



DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH
 Scheme of Teaching and Examination
 Semester – VII (Computer Science and Technology)



To be implemented from Academic Year 2023-24

Sr. No.	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical		
						Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
CS411	High Performance Computing	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS412	Advanced Database Management System	3	1	-	04	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS413	Distributed and Cloud Computing	3	1	-	04	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS414	Advanced Network Engineering	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS415	Elective-1	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS414L	Advanced Network Engineering Lab	-	-	2	01	-	-	-	EPE	50	20
CS416L	Web Technology Lab-1	2	-	4	04	-	-	-	IPE	50	20
									EPE	50	20
CS417L	Major Project Phase - I	-	-	2	02	-	-	-	IPE	50	20
									EPE	50	20
CS418	Internship-II	-	-	-	01	-	-	-	IOE	50	20
Total		17	02	08	25	-	500	-	-	300	-
Audit Course											
HS411	Professional Ethics	02	-	-	-	Institute Level	-	-	-	-	-

Total Credits: 25
 Hours/Week: 29 hrs

Total Contact

Note:

1. Minimum 40% marks must be secured in SEE to pass that head.
2. Students are expected to do self-study for two hours as per the guide hence contact hours to be taken as two for the calculation of contact hours.
3. Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE –Mid Semester Evaluation, SEE – Semester End Examination,
 IPE – Internal Practical Evaluation, EPE–External Practical Examination,
 IOE– Internal Oral Evaluation, EOE–External Oral Examination

Note on Electives:

A particular elective will be offered when at least 20 students opt for it.

Note on Open Elective:

In order to promote interdisciplinary study department can offer open electives to students. This elective will be offered from the electives of other branches, particularly available in Sem. VII only. Students shall attend the theory lectures as per schedule of respective branch.



**DEPARTMENT OF TECHNOLOGY
FINAL YEAR B.TECH**

Scheme of Teaching and Examination
Semester – VIII (Computer Science and Technology)



To be implemented from Academic Year 2023-24

Sr. No	Subject	Teaching Scheme (Hours / Week)				Examination Scheme (Marks)					
		L	T	P	Credits	Theory			Practical		
						Scheme	Max. marks	Min. Passing	Scheme	Max. marks	Min. Passing
CS421	Mobile Computing	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS422	Information Security	3	1	-	04	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS423	Soft Computing	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS424	Elective-2	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS425	Elective- 3(Open Elective)	3	-	-	03	CIE	30	40	-	-	-
						SEE	70		-	-	-
CS423L	Soft Computing Lab	-	-	2	01	-	-	-	IPE	50	20
						-	-	-	EPE	50	20
CS426L	Web Technology Lab-2	2	-	4	04	-	-	-	IPE	50	20
						-	-	-	EPE	50	20
CS427L	Major Project Phase – II	-	-	4	04	-	-	-	IPE	50	20
						-	-	-	EPE	50	20
Total		17	1	10	25		500			300	
Audit Course											
HS421	Constitution of India	02	-	-	-	Institute Level	-	-	-	-	-

Total Credits: 25
Hours/Week: 30hrs

Total Contact

Note:

1. Minimum 40% marks must be secured in SEE to pass that head.
2. Students are expected to do self-study for two hours as per the guidance given by the project guide hence contact hours to be taken as two for the calculation of contact hours.

3. Tutorials and practical shall be conducted in batches with batch strength not exceeding 18 students.

CIE –Mid Semester Evaluation, SEE – Semester End Examination,

IPE – Internal Practical Evaluation, EPE–External Practical Examination,

IOE– Internal Oral Evaluation, EOE–External Oral Examination

Note on Electives:

A particular elective will be offered when at least 20 students opt for it.

Note on Open Elective:

In order to promote interdisciplinary study department can offer open electives to students.

This elective will be offered from the electives of other branches, particularly available in Sem. VIII only. Students shall attend the theory lectures as per schedule of respective branch.

List of Proposed Electives for final Year B. Tech

ELECTIVE-I, ELECTIVE-II and ELECTIVE-III Subjects

Elective-1 (CS415)
1. Data Science
2. Internet of Things
3. Project Management
Elective-2 (CS424)
1. Big Data Technology
2. Data Mining and Warehousing
3. Image Processing
4. Service Oriented Architecture
Elective-3 (Open Elective) (CS425)
1. Cyber Laws
2. IT for Engineers
3. E-Commerce

Equivalence of Final Year B.Tech (Computer Science and Technology) Semester VII and VIII

The above detailed syllabus is a revised version of the Final Year B. Tech (**Computer Science and Technology**) course being conducted by the Shivaji University at the Technology Department of the University. This syllabus is to be implemented from June 2023, (Academic year 2023-24). The prime feature of this revision is the transformation of the existing curriculum into the Outcome based curriculum as specified in NBA rules and regulations.

The Equivalence for the subjects of **Computer Science and Technology** at Final Year B Tech Semester VII and VIII pre-revised course under the faculty of Engineering and Technology is as follows.

Final Year B Tech Semester VII (Computer Science and Technology)

Sr. No.	Final Year B. Tech (Computer Science and Technology) Semester VII Pre-revised syllabus	Final Year B. Tech (Computer Science and Technology) Semester VII Revised syllabus(For Credit System)	Remark
1	Advanced Computer Architecture	High Performance Computing	Course Name Changed Slight modification in the content
2	Advanced Database Management System	Advanced Database Management System	No change in the subject content
3	Distributed Systems	Distributed and Cloud Computing	Course Name Changed Slight modification in the content
4	Network Engineering	Advanced Network Engineering	Course Name Changed Slight modification in the content
5	Elective-I Project Management	Elective-I Project Management	No change in the subject content
6	Elective-I Cyber Laws	-----	Shifted to Sem-VIII
7	Elective-I Internet of Things	Elective-I Internet of Things	No change in the subject content
8	-----	Elective-I Data Science	New Elective Course Introduced
9	Network Engineering Lab	Advanced Network Engineering Lab	Course Name Changed Slight modification in the content
10	Web Technology Lab-1	Web Technology Lab-1	No change in the subject content
11	Major Project Phase-I	Major Project Phase-I	No change in the subject content
12	Internship - II	Internship - II	No change in the subject content
13	Professional Ethics	Professional Ethics	No change in the subject content

Final Year B Tech Semester VIII (Computer Science and Technology)

Sr. No.	Final Year B. Tech (Computer Science and Technology) Semester VIII Pre-revised syllabus	Final Year B. Tech (Computer Science and Technology) Semester VIII Revised syllabus(For Credit System)	Remarks
1.	Mobile Technology	Mobile Computing	Course Name Changed Slight modification in the content
2.	Information Security	Information Security	No change in the subject content
3.	Soft Computing	Soft Computing	No change in the subject content
4.	Elective-2 Big Data Technology	Elective-2 Big Data Technology	No change in the subject content
5.	Elective-2 Data Mining and Warehousing	Elective-2 Data Mining and Warehousing	No change in the subject content
6.	Elective-2 Service Oriented Architecture	Elective-2 Service Oriented Architecture	No change in the subject content
7.	-----	Elective-2 Image Processing	New Elective introduced
8.	Elective-3 Industrial Management	-----	Elective removed from Open Elective
9.	Elective-3 Real Time Operating System	-----	Elective removed from Open Elective
10.	Elective-3 Optimization Techniques	-----	Elective removed from Open Elective
11.	-----	Elective-3(Open Elective) Cyber Laws	New Elective introduced
12.	-----	Elective-3(Open Elective) IT for Engineers	New Elective introduced
13.	-----	Elective-3(Open Elective) E-Commerce	New Elective introduced
14.	Soft Computing Lab	Soft Computing Lab	No change in the subject content
15.	Web Technology Lab-2	Web Technology Lab-2	No change in the subject content
16.	Major Project Phase-II	Major Project Phase-II	No change in the subject content

17.	Constitution of India	Constitution of India	No change in the subject content
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Audit course have not been assigned any credits. The students will be evaluated for these courses by the concerned course in charge. There will be grade conferred to the student. The grade will be based on conversion of marks obtained out of 50. (Obtaining passing grade is essential). Please refer to chart in the detail examination scheme. The chart shows the marks range and the respective grade.

***Course work:** It consists of assignments, quiz, seminars, presentations, research papers and research articles, developing working models, surveys and activities related to course as designed by the course coordinator to suit the needs of the course and to complement programme outcomes. The practical work and its journal is not part of course work.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII					
Course Title	:	High Performance Computing		Course Code:	:	CS411	
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week		Total Credits	:	03
		Tutorial :	-- Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS223, CS313					
Course Domain	:	Core					

Course Rationale: The aim of the course is to study the fundamental concepts of HPC, the commonly used HPC platforms, the methods for measuring, assessing and analysing the performance of HPC architecture. This will also give overview of multitasking and multiprocessing concepts in parallel architecture.

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Provide detail knowledge of different Parallel Architectures	1.	Classify parallel architectures
2.	Analyse performance measures for evaluation of parallel architectures and pipeline processors	2.	Analyse and evaluate parallel architectures and describe pipelined processors.
3.	Provide details of multitasking architecture and Latency hiding techniques	3.	Understand concept of multitasking architecture and Latency hiding techniques
4.	Provide details of processor topology and multiprogramming architectures	4.	Design processor topology and understand basics multiprogramming architectures
5.	Provide details of data flow architecture and data flow programming language	5.	Understand data flow architecture and data flow programming language
6.	Analyse modes of programming parallel architectures	6.	Analyse and understand modes of programming parallel architectures

