynamic Invocation in CORBA, CORBA IDL, Developing Application using CORBA	2,3,4	4
	Introduction to .NET, .NET architecture, NET Remoting	3	3
	Comparison of RMI, CORBA, EJB, .NET	3	1
7	Service Oriented Architecture Defining SOA, Business value of SOA, SOA characteristics, Concept of a service, SOA Architecture, Deploying SOA applications.	5	3
Total Hours of instructions			48

References:

1. Sunita Mahajan, Seema Shah, “ *Distributed Computing*”, Oxford, second edition.
2. Andrew S. Tanenbaum & Maarten van Steen “ *Distributed Systems : Principles and paradigms*” Prentice Hall of India Private Limited
3. G. Sudha Sadasivam, Radha Shankarmani, " *Middleware and Enterprise Integration Technologies*" , Wiley Precise Textbook
4. .Pradeep K. Sinha “ *Distributed Operating Systems*”, Prentice Hall of India Private Limited
5. Thomas Erl " *Service Oriented Architecture : Concepts, Technology and Design*" Prentice Hall
6. G. Coulouris, J. Dollimore and T. Kindberg “ *Distributed Systems* “.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC603	System And Web Security	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	IT35 (Information Theory and Coding)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Interpret concepts of security ,authentication and authorization
	CO2	Illustrate the software security practices.
	CO3	Compare security model in Linux and windows operating system,
	CO4	Experimental analysis of attacks involved in network and web security

Module No.	Topics	Ref.	Hrs.
1	Introduction to Computer Security Vulnerabilities, Threats and Attacks, Public Key Cryptography and Cryptanalysis, Knapsack, cryptosystem	5,4	4
2	Authentication Authentication Methods and Protocols, Password based authentication, Token Based Authentication, Biometric Authentication, Digital Certificates, X.509 Directory Services, PKI, Needham Schroeder ,Authentication Protocol, Single sign on, Kerberos, Authentication Protocol, Federated Identity Management	5,4	8
3	Access Control Access control Policies: DAC, MAC, RBAC, Access control Matrix, ACLs and Capability Lists, Multiple level security model: Biba and Bell La Padula Models, Multilateral security, Covert channel, CAPTCHA	5	6
4	Software security Software Flaws, Buffer Overflow, Incomplete Mediation, Race conditions, Malware: Viruses, Worms, Trojans, Logic Bomb, Bots, Rootkits, Miscellaneous Software Attacks: Salami attack, Linearization Attacks, Trusted Computing: Software reverse engineering, Digital Rights management	5	8
5	Operating System Security Linux Security Model, File System Security, Linux Vulnerabilities, Windows Security Architecture, Windows Vulnerabilities	5	4



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6	Network Security Network security basics, TCP/IP vulnerabilities Layer wise: Packet Sniffing, ARP spoofing, port scanning, IP spoofing, TCP syn flood, DNS Spoofing, Internet Security Protocols: SSL, TLS, IPSEC, Secure Email and S/MIME, Denial of Service: Classic DOS attacks, Source Address spoofing, ICMP flood, SYN flood, UDP flood, Distributed Denial of Service, Defenses against Denial of Service Attacks. Firewalls, Intrusion Detection Systems: Host Based and Network Based IDS, Honey pots.	5	12
7	Web Security User Authentication and session management, Cookies, Secure HTTP, SQL Injection Techniques, Cross Site Scripting, Cross-Site Request Forgery, Session Hijacking and Management, Phishing and Pharming Techniques, Web Services Security	5	6
Total hours of instructions			48

References:

- 1) William Stallings ,”*Computer Security Principles and Practice*”, Pearson Education.
- 2) Charles P. Pfleeger,” *Security in Computing*”, Pearson Education
- 3) Dieter Gollman ,”*Computer Security* “, 3rd Edition, Wiley India.
- 4) Behrouz A. Forouzan ,”*Cryptography and Network Security*”, TATA McGraw hill.
- 5) Mark Stamp ,”*Information security Principles and Practice*”, Wiley publication.
- 6) Eric Cole,” Network security bible”, 2nd edition,Wiley India.
- 7) OWASP TOP 10: https://www.owasp.org/index.php/Top_10_2013



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC604	Data Mining & Business Intelligence	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	IT44 (Database Management Systems) IT34 (Object Oriented Programming)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Demonstrate an understanding of the importance of data mining and the principles of business intelligence.
	CO2	Able to prepare the data needed for data mining algorithms in terms of attributes, class inputs, training, validating, and testing files.
	CO3	Implement classification on large data sets and apply metrics to measure the performance of algorithms.
	CO4	Apply Clustering on large data sets and measure the performance of algorithms.
	CO5	Apply Association mining on large data sets.
	CO6	Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.