<i>Curriculum Content</i>	Hours
Unit I Introduction Architectures and its classification, Evolution of parallel processors, current & future trends towards parallel processors. Principles of pipelining and array processing. Scalar and vector pipelines. Architectural development tracks.	7
Unit II Pipeline Processors Classification of pipelined processors, Instruction Pipeline design, performance evaluation factors. Vector processing concepts, pipelined vector processors, Cray type vector processor -design example. Array processors	7
Unit III Multithreading Introduction to Associative memory processors, examples – STARAN. Multithreaded arch –principles of multithreading, Scalable and multithreaded architectures Latency hiding techniques. Scalable coherent multiprocessor model with distributed shared memory	6
Unit IV Multiprocessing Various topologies, static and dynamic type of networks with examples. Loosely coupled and tightly coupled architectures. Cluster computing as an application of loosely coupled architecture. Example –CM*	6
Unit V Data Flow Architectures Dataflow Architectures: Concepts of data flow computing, static and dynamic dataflow architectures. Dataflow operators, data flow language properties, advantages & potential problems	6
Unit VI Parallel Programming Parallel programming models, parallel languages and compilers, code optimization and scheduling, loop parallelization and pipelining.	7
<i>Suggested Text Books:</i>	
1.	Advanced computer architecture – Kai Hwang (MGH)
2.	Computer Architecture and Parallel Processing – Kai Hwang and Briggs (MGH).
3.	Advanced Computer Architectures ,Parallelism, Scalability, Programmability, Kai Hwang & Naresh Jotwani, 2nd Edition McGrawHill Education.
<i>Suggested Reference Books:</i>	
1.	Parallel and Distributed Systems 2nd Edition Arun Kulkarni, Napur Prasad Giri, Wiley Publications.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII					
Course Title	:	Advanced Database Management System		Course Code:	:	CS412	
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week		Total Credits	:	04
		Tutorial :	1 Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total= 100	Duration of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS315					
Course Domain	:	Core					
Course Rationale: This course will introduce the students the knowledge of various types of database systems with advanced querying for decision support system and information retrieval etc.							
Course Objectives: The Course teacher will				Course Outcomes: Students will be able to			
1.	Discuss the different types of database system architectures.			1.	Explain and evaluate the fundamental theories for advanced database architectures and query operators.		
2.	Help Students to Design and implement advanced object oriented database queries using Structured Query Language.			2.	Design and implement parallel database systems with evaluating different methods of storing, managing of parallel database.		
3.	Explain study and designing of distributed database with its applications.			3.	Assess and apply database functions of distributed database.		
4.	Elaborate parallel database principles.			4.	Evaluate different database designs and architecture.		
5.	Describe recommending and implementing procedures including database tuning, backup, query processing, query optimization and recovery.			5.	Administer and analyse database with query optimization techniques and develop Web interface with database.		
6.	Teach advanced querying with Decision support system and information retrieval.			6.	Understand advanced querying and decision support system.		

<i>Curriculum Content</i>	Hours
<p>Unit I Database Systems architectures</p> <p>Centralized & C/S architectures, server systems, distributed systems, networks types.</p> <p>Object-Relational Databases</p> <p>Nested relations, complex types, inheritances, reference types, querying with complex types, functions and procedures, OO versus Object-Relational.</p>	<p>4</p> <p>5</p>
<p>Unit II Distributed Databases</p> <p>Homogeneous & heterogeneous databases, distributed data storage, distributed transactions, commit protocols, concurrency control in distributed databases, availability, distributed query processing, heterogeneous distributed databases, directory systems.</p>	<p>6</p>
<p>Unit III Parallel Database</p> <p>Integrated, I/O parallelism, inter-query parallelism, intra-query parallelism, intra-operation parallelism, inter-operation parallelism, design of parallel systems.</p>	<p>5</p>
<p>Unit IV Application Development & Administration</p> <p>Web interfaces to databases, performance tuning, performance benchmarks, standardization, E-commerce, Legacy systems.</p>	<p>7</p>
<p>Unit V Advanced Querying & Information Retrieval</p> <p>Decision support systems, data analysis and OLAP, Data mining, data-warehousing, Information Retrieval systems.</p>	<p>7</p>
<p>Unit VI Advanced Transaction Processing</p> <p>Transaction-processing monitors, transactional workflows, main-memory databases, real-time transaction systems, long-duration transactions, transaction management in multi-databases.</p>	<p>5</p>
<p>Suggested list of Tutorials and Assignments: Students have to perform 6-8 tutorials based on the curriculum.</p>	

General Instructions:-----	
Suggested Text Books:	
1.	Silberschatz, Korth, Sudarshan – 4th Edition Database system concepts – (MGH).
2.	Raghu Ramkrishnan Database Management System – (MGH).
Suggested Reference Books:	
1.	Thomas Connolly & Carolyn Begg (Pearson) Third Edition Database Systems: A practical approach to design, implementation & Management.
2.	Ramez Elmasri and Shamkant Navathe, Fundamentals of Database Systems 2nd Ed, Benjamin Cummings, 1994.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology),		
		Part IV, Semester VII		
Course Title	:	Distributed and Cloud Computing	Course Code:	: CS413
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week	Total Credits : 4
		Tutorial :	1 Hrs/week	
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Duration of SEE : 3 hrs
Revision:	:	Fourth	Month	: June 2023
Pre-requisites (if any)	:	CS313, CS322		
Course Domain	:	Core		
Course Rationale: This course provides an introduction to the fundamentals of distributed systems and cloud computing. The main goal of a distributed system is to make it easy for users to access remote resources, and share them with other users in a controlled manner. The main purpose of cloud computing is the delivery of different services through the Internet. These resources include tools and applications like data storage, servers, databases, networking, and software.				
Course Objectives: The Course teacher will		Course Outcomes: Students will be able to		
1.	Introduce the fundamentals of distributed operating systems	1.	Demonstrate knowledge of the core architectural aspects of distributed Systems.	

2.	Describe the principles, architectures, and algorithms used in distributed systems.	2.	Demonstrate distributed systems using various interpose communication techniques, such as remote procedure call, and remote method invocation.
3.	Introduce the concepts of naming, synchronization, consistency and replication, and distributed file systems.	3.	Summarize key mechanisms and models for distributed systems including logical clocks, election algorithms, distributed mutual exclusion, consistency, and replication.
4.	Give students a basic grounding in designing and implementing distributed and cloud systems	4.	Describe the various design issues in distributed systems e.g. system performance and reliability, distributed file system, etc.
5.	Explain the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges;	5.	Understand the fundamental principles of distributed computing and the cloud infrastructure model.
6.	Help students identify the technical foundations of cloud systems architectures.	6.	Demonstrate public cloud platforms

<i>Curriculum Content</i>		Hours
Unit I Introduction Definition, Goals, Types of distributed systems: Distributed Computing System, Distributed Information System, Architecture: Architectural, Styles, System Architecture		6
Unit II Processes and Communication Virtualization, Servers, Code Migration, Software Agents, Remote Procedure Call, Message Oriented Transient Communication		6
Unit III Synchronization Distributed Shared Memory: General architecture, Design and Implementation Issues, Consistency Models, Implementing Sequential Consistency Model, Replacement Strategy, Thrashing, Heterogeneous DSM, Physical Clock Synchronization, Logical Clock, Mutual exclusion, Election Algorithms		8
Unit IV Distributed File Systems Architecture, Processes, Communication, Naming, Synchronization, Consistency Replication		5
Unit V Cloud Computing and Service Models Public, Private, and Hybrid Clouds, Cloud Ecosystem and Enabling Technologies, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS) and Software-as-a-Service (SaaS) Architectural Design of Compute and Storage Clouds A Generic Cloud Architecture Design, Layered Cloud Architectural Development, Virtualization Support and Disaster Recovery, Architectural Design Challenges		8
Unit VI Public Cloud Platforms: GAE, AWS, and Azure Public Clouds and Service Offerings, Google App Engine (GAE), Amazon Web Services		6

(AWS), Microsoft Windows Azure, Cloud Security Defense Strategies	
Suggested list of Tutorials and Assignments: Students have to perform 6 to 8 tutorials based on the curriculum.	
Suggested Text Books:	
1.	A. S. Tanenbaum (2nd Edition) Distributed Systems Principles and Paradigms-, Pearson Education
2.	P. K. Sinha (PHI) Distributed Operating Systems (For Distributed Shared Memory and Distributed Operating Systems)
3.	Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing, © 2012 Elsevier
Suggested Reference Books:	
1.	George Coulouris, Jean Dollimore, Tim Kindberg (Pearson Education) Distributed Systems Concepts & Design

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology) Part - IV Semester VII					
Course Title	:	Advanced Network Engineering	Course Code	:	CS414		
Teaching Scheme (Hours)	:	Lecture	03Hours/Week		Total Credits	:	03
		Tutorial	00 Hours/Week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Grand Total =100	Duration of SEE	:	03 Hrs.
Revision	:	Fourth			Month	:	June 2023
Pre-requisites (If any)	:	CS214					
Course Domain	:	Core					
Course Rationale: The objective of the course is to familiarize students with basics and Advance Networking. This course is designed to produce networking professionals capable of implementing, administering, and maintaining Networks and overall systems with the knowledge of the Windows Server 2008 through its internal working of the core components and introduction to Linux services, protocols and Microsoft Azure Cloud services							
Course Objectives: The Course Teacher will				Course Outcomes: Students will be able to			

1.	Introduce various networking components and Microsoft windows operating system, concepts and trends.	1.	Identify the various networking devices like switches, hub, routers, and gateways with their functioning and understand Microsoft windows O.S. Concept and terms.
2.	Provide the knowledge of overall system architecture of windows operating system with its key system components.	2.	Learn overall system architecture of windows with its key components.
3.	Provide the knowledge of windows security system components and design issues of it.	3.	Learn security system components and analyze design issues of Window security system.
4.	Introduce I/O system components of windows network operating system.	4.	Understand and analyze I/O system components of Windows Network operating system.
5.	Provide knowledge of windows networking architecture and Microsoft Azure Cloud Services.	5.	Identify various programming models and protocol support for implementing windows network applications and Microsoft Azure Cloud Services.

Curriculum Content		Hours
Unit-I Introduction to concepts and tools of Windows Operating System Introduction to Networking Components, Architectures, Windows Flavors of Network , Operating Systems, Foundation Concepts And Terms, Windows API, Services, Functions, Routines, Processes, Threads, Jobs, Virtual Memory, Kernel Mode Vs. User , Mode, Terminal Services And Multiple Sessions, Objects And Handles, Registry..		4
Unit II System Architecture Requirements and Design Goals, Operating System Model, Architecture Overview, Key System Components.		5
Unit III Security Security Ratings, Security System Components, Protecting Objects, Account Rights , and Privileges, Security Auditing.		7

Unit IV I / O system Device Drivers, Types of Device Drivers, Structure of a Driver, Types of I/O, The Plug and Play (pnp) Manager, Installation. Storage terminology, disk drivers, volume management, windows file system formats, File system driver architecture.	7
Unit V Windows networking architecture Windows networking architecture, the OSI reference model, windows networking Components, networking APIs, windows sockets, Winsock kernel (wks.), remote procedure Call, web access APIs, named pipes and mail slots , NetBIOS, other Networking APIs.	7
Unit VI Linux Services , Protocols and Microsoft Azure cloud services Linux Services and protocols-FTP, SMTP, Telnet IP Sec and Virtual Private Network(VPN) , Core Microsoft Azure Services	7
Suggested Text Books:	
1.	1. Mark E. Russinovich and David A. Solomon with Alex Ionescu Windows Internals, Including Windows Server 2008 and Windows Vista 5th Edition (2009) .(MS Press)..
Suggested Reference Books:	
1.	Charlie Russel and Craig Zacker Introducing Server 2008 R2 (Microsoft Press).
2.	Anthony Jones & Jim Ohlund Network Programming for MS Windows 2nd Edition – (Microsoft Corporation)
3	Jonathan Hassell Windows Server 2008: The Definitive Guide (SPD O’Reilly). Jeffrey R.Shapiro Windows Server 2008 – (Wiley India Edition)
4.	Richard Petersen Linux: The complete Reference Sixth edition (TMGH)

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII			
Course Title	:	Data Science (Elective-1)		Course Code:	CS415
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week	Total Credits	: 03
		Tutorial :	-- Hrs/week		
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE : 3 hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	CS314,CS315			
Course Domain	:	Elective			
Course Rationale: This course will introduce the students the fundamentals knowledge of data science and gives knowledge to extract and visualize valuable information for use in decision making, product development, trend analysis, and forecasting etc.					
Course Objectives: The Course teacher will			Course Outcomes: Students will be able to		
1.	Elaborate the students to fundamentals of data science.	1.	Describe fundamentals of data science.		
2.	Help to make students to learn techniques of data processing and data analytics.	2.	Apply data processing techniques.		
3.	Help students to learn how to extract meaning from data.	3.	Apply data analytical techniques on pre-processed data.		
4.	Describe Data Visualization methods.	4.	Find how to extract meaning from data.		
5.	Explain Social Network Analysis techniques.	5.	Apply Data Visualization techniques.		
6.		6.	Elaborate and Explain Social Network Analysis techniques.		
Curriculum Content					Hours
Unit I Introduction Introduction to Data Science, Examples, Data Sources, Challenges, Applications, Comparative Study of data science with databases, scientific computing, computational science, machine learning, Data Modelling, Statistical Data Modelling, Computational Data Modelling, Statistical limits on data- Bonferroni's principle.					6
Unit II Data Pre-processing Why do We Need to Pre-process the Data?, Data Cleaning, Handling Missing Data, Identifying Misclassifications, Graphical Methods for Identifying Outliers, Measures of					7

<p>Center and Spread, Data Transformation, Min–Max Normalization, Z-Score Standardization, Decimal Scaling, Transformations to Achieve Normality, Numerical Methods for Identifying Outliers, Flag Variables, Transforming Categorical Variables into Numerical Variables, Binning Numerical Variables, Reclassifying Categorical Variables, Adding an Index Field, Removing Variables that are not Useful, Variables that Should Probably not be Removed, Removal of Duplicate Records</p>	
<p>Unit III Exploratory Data Analysis</p> <p>Hypothesis Testing Versus Exploratory Data Analysis, Getting to Know the Data Set, Exploring Categorical Variables, Exploring Numeric Variables, Exploring Multivariate Relationships, Selecting Interesting Subsets of the Data for Further Investigation, Using EDA to Uncover Anomalous Fields, Binning Based on Predictive Value, Deriving New Variables: Flag Variables, Deriving New Variables: Numerical Variables, Using EDA to Investigate Correlated Predictor Variables .</p>	7
<p>Unit IV Extracting Meaning from Data</p> <p>William Cukierski , The Kaggle Model, Thought Experiment: What Are the Ethical Implications of a Robo-Grader?, Feature Selection, David Huffaker: Google’s Hybrid Approach to Social Research.</p>	6
<p>Unit V Data Visualization and Fraud Detection</p> <p>Data Visualization History, What Is Data Science, Redux?, A Sample of Data Visualization Projects, Mark’s Data Visualization Projects, Data Science and Risk, Data Visualization at Square, Ian’s Thought Experiment, Data Visualization for the Rest of Us.</p>	6
<p>Unit VI Social Networks and Data Journalism</p> <p>Social Network Analysis at Morning Analytics, Social Network Analysis, Terminology from Social Networks, Thought Experiment, Morningside Analytics, More Background on Social Network Analysis from a Statistical Point of View, Data Journalism.</p>	6
<p>Suggested list of Tutorials and Assignments: -----</p> <p>General Instructions:-----</p>	
<p><i>Suggested Text Books:</i></p>	
1.	Cathy O’Neil and Rachel Schutt, "Doing Data Science", O’Reilly Media, October 2013, Print ISBN:978-1-449-35865-5
2.	Daniel T. Larose and Chantal D. Larose, “Data Mining and Predictive Analytics”, Wiley Publication, ISBN 978-1-118-11619-7
<p><i>Suggested Reference Books:</i></p>	

1.	Field Cady, "The Data Science Handbook", Wiley Publication
2.	Wes McKinney, "Python for Data Analysis", O'Reilly Media, ISBN ISBN: 978-1-449-31979-3
3.	Jure Leskovec, Anand Rajaraman, and Jeffery David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2 edition (13 November 2014), ISBN-10: 1107077230, ISBN-13: 978-1107077232

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII					
Course Title	:	Internet of Things (Elective I)		Course Code:	:	CS415	
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week		Total Credits	:	03
		Tutorial :	-- Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Durati on of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS214					
Course Domain	:	Elective (IoT Platform, communication, security)					

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Elaborate what is Internet of things and how it works.	1.	Describe key technologies in Internet of Things.
2.	Describe different technologies used in IOT.	2.	Compare and contrast the deployment of smart objects and the technologies to connect them.
3.	Compare different Application protocols for IoT	3.	Compare the role of IoT protocols for efficient network communication.
4.	Provide the basics of embedded devices.	4.	Summarize the need for Data Analytics and Security in IoT.
5.	Recognise the factors that contributed to the emergence of IoT	5.	Describe different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
		6.	Understand IoT platforms such as Raspberry-Pi and Arduino

Curriculum Content		Hours
Unit I Introduction to the Internet of Things What is the Internet of Things? About objects/things in the IoT, The identifier in the IoT , Examples of applications, Enabling technologies of IoT, Identification technology, Sensing and actuating technology , Other technologies, Connected objects' communication.		6
Unit II Radio Frequency Identification Technology Introduction, Principles of RFID, Components of an RFID system, Reader, RFID tags, RFID Middleware, Issue.		6
Unit III Wireless Sensor Networks The node: Communication, Computation, Sensing, Energy, Connecting nodes: Radio basics, Common Misconceptions, Reliable communication in practice: channel hopping, Networking nodes, Medium access control, Multi-hop routing Securing communication.		5
Unit IV Communication Technologies WPAN Technologies for IoT: Introduction to Zigbee/IEEE 802.15.4 , Bluetooth and its Low-Energy Profile , IEEE 802.15.6 WBANs, NFC , Comparison of WPAN Technologies., LTE, data rate, range, power, computations/bandwidth, QoS.		7
Unit V IoT Architecture and Protocols Layered Architecture for IoT: Three layers and five layers Architecture, Protocol Architecture of IoT, Fog architecture of a smart IoT gateway. Protocols: Message Queue Telemetry Transport, Constrained Application Protocol, Advanced Message Queuing Protocol Data Distributed Services, Representational State Transfer, Extensible Messaging and Presence Protocol.		8
Unit VI Prototyping Embedded Devices Electronics: Sensors, Actuators, Scaling Up the Electronics. Embedded Computing Basics: Microcontrollers, System-on-Chips, Choosing Your Platform. Arduino: Developing on the Arduino, Some Notes on the Hardware, Openness Raspberry Pi: Cases and Extension Boards, Developing on the raspberry Pi, Some Notes on the Hardware, Openness		7
Suggested Text Books:		
1.	The Internet of Things: Connecting Objects to the Web, Hakima Chaouchi, Wiley Publications	
2.	Building the internet of things with IPv6 and MIPv6 by DANIEL MINOLI	
3.	Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally	
Suggested Reference Books:		
1.	Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels,	

	Morgan Kuffmann						
Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII					
Course Title	:	Project Management(Elective-1)		Course Code:	:	CS415	
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week		Total Credits	:	03
		Tutorial :	-- Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	03 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS224					
Course Domain	:	Elective					

Course Rationale:

Project management course help aspirants inculcate a strong leadership quality, set goals and targets, and take step-by-step action to achieve those goals.

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.	1.	Understand the selection and initiation of individual projects and of portfolios of projects in the enterprise.
2.	Help to Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.	2.	Conduct project planning activities that accurately forecast project costs, timelines, and quality. Implement processes for successful resource, communication, and risk and change management.
3.	Help to Utilize technology tools for communication, collaboration, information management, and decision support.	3.	Demonstrate effective project execution and control techniques that result in successful projects.
4.	Help to Implement general business concepts, practices, and tools to facilitate project success.	4.	Conduct project closure activities and obtain formal project acceptance.
5.	Explain the project to the organization's strategic plans and business justification throughout its lifecycle.	5.	Demonstrate a strong working knowledge of ethics and professional responsibility and effective organizational leadership and change skills for managing projects, project teams, and stakeholders.

<i>Curriculum Content</i>		Hours
Unit I Introduction to Project Management Project, project management(PM), role of project manager, project management profession, system view of PM, organization ,stakeholders, project phases and lifecycle, context of IT projects, process groups, mapping groups to knowledge areas.		7
Unit II Project Integration Management Strategic planning and project selection, preliminary scope statements, project management plans, project execution, monitoring and controlling project work, integrated change control, closing project, software assistance.		6
Unit III Scope and Time Management Scope planning and scope management plan, scope definition and project scope statement, creating the work breakdown structure, scope verification and control, software assistance, Time management-Importance of project schedules, activity - definition, sequencing, resource estimating, duration estimating; schedule development and control, software assistance.		7
Unit IV Cost and quality management Importance, basic principles, cost estimating, budgeting and control, software assistance, Quality management- Importance, quality - planning assurance control, tools and techniques, modern quality management and improving IT project quality, software assistance.		6
Unit V Human Resource management Importance, keys to managing people, human resource planning, acquiring, developing and managing project team, software assistance, Communication management- Importance, communication planning, information distribution, performance reporting, managing stakeholders, suggestions for improving project communication, software assistance.		6
Unit VI Risk and procurement management Importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control, software assistance, Procurement management- Importance, planning purchases and acquisitions, planning contracting, requesting seller responses, selecting sellers, administering the contract, closing the contract, software assistance.		7
Suggested Text Books:		
1.	Information Technology Project Management (4th Edition) – Kathy Schwalbe (Cengage learning – India Edition).	
Suggested Reference Books:		
1.	Mantel Jr., Meredith, Shafer, Sutton with Gopalan Project Management Core	

	Textbook – (Wiley India Edition)
2.	Harold Kerzner Project Management- A systems Approach to planning, scheduling and controlling - (John Wiley & Sons, Inc)
3.	Newtown Square A Guide to the Project Management Body of Knowledge (3rd Edition), PA, Project Management Institute, 2005.