Module No.	Topics	Ref.	Hrs.
1	Introduction to Data Mining What is Data Mining; Kind of patterns to be mined; Technologies used; Major issues in Data Mining	1,5	2
2	Data Exploration Types of Attributes; Statistical Description of Data; Data Visualization; Measuring similarity and dissimilarity.	1,5	4
3	Data Preprocessing Why Preprocessing? Data Cleaning; Data Integration; Data Reduction: Attribute subset selection, Histograms, Clustering and Sampling; Data Transformation & Data Discretization: Normalization, Binning, Histogram Analysis and Concept hierarchy generation	1,5	4



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4	<p>Classification Basic Concepts; Classification methods: 1. Decision Tree Induction: Attribute Selection Measures, Tree pruning. 2. Bayesian Classification: Naïve Bayes“ Classifier. Prediction: Structure of regression models; Simple Linear regression, Multiple linear regression. Model Evaluation & Selection: Accuracy and Error measures, Holdout, Random Sampling, Cross Validation, Bootstrap; Comparing Classifier Performance using ROC Curves. Combining Classifiers: Bagging, Boosting, Random forests</p>	1,5	8
5	<p>Clustering Cluster Analysis: Basic Concepts; Partitioning Methods: K-Means, K-Medoids; Hierarchical Methods: Agglomerative, Divisive, BIRCH; Density-Based Methods: DBSCAN, OPTICS</p>	1,6	8
6	<p>Outlier Analysis What are outliers? Types, Challenges; Outlier Detection Methods: Supervised, Semi-Supervised, Unsupervised, Proximity based, Clustering Based.</p>	1,6	2
7	<p>Frequent Pattern Mining Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rules Market Basket Analysis, Frequent Item sets, Closed Item sets, and Association Rules; Frequent Pattern Mining, Efficient and Scalable Frequent Item set Mining Methods, The Apriori Algorithm for finding Frequent Item sets Using Candidate Generation, Generating Association Rules from Frequent Item sets, Improving the Efficiency of Apriori, A pattern growth approach for mining Frequent Item sets; Mining Frequent item sets using vertical data formats; Mining closed and maximal patterns; Introduction to Mining Multilevel Association Rules and Multidimensional Association Rules; From Association Mining to Correlation Analysis, Pattern Evaluation Measures; Introduction to Constraint-Based Association Mining.</p>	1,6	8
8	<p>Business Intelligence What is BI? Effective and timely decisions; Data, information and knowledge; The role of mathematical models; Business intelligence architectures; Enabling factors in business intelligence project; Development of a business intelligence system; Ethics and business Intelligence</p>	2,3	3
9	<p>Decision Support System Representation of the decision-making process; Evolution of information systems; Definition of decision support system;</p>	2,3	3



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	Development of a decision support system		
10	BI Applications Data mining for business Applications like Fraud Detection, Click stream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance CRM etc	2,3	6
Total hours of instructions			48

References:

1. Han, Kamber, "*Data Mining Concepts and Techniques*", Morgan Kaufmann 3rd Edition
2. G. Shmueli, N.R. Patel, P.C. Bruce, "*Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner*", 1st Edition, Wiley India.
3. Carlo Verrellis "*Business Intelligence: Data Mining and Optimization for Decision Making*", Wiley India Publications.
4. P. N. Tan, M. Steinbach, Vipin Kumar, "*Introduction to Data Mining*", Pearson Education
5. Michael Berry and Gordon Lin off, "*Data Mining Techniques*", 2nd Edition Wiley Publications.
6. Michael Berry and Gordon Lin off, "*Mastering Data Mining- Art & science of CRM*", Wiley Student Edition
7. Vikram Pudi & Radha Krishna, "*Data Mining*", Oxford Higher Education.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITC605	Advanced Internet Technology	4	-	-	4	-	-	4
		Examination Scheme						
		ISE		MSE		ESE		
		10	30	100 (60% Weightage)				

Pre-requisite Course Codes	ITL45 (Web Programming Lab)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Analyze the basic concept and working of Search Engine
	CO2 Design SEO objectives and SEO plan prior to site development
	CO3 Develop responsive web pages using HTML5 and CSS3.
	CO4 Summarize RIA - web mash up Eco-systems using different technologies like Ajax, JSON, REST and Web Services.