Class, Part & Semester	:	Final Year B.Tech (Computer Science & Technology) Part IV, Semester VII					
Course Title	:	Advanced Network Engineering Lab	Course Code:	:	CS414L		
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week	Total Credits	:	01	
Evaluation Scheme (Marks)	:	IPE/IOE= Nil	EPE= 50	Total=50	Duration of EPE	:	03 hours
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS214					
Course Domain	:	Practical					

Course Rationale

In this lab, students will perform Network programming assignments on different network services and protocols using socket programming, Named pipes, NetBIOS, RPC, etc., and Installing, configuring, managing, and troubleshooting any one or more network operating systems and services – Win 2008 / 2003, Linux, etc and use their services like – FTP, Telnet, DHCP, HTTP, Clustering, Terminal Services, DNS, Active Directory Services, etc.

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Provide Knowledge about Networking Devices like hub switches, routers, and Network Interface Card.	1.	Analyze and resolve networking problems through the application of systematic approaches and diagnostics tools.
2.	Provide Knowledge about Socket and Socket Programming models.	2.	Implement of TCP and UDP client-server socket programs.

3.	Provide knowledge about the installation of the Different operating systems.	3.	Demonstrate the installation of different operating systems.
4.	Teach to interpret basic skills needed to understand common services needed for network functionality, maintenance, and troubleshooting such as DNS, DHCP and FTP, IIS Server and Netsim.	4.	Demonstrate the installation and configuration of DNS, DHCP, FTP, IIS Servers.
5.	Provide the knowledge about Network Analyzer and Network Simulator Tools.	5.	Simulate, configure and analyze the network using networking tools e.g. Wireshark, Netsim etc.

List of Experiments

Sr. No.	
1.	Study of different Networking Devices.
2.	Examining Network Interface Card (NIC).
3.	Illustration of Socket programming and implementation of TCP client server program.
4.	Implementation of UDP client server program.
5.	Demonstration of installation of Windows server 2008/2012.
6.	Demonstration of installation of Red Hat Linux.
7.	Illustration of installation and configuration of DNS.
8.	Illustration of installation and configuration of DHCP.
9.	Illustration of installation and configuration of FTP.
10.	Illustration of installation and Configuration of IIS server on Windows 2008 Server.
11.	Demonstration of Netsim/Wireshark for packet analyzer.

General Instructions: Students have to perform 8-10 practical's from the list

Suggested Text Books/ Reference Books/Manual

1.	Richard Steven, "Unix network programming", for Socket Programming, Prentice Hall 3rd edition, 2015
2.	Jeffery S. Beasley, "Networking", New Riders Press, 2nd edition, 2008

3.	UNIX-Linux-System-Administration- Handbook (5 TH EDITION) Evi, Nemeth , Garth Snyder , Trent R. Hein , Ben Whaley , Dan Mackin.
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Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VII			
Course Title	:	Web Technology Lab-I			Course Code: : CS416L
Teaching Scheme (Hours)	:	Lecture :	2 Hrs/week		Total Credits : 04
	:	Practical:	4Hrs/week		
Evaluation Scheme (Marks)	:	IPE=50	EPE=50	Total=100	Duration of EPE : 2hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	CS317L			
Course Domain	:	Core			

Course Rationale: Introduce the student to the conceptual and practical aspects of XML, XSL, XSLT, validation by DTD. This course will introduce the role of java servlet in making any web based applications This course will introduce the practical knowledge of JSP. Demonstrate how jsp differ from servlet programming.

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Demonstrate configuration of XML application.	1.	Apply technical knowledge of XML
2.	Provide different XML applications	2.	Design web applications using XML
3.	Give the demonstration on connectivity of database with application	3.	Use and design XML controls.
4.	Demonstrate Configuration of Tomcat Server and Deployment servlet	4.	Create database driven applications using Apache server
5.	Introduce the fundamentals of developing modular application by using JSP	5.	Handle database using jsp applications

Curriculum Content		Hours
Unit I Introduction to XML What is XML, XML verses HTML, XML terminology, XML standards, XML syntax checking, The idea of markup, XML Structure, Organizing information in XML, Creating Well-formed XML, XML Namespaces. DTD- Introduction to DTD, Document Type Declaration, Element Type Declaration, Attribute Declaration, Conditional Section, Limitations of DTD Parsing XML: Introduction to Parser, Parsing approaches, JAXP, JAXP and SAX, JAXP and DOM.		5
Unit II Extensible Stylesheet Language (XSL), XML Schema Introduction to XSL, overview, XPATH, XSLT– templates, creating elements and attributes, looping and sorting, conditional processing, defining variables.		4

<p>XML Schema: Introduction, basic and complex schema, specifying frequency, element contents, content model reuse, anonymous types, mixed content, grouping of data, mandating all elements, choices, sequences, simple types numeric, time, xml, string, binary data types, deriving types-facets, attribute.</p>	
<p>Unit III Introduction to Servlet History of web applications, support for web application, power of servlet, a Servlet's job, basic servlet code, configuration of apache tomcat server, setup Development Environment, Compiling and Deploying Servlet, Web Application -directory structure, Deployment descriptor, Assigning custom URLs to servlet. Structure of Servlet HTTP basic, The servlet API, Page Generation, The Servlet Life Cycle – The Service method, doGet and doPost methods, Init method, destroy method, The Single Thread Model interfaces.</p>	5
<p>Unit IV Retrieving Information Servlet Init Parameters and Parameter Names, Information about server, Context Init Parameters, The Client Information – information about client machine, Restricting Access, Information about user, The Request – Request Parameter, path information, Serving files, Serving Resources, Request Headers, Handling Post Request. Creating Response in Servlet The Structure of response, sending normal response, using persistent connection, response buffering, controlling response buffer, status codes, setting status code, HTTP headers, setting HTTP headers, Redirecting request, client pull, configuring error pages, logging, Exceptions.</p>	6
<p>Unit V Java Server Pages: Need for JSP, Benefits of JSP, Advantages of JSP over other technologies, Installation of JSP pages, Creating Template Text, Invoking Java Code From JSP, Limiting the JAVA code in JSP, Using JSP Expression, Example of JSP Expression, Comparing Servlet to JSP, Writing Scriptlets, Scriptlet examples, Scriptlet for conditional execution, Using Declaration, Declaration Example, Using Predefined Variables, JSP page Directive – import, contentType, pageEncoding, session, buffer, autoFlush, errorPage</p>	4
<p>Unit VI Web Services: Introduction to Web Services, Comparison of Web Services with traditional technologies, Buzzwords in Web Services, Java Web Services, RESTful Web Services.</p>	2

List of Experiments

Sr. No.	Experiment Name
1.	Study of XML and implement simple xml program.
2.	Implement program for XML with CSS
3.	Implement program in xml by using internal and external DTD.
4.	Implement program for XML Schema
5.	Study of XSLT and Implement program to display content of xml document
6.	Implement program to convert XML into HTML using SORT function
7.	Implement program to convert XML into HTML using IF function
8.	Implement program to convert XML into HTML using WHEN function
9.	Study of installation and configuration of Apache Tomcat Server and implement simple servlet program.
10.	Implement chaining program using servlet.
11.	Implement session management using servlet.
12.	Implement simple demo program using JSP.
13.	Implement database connectivity using JSP(SELECT,INSERT operation)
14.	Implement database connectivity using JSP(DELETE,UPDATE operation)

General Instructions:

1. Perform XML programs on any browser.
2. Install and configure Tomcat Apache Server.
3. Perform Servlet and JSP programs on tomcat apache server.

Suggested Text Books/ Reference Books/Manual

1.	Atul Kahate[Pearson Education] – XML and Related Technologies
2.	Jason Hunter- Java Servlet Programming – [SPD O'REILLY]
3.	Marty Hall, Larry Brown, Core-Servlet and JavaServer Pages Volume -1 , 2nd Edition [Pearson Education]
4.	Charls Goldfarb The XML Handbook .
5.	Erik Ray -Learning XeamtML – [SPD O'REILLY 2nd Edition]
6.	Black Book Web Technologies - [Drech Press]
7.	Bryan Basham Head First – Servlet and JSP - [SPD O'REILLY, 2nd Edition]

Class, Part & Semester	:	Final Year B.Tech (Computer Science & Technology) Part I, Semester VII					
Course Title	:	Major Project Phase - I	Course Code:	:	CS417L		
Teaching Scheme (Hours)	:	2 hours/weeks=2x 13 weeks=26hrs minimum		Total Credits	:	02	
Evaluation Scheme (Marks)	:	CIE = SEE =	IPE:50 EPE:50	Total= 100	Duration of SEE	:	-----
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	Synopsis					
Course Domain	:	Core					
Course Rationale: Student is evaluated during the Internal practical evaluation and External practical evaluation							
Course Objectives: The Course teacher will				Course Outcomes: Students will be able to			
1.	Identify selection and initiation of individual projects and of portfolios of projects in the enterprise.			1.	Describe the need of a software project for the society		
2.	Recognize the need and ability to engage in lifelong learning.			2.	Identify requirement analysis like functional and technical requirements for the project		
3.	Conduct project planning activities that accurately forecast project costs, timelines, and quality.			3.	Come up with design documents for the project consisting of Architecture, Dataflow diagram, class diagram, Algorithmic descriptions of various modules, collaboration diagram, ER Diagrams, Database Design Documents, Sequence Diagram, Use Case Diagram etc.		
4.	Function effectively on teams and to communicate effectively			4.	Demonstrate analysis and design.		
				5.	Prepare the technical Design Phase-1 report		
Curriculum Content							
The project work is to be carried out in two semesters of Final Year B.Tech. The project should be undertaken preferably by group of 4-5 students who will jointly work and implement the project in the two semesters.							
In Semester VII, The group will select a project with the approval of the Guide (teaching							

	<p>faculty) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages before second week of August in the academic year. The group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work at the end of semester –VII as a part of the term work submission in the form of a joint report.</p> <p>The term work assessment will be done jointly by teachers appointed by Head of the Department.</p> <p>The oral examination will be conducted by an internal and external examiner as appointed by the University.</p> <p>Note: 1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.</p> <p>2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.</p> <p>3. Care should be taken to avoid copying and outsourcing of the project work.</p>
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Class, Part & Semester	:	Final Year B.Tech (Computer Science & Technology) Part IV, Semester VII			
Course Title	:	Internship- II		Course Code:	: CS418
Teaching Scheme (Hours)	:	-		Total Credits	: 01
Evaluation Scheme (Marks)	:	CIE = NA SEE =NA	IOE:50	50	Duration of SEE : NA
Revision:	:	Fourth		Month	: June 2023
Pre-requisites (if any)	:	CS319			
Course Domain	:	Core			
Course Rationale: Student is evaluated during the Internal oral evaluation					
Course Objectives: The Course teacher will			Course Outcomes: Students will be able to		
1.	Provide exposure to corporate culture.		1.	Apply fundamental principles of Computer Science.	
2.	Provide exposure to latest technologies used in the industry.		2.	Become specialized in a particular technology domain.	

3.	Learn to communicate efficiently.	3.	Become updated with all the latest changes in technological world.
4.	Help to apply fundamental principles of Computer Science in real-world problems.	4.	Communicate efficiently.
		5.	Identify, formulate and model problems and find engineering solution based on a systems approach.
		6.	Get awareness of the social, cultural, global and environmental responsibility as an engineer.

Curriculum Content

Course Contents

As per the approved academic structure, students will be allowed to take internships after the 6th semester of B. Tech program. Below are the guidelines/rules and regulations for the students willing to opt for the internship –

- Students have to complete one month of industrial training program after semester VI in Software /hardware Industries, Telecom Sectors, and Corporate Offices of their choice with the approval of the Department.
- At the end of the training, the student will submit a report as per the prescribed format to the department.

Course Assessment

This course is mandatory credit-based course and the student has to pass the course to be promoted to final year. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. CIE Marks will be awarded out of 50 and appropriate grades assigned as per the rules and regulations.

Class & Semester	:	Final Year B.Tech(Computer Science & Technology), Part IV, Semester VII								
Course Title	:	Professional Ethics		Course Code:	:	HS421				
Teaching Scheme (Hours)	:	Lecture= 2 hr /Week		Credits	:	Nil				
Evaluation Scheme (Marks)	:	Assignment	:	50	Written Test Total	:	25	Duration of Exam	:	NA
Revision	:	Fourth		Month	:	June 2023				
Pre-requisites	:	It does not require any pre-requisite as such but eager to know about our profession's connectivity, role and responsibility towards society and environment.								
Course Domain	:	Audit Course at institute level , Humanities & Social Science								

Course Rationale:

Course Objectives: The Course Teacher will		Course Outcomes: Students will be able to	
1.	Explain importance of engineers' connectivity with society and environment.	1.	Realize the role of engineers towards society and environment.
2.	Make students aware of ethics and responsibility of engineers as professionals.	2.	Demonstrate ethical practices and responsibility as a professional.
3.	Make them able to undergo ethical judgments and solve problems.	3.	Make ethical judgments and solve problems.
4.	Develop attitudes required of engineers and values shared by engineers	4.	Get developed for engineers' attitude with sharing of values.
5.	Help them practice decision making & team players.	5.	Practice decision making and team culture.
6.	Describe importance of lifelong learning.	6.	Follow lifelong learning attitude.

Curriculum Content		Hours
Unit I: Engineer, Society and Environment		07
1. Understanding of the relation between engineering and society/Environment. 1.1 Understanding of the effects and impacts of science and technology on human society. 1.2 Understanding the effects and impacts of science and technology on the natural environment. 1.3 Understanding the characteristics of the modern globalized world.		
Unit II: Ethics and engineering Profession		07
2 Understanding of ethics and responsibilities of engineers as Professionals. 2.2 Understanding of the roles and responsibilities of engineers in Society. 2.3 Understanding of the basic concepts and theories of ethics. 2.4 Understanding the relation between law and ethics and having basic legal literacy. 2.5 Understanding of the nature of professional ethics. 2.6 Understanding of the purposes and roles of codes of ethics and those of conduct set by engineering societies and associations. 2.7 Understanding of the social responsibility (SR) of organizations (companies in particular). 2.8 Understanding of ethics in specific areas (and knowledge of concrete cases) 2.9 Understanding the nature of ethics in research and development		
		06

<p>Unit III: Ethical Perception and Problem solving 3 Ability to make ethical judgments and solve problems. 3.2 Understanding and application of methods to identify related factors in ethical issues and to make a structural analysis of them. 3.3 Understanding and application of methods to analyze technical factors in ethical issues and make structural analysis of them. 3.4 Understanding and application of methods to analyze organizational factors and provide organizational solutions. 3.5 Ability to design one’s conduct to solve ethical problems Based on the abilities to analyze factors gained through 3.2–3.4, 3.6 Comprehensive problem-solving capability</p> <p>Unit IV: Engineer’s attitude and Social Responsibility 4 Attitude required of engineers and values shared by engineers. 4.1 Attitude to think autonomously and independently based on an understanding of the responsibility of an engineer. 4.2 Attitude to accept a diversity of values (recognizing the existence of the various value systems different from their own as well as the multiplicity of values). 4.3 Attitude to share values (such as safety emphasized in the codes of ethics) to which engineers should assign paramount importance. 4.4 Attitude and willpower to act on ethical judgments of their own.</p>	06
<p>Reference Books:</p>	
<ol style="list-style-type: none"> 1. Charles D. Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 1999. 2. Seth, M. L., “Principles of Economics”, Lakshmi Narain Agarwal, Agra. 3. Agarwal, A. N., “Indian Economy”, Vikas Publishing House Pvt. Ltd., New Delhi. 4. Datta R. and Sundharam, “Indian Economy”, K. P. M., S. Chand & Co. Ltd., New Delhi 5. Prof. M P Raghavan, “Professional Ethics in Engineering”, SCITECH Publication(India) Pvt.Ltd, Second Edition 	

Semester – VIII (Computer Science and Technology)

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology) Part – IV, Semester VIII					
Course Title	:	Mobile Computing		Course Code	:	CS421	
Teaching Scheme (Hours)	:	Lecture	03Hours/Week		Total Credits	:	03
	:	Tutorial	00 Hours/Week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Grand Total =100	Duration of SEE	:	03 Hrs.
Revision	:	Fourth			Month	:	June 2023
Pre-requisites (If any)	:	CS214					
Course Domain	:	Core					

Course Rationale: This course covers many aspects of mobile communications from a computer science point of view. Furthermore, This course provides knowledge to students about how mobile phone systems work, what technology will be next in wireless local area networks, and how mobility will influence applications, security, or IP networks. It also helps Engineers working in fixed networks can see paths of migration towards mixed fixed/mobile networks.

Course Objectives: The Course Teacher will		Course Outcomes: Students will be able to	
1.	Introduce the fundamental aspects of wireless transmissions.	1.	Understand the basics facts about signal, antenna and signal propagation, and differentData transmission techniques.
2.	Provide the knowledge of medium access technology	2.	Learn medium access control algorithms and compare SDMA, FDMA, CDMA mechanisms.
3.	Provide the knowledge of GSM and DECT system.	3.	Identify the architecture, services and protocol of GSM and DECT system.
4.	Provide the knowledge of wireless local area network technologies, WATM	4.	Identify architectures and data transmission technologies used in IEEE 802.11,HIPERLAN,

			Bluetooth, and WATM.
5	Provide the knowledge of mobile network layer and transport layer.	5.	Identify design issues of network layer and transport layer.

Curriculum Content	Hours
Unit: 1 Introduction to wireless communication: Need and Applications of wireless communication, Wireless Data Technologies, Market for mobile communication, Mobile and wireless devices	3
Unit: 2 Wireless transmission: Frequencies for radio transmission, signals, antennas, signal propagation, Multiplexing, Modulation, Spread spectrum and Cellular systems.	7
Unit: 3 Medium Access Control: Specialized MAC, SDMA, FDMA, TDMA and CDMA.	7
Unit: 4 Telecommunication Systems : GSM, DECT systems – Architecture and protocols, Tetra frame structure, UMTS basic architecture and UTRA modes. Wireless LAN : Introduction, Infrared v/s Radio transmission, Infrastructure and ad-hoc networks, IEEE 802.11, HIPERLAN, Blue To	7
Unit: 5 Wireless ATM : WATM services, Reference model, functions, radio access layer, handover, Location management, Addressing, Mobile QoS, Access point control protocol.	6
Unit: 6 Mobile Network Layer : Mobile IP, DHCP. Transport Layer: Traditional TCP, Indirect TCP, SnoopingTCP, Mobile TCP, Fast and selective retransmission & recovery.	

Text Books	:	
		1. Jachen Schiller Mobile Communications – (Addison-Wesley).
Reference Books	:	

1. Peter T. Davis, Craig R. McGuffin Wireless LAN – (MGH International Edn).
2. Sandeep Singhal, JariAlvinen and group The Wireless Application Protocol.
(Addison-Wesley).
3. Charles Arehart and group Professional WAP – (SPD).

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII					
Course Title	:	Information Security	Course Code:	:	CS422		
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week	Total Credits	:	04	
		Tutorial :	01 Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	3 hrs
Revision:	:	Fourth		Month	:	June 2023	
Pre-requisites (if any)	:	CS214, MA211					
Course Domain	:	CORE					

Course Rationale: In this course, students will learn the fundamentals of information security, security threats, modes of attack, and cryptographic models. Access control, identification, and authentication are also addressed. Network security and operating system (OS) hardening are explained along with intrusion detection and prevention.

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Provide knowledge of basics of cryptography, and some key encryption techniques.	1.	Describe basic terminology in cryptography, and classical cryptosystems.
2.	Explain modern cryptosystems.	2.	Explain modern cryptosystems.
3.	Discuss concepts of finite mathematics and number theory and concepts of public key cryptography	3.	Explain concepts of finite mathematics and number theory and concepts of public key cryptography
4.	Discuss security policies such as authentication, integrity and confidentiality.	4.	Explain security policies such as authentication, integrity and confidentiality.
5.	Provide Knowledge key management and key distribution	5.	Explain key management and key distribution

6.	Discuss network and Web security protocols.	6.	Explain network and Web security protocols.
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<i>Curriculum Content</i>		Hours
Unit I Overview and Classical Encryption Techniques		6
Overview: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines		
Unit II Block Ciphers and Advanced Encryption Standard		6
Block Cipher Principles, The Data Encryption Standard (DES), A DES Example, The Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles Block cipher modes of operations, Introduction to AES		
Unit III Number Theory and Asymmetric Key Cryptography:		8
Prime Number, relatively prime numbers, Modular Arithmetic, Fermats and Eulers Theorem, The Chinese Remainder Theorem, Discrete logarithms, Public Key Cryptography and RSA - Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Diffie-Hellman Key Exchange		
Unit IV Cryptographic Data Integrity Algorithms		8
Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Secure Hash Algorithm (SHA), SHA-3 Message Authentication Code: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, MACs Based on Hash Functions: HMAC Digital Signatures: Elgamal Digital Signature Scheme, DSS, NIST Digital Signature Algorithm		
Unit V Mutual Trust and Key Management		5
Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure		
Unit VI Network and Internet Security		6
Transport-Level Security: Web Security Considerations, Secure Sockets Layer, Transport Layer Security, HTTPS Electronic Mail Security: Pretty Good Privacy, S/MIME, Domain Keys Identified Mail IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange, Cryptographic Suites		
Suggested Text Books:		

1.	Williams Stallings – Cryptography and Network security principles and practices, Pearson Education (LPE), Sixth Edition
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Suggested Reference Books:

1.	Cryptography and network security – Atul Kahate (TMGH)
2.	Handbook of Applied Cryptography - Menezes, A. J., P. C. Van Oorschot, and S. A. Vanstone
3.	Schneier, Bruce, “Applied Cryptography: Protocols & Algorithms”

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology) Part –IV, Semester VIII					
Course Title	:	Soft Computing			Course Code:	:	CS423
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week		Total Credits	:	3
		Tutorial :	NA				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS225, CS227L, CS316L, CS317L					
Course Domain	:	Core					

Course Rationale: Soft computing is an emerging approach to computing that parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. This course will cover fundamental concepts used in Soft computing. The concepts of Artificial Neural Networks (ANNs) will be covered first, followed by Fuzzy logic (FL) and optimization techniques using a Genetic Algorithm (GA).