Module No.	Topics	Ref.	Hrs.
1	<p>Search Engine Optimization</p> <p>Search Engine Basics</p> <p>Algorithm based Ranking Systems – Determining Searcher Intent and Delivering Relevant, Fresh Content, Analyzing Ranking Factors, Using Advanced Search Techniques, Vertical Search Techniques, Country-Specific Search Engines.</p> <p>Determining SEO Objective and Finding Your Site's Audience – Setting SEO Goals and Objective, Developing SEO plans Prior to Site Development -SEO for Raw traffic; E-commerce Sales; Mindshare/Branding; Direct Marketing; Reputation Management; Ideological Influence.</p> <p>Getting started SEO: Defining Your Site's Information Architecture, Auditing an Existing Site to identify SEO Problems, Identifying Current Server Statistic Software and Gaining Access – Determining Top competitors, Benchmarking Current Indexing Status, Current Rankings, Benchmarking Current Traffic Source and Volumes, Conduct SEO/Website SWOT analysis.</p> <p>Keyword Generation – Creating Pages – Website Structure- Creating Content-Creating Communities-building Links-Using Google Analytics-Social Media Optimization-Creating Pay-per-click Campaigns-Optimizing PPC Campaigns through Quality Score optimization - Tracking Results and Measuring Success.</p>	3,4	20
2	<p>Responsive web design with HTML5 and CSS3</p> <p>Getting Started with HTML 5, CSS3 and Responsive Web Design.</p>	2	16



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	Media Queries: Supporting Differing Viewports Embracing Fluid Layout HTML 5 for Responsive Design CSS3: Selectors, Typography and color Modes Stunning Aesthetics with CSS3 CSS3 Transitions, Transformations and Animations Conquer Forms HTML5 and CSS3		
3	RIA and Mash up Characteristic of RIA – Web Mash up Eco Systems –Mash up Techniques :1) Mashing on the Web Server, Rich User Interface using Ajax, Mashing with JSON. RIA: Ajax vs Traditional Approach Technical Background: 1) Java script and AJAX 2) JSON Alternative to XML 3) Syndication 4) REST and WS * Web Services	1,5,6	12
Total hours of instructions			48

References:

1. Professional Web 2.0 Programming WROX press.
2. Ben Frain, "Responsive Web Design with HTML5 and CSS3", PACKT
3. Eric Enge, Stephan Spencer, Jessie Srricchiola, Rand Fishkin, "The Art of SEO" 2nd edition, O" Reilly Publication.
4. Kristopher B. Jones, "Search Engine Optimization", 3rd edition, Wiley publication.
5. Dana Moore, Raymond Budd, Edward Benson "Rich Internet Application AJAX and Beyond "WROX press, WILEY.
6. Srinivasan, "Web Technology", Pearson.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL601	Software Engineering Lab	-	-	2	-	-	1	1	
		Examination Scheme							Total
		ISE		ESE		Total			
				Practical	Oral				
		40	10	10	60				

Pre-requisite Course Codes	TEITC601 (Software Engineering)	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Convert user story into the software requirement specification report.
	CO2	Design quality software for complex problem.
	CO3	Analyze software for risk and configuration management.
	CO4	Measure the assumption made in input and the extend test cases to validate the system

Exp. No.	Experiment Details	Ref.	Marks
1	To Formulate problem statement and prepare software requirement specification for the same.	1,2	5
2	To draw a use case diagram with specification for the case study.	1,3	5
3	To use gant chart to prepare project planning and scheduling	1,4	5
4	To draw Activity diagram for one use case from the case study.	1,2,3	5
5	To draw a data flow diagram for your case study.	1,3	5
6	To perform Risk Management plan for your case study.	1,3	5
7	To find the cyclomatic complexity of your project.	1,2	5
8	Download any change control tool and make changes in the scope of your project.	1,2	5
Total Marks			40