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Familiarize the students with soft computing concepts	1.	Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks, and their combination.
2.	Conceptualize the working of the human brain using ANN	2.	Design and implement computing systems by using appropriate Artificial Neural networks and tools.
3.	Make students familiar with neural networks that can learn from available	3.	Apply neural networks to pattern classification

	examples and generalize to form appropriate rules for inference systems.		
4.	Introduce the ideas of fuzzy sets, fuzzy logic, and the use of heuristics based on human experience	4.	Apply the concepts of Fuzzy Logic, Various fuzzy systems, and their functions to real-time systems.
5.	Provide the mathematical background for carrying out the optimization and familiarizing genetic algorithm for seeking global optimum in self-learning situations.	5.	Analyse the genetic algorithms and their applications to solve engineering optimization problems
6.	Introduce the applications of soft computing	6.	Apply soft computing techniques to solve engineering or real-life problems.

<i>Curriculum Content</i>		Hours
Unit I Introduction: Artificial Neural Network, Advantages of Neural Network, Fuzzy Logic, Genetic Algorithms, Hybrid Systems: Neuro-Fuzzy Hybrid System, Neuro-Genetic Hybrid System, Fuzzy-Genetic Hybrid System.		5
Unit II Artificial Neural Networks: Fundamental Concept, Evolution Of Neural Networks, Basic Models of Artificial Neural Network, Terminologies of ANNs, McCulloch-Pitts Neuron, Linear Separability, Hebb Network.		7
Unit III Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron (Adaline), Multiple Adaptive Linear Neuron, Back Propagation Network, Radial Basis Function Network.		7
Unit IV Introduction to Fuzzy Sets: Introduction, Classical Sets, Fuzzy Sets, Fuzzy relations, Membership Function, Defuzzification, Fuzzy Arithmetic and Fuzzy Measures, Fuzzy Rule base and Approximate Reasoning, Fuzzy Decision Making, Fuzzy Logic Control System.		7
Unit V Genetic Algorithms: Introduction, Basic Operators and Terminologies in GAs , Traditional Algorithm vs Genetic Algorithms, Simple GA, General Genetic Algorithm, The Schema Theorem, Classification of Genetic Algorithm, Holland Classifier System, Genetic Programming, Applications of GA.		7
Unit VI Applications of Soft Computing: GA Based Internet Search Technique; Soft Computing Based Hybrid Fuzzy Controllers.		5

Suggested Text Books:

1.	S.N. Sivanandam, S.N. Deepa, Principles of Soft Computing (Wiley India Edition).
2.	K. Mehrotra, C.K. Mohan, and S. Ranka, Elements of Artificial Neural Networks, Published by MIT Press, 1997 (http://mitpress.mit.edu/book-home.tcl?isbn=0262133288)

Suggested Reference Books:

1.	F.O. Karray & C.D. Silva, Soft Computing and Intelligent Systems Design – theory, tools and applications – (Pearson Education).
2.	J.S.R. Jang, C.T. Sun & E. Mizutani, Neuro-Fuzzy and Soft Computing – A computational approach to learning and machine intelligence – (Pearson Education).

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester- VIII				
Course Title	:	Big Data Technology (Elective-2)		Course Code:	: (CS424)	
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week		Total Credits	: 3
		Tutorial :	NA			
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	: 3 hrs
Revision:	:	Fourth			Month	: June 2023
Pre-requisites (if any)	:	CS213, CS315				
Course Domain	:	Elective				

Course Rationale: This course introduces the student to current scenarios of big data and provides various facets of big data. It also provides them with technologies playing a key role in it and equips them with the necessary knowledge to use them for solving various big data problems in different domains.

Course Objectives: The Course teacher will		Course Outcomes: Students will be able to	
1.	Introduce students to the concept and challenge of big data	1.	Understand the concept and challenge of big data
2.	Help students learn tips and tricks for Big Data use cases and solutions.	2.	Collect, manage, store, query, and analyze various forms of big data.
3.	Introduce NoSQL data management concept	3.	Understand the NoSQL Data Management
4.	Help students study the basics of Hadoop	4.	Describe architectural concepts of the Hadoop Framework
5.	Explain the applications of MapReduce	5.	Explain and Analyze the Big Data using Map-reduce applications
6.	Help students apply skills and tools to manage and analyze the big data	6.	Analyze Hadoop-related tools

Curriculum Content	Hours
Unit I Understanding Big Data What is big data, why big data, convergence of key trends, unstructured data, industry examples of big data, web analytics, big data and marketing, fraud and big data, risk and big data, credit risk management, big data and algorithmic trading, big data and healthcare, big data in medicine, advertising and big data, big data technologies, introduction to Hadoop, open source technologies, cloud and big data mobile business intelligence, Crowd sourcing analytics ,inter and trans firewall analytics.	8
Unit II NoSQL Data Management Introduction to NoSQL, aggregate data models, aggregates, key-value and document data models, relationships, graph databases, schema-less databases, materialized views, distribution models,	8

sharding, master-slave replication, peer-peer replication, sharding and replication, consistency, relaxing consistency, version stamps, map-reduce, partitioning and combining, composing map-reduce calculations.		
Unit III Basics of Hadoop Data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, design of Hadoop distributed file system (HDFS), HDFS concepts, Java interface, data flow, Hadoop I/O, data integrity, compression, serialization, Avro file-based data structures.		8
Unit IV Map Reduce Applications Map Reduce workflows, unit tests with MRUnit, test data and local tests – anatomy of Map Reduce job run, classic Map-reduce, YARN, failures in classic Map-reduce and YARN, job scheduling, shuffle and sort, task execution, MapReduce types, input formats, output formats.		7
Unit V Hadoop Related Tools-I Hbase, data model and implementations, Hbase clients, Hbase examples– praxis. Cassandra, Cassandra data model, Cassandra examples, Cassandra clients, Hadoop integration.		4
Unit VI Hadoop Related Tools-II Pig, Grunt, pig data model, Pig Latin, developing and testing Pig Latin scripts. Hive, data types and file formats, HiveQL data definition, HiveQL data manipulation – HiveQL queries.		4
Suggested Text Books:		
1.	Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.	
2.	Big-Data Black Book, DT Editorial Services, Wily India.	
Suggested Reference Books:		
1.	Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012. 5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.	
2.	E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012. 7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.	

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII			
Course Title	:	Data Mining and Warehousing (Elective-2)		Course Code:	: CS424
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week	Total Credits	: 03
		Tutorial :	-- Hrs/week		
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE : 3 hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	CS315,CS412			
Course Domain	:	Elective			
Course Rationale: This course will introduce the students, database technology for data mining and develop and apply critical thinking, problem-solving, and decision-making skills.					
Course Objectives: The Course teacher will			Course Outcomes: Students will be able to		
1.	Describe the concepts of database technology for the need of data mining and its applications.	1.	Understand the role of data warehousing and enterprise intelligence in industry.		
2.	Elaborate different models used for OLAP and data pre-processing. Apply pre-processing statistical methods for any given large amount of raw data.	2.	Compare and contrast the dominant data mining algorithms.		
3.	Explains the performance of different data mining methods and tools.	3.	Evaluate and select appropriate data-mining algorithms and apply, and interpret, report the output appropriately.		
4.	Help the study students, various developing areas in data mining as web mining, text mining, spatial mining, temporal mining and Identifying business applications of data mining.	4.	Design and implement of a data-mining application using sample, realistic data sets and modern tools.		
5.	Explain critical thinking, problem-solving, and decision-making skills.	5.	Evaluate and implement a wide range of emerging and newly-adopted methodologies and Technologies to facilitate the knowledge discovery.		
6.	To interpret the contribution of data warehousing and data mining to the decision support level of organizations.	6.			
Curriculum Content					Hours

Unit I Machine Learning and Data Mining-Data Flood, Data Mining and Knowledge Discovery, Data Mining Tasks Data Preparation for Knowledge Discovery, Data understanding, Data cleaning, Data transformation, False "predictors", Feature reduction, Randomization, Learning with unbalanced data.	05
Unit II Knowledge Representation - Decision tables, Decision trees, Decision rules, Rules involving relations, Instance-based representation ,Classification -Statistical Based Algorithms, Decision Trees Based Algorithms, Neural Networks Based Algorithms, Rules, Regression, Instance-based (Nearest neighbor), Case study.	07
Unit III Clustering: Introduction, Clustering Methods, Ways of scaling clustering algorithms, Case study.	05
Unit IV Associations: Transactions, Frequent itemsets, Association rules, Applications.	08
Unit V Data warehousing, OLAP and Data mining, web warehousing, Schema integration and data cleaning, De-duplication, Data marts: Multidimensional databases (OLAP). Advanced Topics ETL, Integrating OLAP and mining, Online aggregation, Recap, future and visions.	08
Unit VI Advanced Topics : Mining Multimedia Databases, Text Mining, Web Mining, Spatial Mining, Temporal Mining Applications and Trends in Data Mining- Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining, Social impacts of Data Mining, Trends in Data Mining.	05
Suggested list of Tutorials and Assignments: ----- General Instructions:-----	
Suggested Text Books:	
1.	Jiawei Han, Micheline Kamber. Data Mining: Concepts and Techniques.
2.	Margaret H. Dunham. Data Mining-Introductory and Advanced Topics.
Suggested Reference Books:	
1.	Soumen Chakrabarti Mining the Web- Discovering Knowledge from Hypertext Data.
2.	Pang-Ning Tan, Michael Steinbach, Vipin Kumar. Introduction to Data Mining.
3.	Heikki Mannila, Padhraic Smyth, David Hand. Principles of Data Mining.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII			
Course Title	:	Image Processing (Elective-2)		Course Code:	: CS424
Teaching Scheme (Hours)	:	Lecture :	03 Hrs/week	Total Credits	: 03
		Tutorial :	-- Hrs/week		
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE : 3 hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	BS-11A1, ES-11A3			
Course Domain	:	Elective			

Course Rationale:

This course introduces students to the fundamentals of digital image processing, and various image transforms, image restoration techniques, image compression and segmentation used in digital image processing.

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Introduce the students to the fundamental techniques and algorithms used for acquiring, processing and extracting useful information from digital images	1.	Describe the roles and the scope of image processing systems in a variety of applications
2.	Emphasize on covering basic image processing operations.	2.	Learn how to explore on color image features and transformation techniques.
3.	Cover the basic analytical methods which are widely used in image processing	3.	Develop the insight of how digital images are represented.
4.	Explain the students some advanced topics in digital image processing	4.	Evaluate the mathematical principles of digital image enhancement
		5.	Explore and apply the concepts of Edge detection, segmentation and object recognition

Curriculum Content

Hours

**Unit I
Introduction**

6

Concept of digital image processing, steps in image processing, components of image processing system, Applications areas.

**Unit II
Digital Image Fundamentals**

6

Image sensing and acquisition, Basic concept of sampling and quantization, representations of digital image, spatial and grey level resolution, zooming and shrinking of image, Basic relationship between pixels.	
Unit III Colour Image Processing Colour fundamentals, colour models, RGB colour model, CMY colour model, HSI colour model, pseudo-colour image processing: intensity slicing, grey level to colour transformation	7
Unit IV Edge Detection And Segmentation Detection of discontinuities: point, line and edge detection, Thresholding, Region based segmentation	6
Unit V Image Enhancement In Spatial Domain Basic grey level transformations, image negation, log transformations, power law transformations, piece wise linear transformations, histogram processing, histogram equalization, histogram matching, Image enhancement using arithmetic and logical operations	7
Unit VI Object Recognition Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers, Structural Methods, Matching Shape Numbers, String Matching.	7
<i>Suggested Text Books:</i>	
1.	R.C.Gonzalez and R.E.Woods, "Digital Image Processing", Addison-Wesley Longman, Inc, 1999
<i>Suggested Reference Books:</i>	
1.	A.K.Jain, "Digital Image Processing", PHL
2.	M.Sonka, V.Hlavac, and R.Boyle – Image processing, Analysis and Machine vision, Thomson Asia pvt. Ltd, 1999.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII				
Course Title	:	Service Oriented Architecture (Elective-2)		Course Code:	: CS424	
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week		Total Credits	: 03
		Tutorial :	-- Hrs/week			
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	: 3 hrs
Revision:	:	Fourth			Month	: June 2023
Pre-requisites (if any)	:	CS315, CS412				
Course Domain	:	Elective				
Course Rationale: Service-oriented architecture (SOA) is a software design style that provides services to other components over a network. Explore the basics of SOA, including its architecture, services, XML, and layers.						
Course Objectives: The Course teacher will			Course Outcomes: Students will be able to			
1.	Provide an overview of XML Technology and modeling databases in XML	1.	Model XML databases.			
2.	Provide an overview of Service Oriented Architecture and Web services and their importance	2.	Overview of Service Oriented Architecture and Web services and their importance			
3.	Provide overview of web services	3.	Create web services.			
4.	Provide an overview of SOA Design and Implementation	4.	Overview of SOA Design and Implementation			
5.	Introduce WS technologies and standards	5.	Implement different WS technologies and standards			
6.	Introduce Security solutions in XML and Web Services and to introduce Security standards for Web Services	6.	Make web services secure.			
Curriculum Content						
Unit I XML Technology XML – XML and Web - Name Spaces – XML Document Structure - Structuring with Schemas and DTD- Modeling Databases in XML – XQuery.					Hours	
Unit II SOA Fundamentals Defining SOA, Business Value of SOA, Principles of SOA, Evolution of SOA, SOA characteristics, concept of a service in SOA, Stages of the SOA lifecycle. Enterprise Service Bus, SOA runtime pattern family.					6	
					7	

Unit III Web Services (WS): SOA and Web Services – Web Services Protocol Stack – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI. Service-Level Interaction patterns – XML and Web Services - Enterprise Service Bus - .NET and J2EE Interoperability.		7
Unit IV SOA Design and implementation Design patterns, SOA governance, need for SOA governance, SOA Governance Lifecycle, SOA governance compared with IT governance, SOA using REST – RESTful Services – RESTful Services with and without JWS – Role of WSDL, SOAP and Java/XML mapping in SOA – JAXB Data Binding		6
Unit V WS Technologies and Standards Web Services Technologies - JAX-RPC, JAX-WS. Web Service Standards – WS-RM, WSAddressing, WS-Policy. Service Orchestration and Choreography – Composition Standards -BPEL. Service Oriented Analysis and Design.		7
Unit VI XML and WS Security XML Security Overview – Canonicalization – XML Security Framework – XML Encryption –XMLSignature – XKMS Structure. Web Services Security - XACML - WS-Security.		6
Suggested Text Books:		
1.	Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2008. (Unit 1 and 3)Thomas Erl, “Service Oriented Architecture: Concepts, Technology, and Design”, Pearson Education, 2005 (Unit 2, 3, 5, and 6).	
2.	Frank P.Coyle, “XML, Web Services and the Data Revolution”, Pearson Education, 2002 (Unit 6).Shankar Kambhampaly, “Service – Oriented Architecture for Enterprise Applications”, Wiley India Pvt Ltd, 2008.	
3.	Mark D. Hansen, “SOA using Java Web Services”, Practice Hall, 2007.	
4.	Thomas Erl, “Service-Oriented Architecture: Concepts, Technology, and Design”, Prentice Hall Publication, 2005	
Suggested Reference Books:		
1.	Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Addison Wesley,2005.	
2.	James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2011	
3.	Mark O’ Neill, et al., “Web Services Security”, Tata McGraw-Hill Edition, 2003.	
4.	Sandeep Chatterjee and James Webber, “Developing Enterprise Web Services: An Architect's Guide”, Prentice Hall, 2004	

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII					
Course Title	:	Cyber Laws (Elective 3)- Open Elective		Course Code:	:	CS425	
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week		Total Credits	:	3
	:	Tutorial :	-- Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	The prerequisite for this course is basic knowledge of Computer Systems.					
Course Domain	:	Open Elective					
Course Rationale: Subject will give a general knowledge of cyber technology and cyber security. Students will clarify issues of jurisdiction and sovereignty of the internet and be introduced to the basic principles of digital intellectual property, online privacy, and the basic elements of software copyright.							
Course Objectives: The Course teacher will				Course Outcomes: Students will be able to			
1.	Give knowledge of the Object and Scope of the IT Act	1.	Explain the Object and Scope of the IT Act				
2.	Explain E-Governance and IT Act 2000 and use of electronic records and digital signatures in Government and its agencies	2.	Understand E-Governance and IT Act 2000 and use of electronic records and digital signatures in Government and its agencies				
3.	Develop understanding of Certifying Authority and Digital Signature Certifications	3.	Understand Certifying Authority and Digital Signature Certifications				
4.	Provide an overview of Domain Name Disputes and Trademark Law	4.	Explain an overview of Domain Name Disputes and Trademark Law				
5.	Enhance knowledge of Cyber Crimes	5.	Discuss knowledge of Cyber Crimes				
6.	Discuss the concept of E-banking and legal issues.	6.	Describe the concept of E-banking and legal issues				
Curriculum Content							
Unit I Object and Scope of the IT Act Genesis, Object, Scope of the Act, Amendments.						Hours	
Unit II E-Governance and IT Act 2000 Legal recognition of electronic records, Legal recognition of digital signature, Use of electronic records and digital signatures in Government and its agencies, Different offences under IT Act, 2000						4	
Unit III Certifying Authorities						7	
						7	

Need of Certifying Authority and Power, Appointment, function of Controller, Who can be a Certifying Authority, Digital Signature Certifications, Generation, Suspension and Revocation of Digital Signature Certificate.	
Unit IV Domain Name Disputes and Trademark Law Concept of Domain Names, New Concepts in Trademark Jurisprudence, Trademarks & Domain Names Related issues, Cyber squatting, Reverse Hijacking, Meta tags, Framing, Spamming, Digital Copyright, Jurisdiction in Trademark Dispute.	7
Unit V The Cyber Crimes (S-65 to S-74) Cyber Crimes against Individuals, Institution and State, Tampering with Computer Source Documents(S-65), Hacking with Computer System(S-66),Publishing of Information Which is Obscene in Electronic Form(s-67), Offences : Breach of Confidentiality & Privacy (S-72), Offences : Related to Digital Signature Certificate (S-73 & S-74)	8
Unit VI E-banking and legal issues Regulating e-transactions, Role of RBI and legal issues, International transactions of e-cash, Credit card and internet, Laws relating to internet credit cards	6
<i>Suggested Reference Books:</i>	
1.	Farooq Ahmad, Cyber Law in India – Pioneer Books
2.	Vakul Sharma Information Technology Law and Practice – Universal Law Publishing Co. Pvt. Ltd.
3.	Justice Yatindra Singh, Cyber Laws, Universal Law Publishing Co, New Delhi, (2012).
4.	Chris Reed & John Angel, Computer Law, OUP, New York, (2007)
5.	Suresh T Vishwanathan, The Indian Cyber Law – Bharat Law house New Delhi.
6.	P.M. Bakshi & R.K.Suri, Hand book of Cyber & E-commerce Laws – Bharat Law house, New Delhi.
7.	Rodney D. Ryder , Guide to Cyber Laws – Wadhwa and Company Nagpur.
8.	The Information Technology Act, 2000 – Bare Act – Professional Book Publishers – New Delhi.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII			
Course Title	:	IT for Engineers (Elective 3)- Open Elective		Course Code:	: CS425
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week	Total Credits	: 03
		Tutorial :	-- Hrs/week		
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE : 3 hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	ES-11A7			
Course Domain	:	Open Elective			

Course Rationale: In this course, students will learn the fundamentals of Information Technology and applications related to it.