References:

1. Alan Dennis, Wixom, R M Roth, "System Analysis and Design" – Wiley India.
2. Roger Pressman "Software Engineering: A Practitioner's Approach" Sixth Edition.
3. Ian Sommerville, "Software Engineering", Pearson.
4. Pankaj Jalote, "Software Engineering: A Precise Approach" Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
TEITL602	Distributed Systems Lab	-	-	2	-	-	1	1
		Examination Scheme						
		ISE		ESE			Total	
				Practical	Oral			
40	10		10		60			

Pre-requisite Course Codes	TEITC502 (Operating Systems) TEITC602 (Distributed Systems)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Apply message communication technique and develop the applications.
	CO2 Demonstrate the clock synchronization algorithm in distributed system
	CO3 Use distributed system technologies like EJB, CORBA and .NET.
	CO4 Create mini projects using distributed system concepts

Exp. No.	Experiment Details	Ref.	Marks
1	Implement the client server socket programming for converting lower case word to uppercase word.	1,2	5
2	Write a program for finding prime numbers using RPC	1,2	5
3	Implementation of "Calculator" Service using JAVA RMI	1,2	5
4	Implement Lamport timestamp logical clock	1,2	5
5	Implement the Election Algorithm	1,2	5
6	To develop a component for retrieving Weather Forecast Information using CORBA.	3,4	5
7	To study and develop application using Enterprise Java Beans(EJB).	3,4	5
8	Mini Project	1-4	5
Total Marks			40

References:

1. Andrew S. Tanenbaum & Maarten van Steen " *Distributed Systems : Principles and paradigms* " Prentice Hall of India Private Limited
2. Pradeep K. Sinha " *Distributed Operating Systems* ", Prentice Hall of India Private Limited
3. Sunita Mahajan, Seema Shah, " *Distributed Computing* ", Oxford, second edition.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL603	System and Web Security Lab	-	-	2	-	-	1	1	
		Examination Scheme							Total
		ISE		ESE		Total			
		40		Practical	Oral		60		

Pre-requisite Course Codes	IT35 (Information Theory and Coding) TEITC603 (System and Web Security)
After successful completion of the course, student will be able to:	
CO1	Interpret the concepts of security
CO2	Illustrate the network vulnerability scanning process
CO3	Experiment different attacks involved in network
CO4	Illustrate attacks involved in web security
CO5	Experiment the method to do forensics analysis on data

Exp. No.	Experiment Details	Ref.	Marks
1.	Foot printing a target network	1,5,7	5
2.	Scanning a network using A. Nmap Network Mapper B. Nessus vulnerability scanner	1,5,7	5
3.	Exploit Windows vulnerability to get unauthorized access	1,5,4,7	5
4.	<i>Exploiting Client side vulnerabilities and establishing a VNC session</i>	1,5,7	5
5.	Performing Man -in-the-Middle Attack using Wireshark & Ettercap	5,7	5
6.	A. Creating a Trojan using Social-Engineer Toolkit B. Implementing DoS attack - SYN flooding a target host using hping3	5,7,2,3	5
7.	Performing SQL injection A. Manual SQL Injection, John the Ripper B. Automate SQL Injection with Sql Map	6	5
8.	Digital forensics (content beyond syllabus)	5	5
Total Marks			40

References:

1. William Stallings, "Computer Security Principles and Practice", Pearson Education.
2. Charles P. Pfleeger, "Security in Computing", Pearson Education.
3. Dieter Gollman, "Computer Security", 3rd Edition, Wiley India.
4. Behrouz A. Forouzan, "Cryptography and Network Security", TATA McGraw Hill.
5. Mark Stamp, "Information security Principles and Practice", Wiley publication
6. OWASP TOP 10: https://www.owasp.org/index.php/Top_10_2013
7. Eric Cole, "Network security bible", 2nd edition, Wiley India.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL604	Data Mining and Business Intelligence Lab	-	-	2	-	-	1	1	
		Examination Scheme							Total
		ISE			ESE		Total		
					Practical	Oral			
		40			-	20	60		

Pre-requisite Course Codes	IT44 (Database Management Systems) IT34 (Object oriented Programming) TEITC604 (data Mining and Business Intelligence)
After successful completion of the course, student will be able to:	
Course Outcomes	CO1 Demonstrate an understanding of the importance of data mining and the principles of business intelligence.
	CO2 Able to prepare the data needed for data mining algorithms in terms of attributes, class inputs, training, validating, and testing files.
	CO3 Implement classification on large data sets and apply metrics to measure the performance of algorithms.
	CO4 Apply Clustering on large data sets and measure the performance of algorithms.
	CO5 Apply Association mining on large data sets.
	CO6 Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.

Exp. No.	Experiment Details	Ref.	Marks
1	a) Choose any business to understand the business model of the company. Objective of choosing this business is to find following:- i) Stakeholders ii) Revenue generation iii) Kind data generated iv) Business tools they use.	1,2	5
2	To demonstrate Data preprocessing using Weka Tool	1,2	5
3	To demonstrate Regression and draw Scatter Plot using R Tool.	1,2	5
4	To demonstrate classifier- Decision Tree, Naïve Bayes, Random Forest using Weka Tool and Java/Python.	1,2	5
5	To demonstrate Clustering Algorithms- K-Means using Weka Tool and Java/Python.	1,2,3	5
6	To demonstrate Association Mining Algorithm(Apriori, F-P Growth) in Weka and Java/Python.	1,2,3	5
7	Exploration of Business Intelligence tool	2,3,4	5
8	Group Work- Identify a) BI problem, Large Dataset, & Algorithm. b)	2,3,4	5



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	Identify & visualize results. c) Describe what decision to be taken as a result of mining.		
Total Marks			40

References:

1. Han, Kamber, "*Data Mining Concepts and Techniques*", Morgan Kaufmann 3rd Edition
2. P. N. Tan, M. Steinbach, Vipin Kumar, "*Introduction to Data Mining*", Pearson Education
3. G. Shmueli, N.R. Patel, P.C. Bruce, "*Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner*", 1st Edition, Wiley India.
4. Carlo Verzellis, "*Business Intelligence: Data Mining and Optimization for Decision Making*", Wiley India Publications.



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Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned				
		L	T	P	L	T	P	Total	
TEITL605	Advance Internet Technology Lab	-	-	2	-	-	1	1	
		Examination Scheme							Total
		ISE		ESE			Total		
		40		Practical	Oral			10	
		10		10		60			

Pre-requisite Course Codes	ITL45 (Web Programming Lab) TEITC605 (Advance Internet Technology)_	
After successful completion of the course, student will be able to:		
Course Outcomes	CO1	Analyze and study the traffic of your website using google analytics.
	CO2	Design appropriate keywords for your website using any open source tool.
	CO3	Develop responsive web pages using HTML5 and CSS3.
	CO4	Create RIA - web mash up Eco-systems using different technologies like Ajax, JSON, REST and Web Services.

Exp. No.	Experiment Details	Ref.	Marks
1	Develop a web page using Ajax	5	5
2	To display data written in JSON format on the browser using AJAX	5	5
3	To create a web mash up that combines any two web services.	1	5
4	Create a responsive web page using HTML5.	2	5
5	Create a rich internet application to incorporate new tags of CSS3.	2	5
6	To develop a fully REST based web service and test it using your own small application.	6	5
7	Using Google Ad words Key planner tool, generate a report for your web site and domain.	3,4	5
8	To analyze your own published site traffic using Page tagging (Google analytics tool). Review and study various reports generated by the tool.	3,4	5
Total Marks			40

References:

1. Professional Web 2.0 Programming WROX press.
2. Ben Frain, "Responsive Web Design with HTML5 and CSS3", PACKT
3. Eric Enge, Stephan Spencer, Jessie Srricchiola, Rand Fishkin, "The Art of SEO "2nd edition, O" Reilly Publication.
4. Kristopher B. Jones, "Search Engine Optimization", 3rd edition, Wiley publication.
5. Dana Moore, Raymond Budd, Edward Benson "Rich Internet Application AJAX and Beyond "WROX press, WILEY.
6. Srinivasan, "Web Technology", Pearson.