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Explain various applications related to Information Technology.	1.	Describe the basics of networking
2.	Provide working knowledge of the technologies needed for web application development	2.	Implement simple web-applications
3.	Demonstrate about scripting languages.	3.	Create simple database applications
4.	Elaborate the principles of database access and storage.	4.	Develop an information system
5.	Introduce the principles required for building web applications.	5.	Design and deploy web-sites

Curriculum Content

Curriculum Content	Hours
Unit I WEB ESSENTIALS Creating a Website - Working principle of a Website - Browser fundamentals - Authoring tools - Types of servers: Application Server - Web Server - Database Server – HTML basics – HTML tags and their use	7
Unit II SCRIPTING ESSENTIALS Need for Scripting languages - Types of scripting languages - Client side scripting - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and HTML - Cookies – Sessions - Authentication – Introduction to JavaScript	6
Unit III DATABASE ESSENTIALS Database management - Database terms - MySQL - commands – Data types – Indexes – Functions	7

– Accessing MySQL using PHP.		
Unit IV NETWORKING ESSENTIALS Fundamental computer network concepts - Types of computer networks - - Network layers - TCP/IP model - Wireless Local Area Network - Ethernet - WiFi		7
Unit V NETWORKING COMPONENTS AND DEVICES Network Routing - Switching - Hub, Bridge, Gateway, Modem, Repeater, Access Point.		5
Unit VI APPLICATION ESSENTIALS Creation of simple interactive applications - Simple database applications - Multimedia applications - Design and development of information systems – Personal Information System – Information retrieval system – Social networking applications		7
Suggested Text Books:		
1.	Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.	
2.	James F. Kurose, "Computer Networking: A Top-Down Approach", Sixth Edition, Pearson, 2012.	
Suggested Reference Books:		
1.	Gottapu Sasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012	
2.	R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.	

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology), Part IV, Semester VIII					
Course Title	:	E-commerce (Elective 3)- Open Elective		Course Code:	:	CS425	
Teaching Scheme (Hours)	:	Lecture :	3 Hrs/week	Total Credits	:	03	
		Tutorial :	-- Hrs/week				
Evaluation Scheme (Marks)	:	CIE=30 (20+10)	SEE = 70	Total=100	Duration of SEE	:	3 hrs
Revision:	:	Fourth			Month	:	June 2023
Pre-requisites (if any)	:	CS214,CS315					
Course Domain	:	Elective					

Course Rationale: This course will introduce the students the foundations and importance of E-commerce.

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Elaborate the students to fundamentals of E-commerce.	1.	Demonstrate an understand the foundations and importance of E-commerce.
2.	Help to make students to learn techniques of communication needed for business operations.	2.	Understand the impact of Information and Communication technologies, especially of the Internet in business operations.
3.	Help students to learn and handle risk and legal issues associated to E-commerce.	3.	Comprehend risk, legal issues and privacy in E-Commerce and Assess electronic payment systems.
4.	Describe various E-Commerce business models.	4.	Analyze the critical building blocks of E-Commerce and different types of prevailing business models employed by leading industrial leaders.
5.	Describe and discuss various opportunities and potential of E-commerce.	5.	Evaluate the opportunities and potential to apply and synthesize a variety of Ecommerce concepts and solutions to create business value for organizations, customers, and business partners.

Curriculum Content

Hours

Unit I Introduction

E-Commerce: meaning advantages & disadvantages, incentives for engaging in electronic commerce, impact of e-commerce on business and e business, electronic commerce framework, types of e-commerce, web background.

06

<p>Unit II Risk and Legal Issues in E-Commerce</p> <p>Risks and barriers in the adoption of e-business environment, the impact of ICT in contemporary business operations, entrepreneurial development in e commerce, cloud computing and e Commerce, e-commerce in India – laws for e-commerce in India, crypto currency and e commerce.</p>	06
<p>Unit III Ethical and Social and Political issues related to Electronic Commerce</p> <p>Protecting privacy, protecting Intellectual property, copyright, trademarks and patents, taxation and encryption policies.</p>	07
<p>Unit IV E-Commerce Business Models</p> <p>Key element of a business model, major B2C business models, major B2B business models, business models in emerging e-commerce areas.</p> <p>E-Government: issues in e-governance applications, benefits and reasons for the introduction of e- governance, e-governance models.</p>	07
<p>Unit V Electronic Payment Systems</p> <p>Types, digital wallet, digital cash, payment through card system, e–cheque, e–cash, e–payment threats & protections, smart cards electronic payment systems, risk in electronic payment Systems, secure electronic transaction protocol, e– marketing : home –shopping, e-marketing, Tele-marketing, digital marketing.</p>	07
<p>Unit VI Electronic Data Interchange (EDI)</p> <p>Meaning, benefits, concepts, application, EDI model, protocols, e-procurement, future of e commerce and latest technology: Storefront digitizing, Chabot, beacon technology, direct social media purchase, voice assistants, drone and droid delivery, augmented reality device etc.</p>	06
<p>Suggested list of Tutorials and Assignments: -----</p> <p>General Instructions:-----</p>	
<p>Suggested Text Books:</p>	
1.	Kenneth C Lauden, Carol G. Traver, "E-Commerce", Perason Education, ISBN 97881317812.
2.	Doing Business on the Internet E-COMMERCE (Electronic Commerce for Business):S. Jaiswal, Galgotia Publications, ISBN 9788175153059
3.	E-Business, Bookseller Code (AG) OXFORD, 1st edition Parag Kulkarni, Sunita Jahirabadkar & Pradip Chande, ISBN 9780198069843

Suggested Reference Books:

1.	P. T. Josef, "Electronic Commerce- A managerial perspective" Prentice-Hall International, ISBN 8120320891.
2.	Kamlesh K. Bajaj, Debjani Nag, "Electronic Commerce: The cutting edge of business", Tata McGraw-Hill Publishing Co. Ltd, 2000, ISBN 9780070585560.
3.	Jeffrey F. Rayport, Bernard J. Jaworski, "e-Commerce", Tata McGraw Hill, 2002, ISBN 9780072510249.
4.	Pete Loshin, Paul A. Murphy, "Electronic Commerce", Jaico Publishing House, 2000, ISBN 9788172246662.
5.	Ravi Kalakota, Andrew B. Whinston, "Frontiers of Electronic Commerce", Addison Wesley, 2002, ISBN 0201845202.

Class, Part & Semester	:	Final Year B. Tech (Computer Science and Technology) Part -IV, Semester VIII			
Course Title	:	Soft Computing Lab			Course Code: : CS423L
Teaching Scheme (Hours)	:	Practical :	2 Hrs/week		Total Credits : 01
Evaluation Scheme (Marks)	:	IPE= 50	EPE=50	Total=100	Duration of EPE : 3 hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	CS213L, CS227L , CS316L, CS317L			
Course Domain	:	Core			

Course Rationale: Soft computing is an emerging approach to computing that parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. This course will cover fundamental concepts used in Soft computing. The concepts of Artificial Neural Networks (ANNs) will be covered first, followed by Fuzzy logic (FL) and optimization techniques using a Genetic Algorithm (GA).

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Familiarize the students with soft computing concepts	1.	Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks, and their combination.
2.	Conceptualize the working of the human brain using ANN	2.	Design and implement computing systems by using appropriate Artificial Neural networks and tools.
3.	Make students familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.	3.	Apply neural networks to pattern classification
4.	Introduce the ideas of fuzzy sets, fuzzy logic, and the use of heuristics based on human experience	4.	Apply the concepts of Fuzzy Logic, Various fuzzy systems, and their functions to real-time systems.
5.	Provide the mathematical background for carrying out the optimization and familiarizing genetic algorithm for seeking global optimum in self-learning situations.	5.	Analyze the genetic algorithms and their applications to solve engineering optimization problems
6.	Introduce the applications of soft computing	6.	Apply soft computing techniques to solve engineering or real-life problems.

List of Experiments

Sr.	
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No.	
1.	Write a program to implement logical AND using McCulloch Pitts neuron model
2.	Write a program to implement logical XOR using McCulloch Pitts neuron model
3.	Write a program to implement logical AND using the Perceptron network
4.	Write a program to implement logical OR using the Perceptron network
5.	Write a program to implement logical AND using the Adaline network
6.	Write a program to implement logical OR using the Adaline network
7.	Write a program to implement logical XOR using the Madaline network
8.	Write a program to implement a Backpropagation network
9.	Write a program to implement the various primitive operations of classical sets
10.	Write a program to implement various primitive operations on fuzzy sets with Dynamic Components.
11.	Write a program to maximize $f(x_1+x_2)=4x_1+3x_2$ using a genetic algorithm
12.	Write a program to minimize $f(x)=x^2$ using a genetic algorithm
<i>Suggested Text Books/ Reference Books/Manual</i>	
1.	S.N. Sivanandam, S.N. Deepa, Principles of Soft Computing - . (Wiley India Edition).
2.	K. Mehrotra, C.K. Mohan, and S. Ranka, Elements of Artificial Neural Networks, Published by MIT Press, 1997 (http://mitpress.mit.edu/book-home.tcl?isbn=0262133288)

Class, Part & Semester	:	Final Year B.Tech (Computer Science & Technology) Part II, Semester VIII			
Course Title	:	Web Technology Lab-2			Course Code: : CS426L
Teaching Scheme (Hours)	:	Lecture : Practical:	2 Hrs/week 4 Hrs/week	Total Credits	: 04
Evaluation Scheme (Marks)	:	IPE =50	EPE =50	Total=100	Duration of EPE : 2hrs
Revision:	:	Fourth			Month : June 2023
Pre-requisites (if any)	:	CS416L, CS317L, CS326L			
Course Domain	:	Core			

Course Rationale: This course provides students with hands on experience using Visual Studio to create websites with ASP.NET Web Forms. Students will be able to create database driven ASP.NET web applications and web services. It is web development platform which provides programming model, comprehensive software infrastructure and various services required to build a robust web application for PC as well as mobiles.

Course Objectives: The Course teacher will

Course Outcomes: Students will be able to

1.	Demonstrate the Configuration of an asp.net application.	1.	Design web applications using ASP.NET
2.	Helps to create ASP.Net applications using standard .net controls and To create a data driven web application.	2.	Use ASP.NET controls in web applications.
3.	Helps to create a Web Application with security	3.	Create database driven ASP.NET web applications and web services
4.	Helps to create and Maintain session and controls related information for user used in multi-user web applications	4.	Handle database using MVC in ASP.NET web applications
5.	Introduce the fundamentals of developing modular application by using MVC	5.	Understand concept of ADO.NET

Curriculum Content

Curriculum Content	Hours
Unit I Introduction to ASP.NET The Evolution of Web Development, Important facts about Web Development, ASP.NET Architecture, The Code Model, Web Project. Web Forms: Page Processing, Web Form Processing Stages, The Page as Control Container, The Page Class. Redirecting User to Another Page, Master Pages.	4
Unit II ASP.NET Server Controls: Types of Server Controls, HTML Server Controls, Web Controls, List Controls,	6

<p>Input Validation Controls, Rich Controls</p> <p>State Management: ASP.NET State Management, View State, Transferring Information between pages, Cookies, Session State, Application State</p> <p>ASP.NET Application: Anatomy of ASP.NET application, global.asax Application file, ASP.NET Configuration, ASP.NET State Management, Web Configuration File and Global.asax, Authentication & Authorization.</p>	
<p>Unit III</p> <p>ADO.NET Fundamentals:</p> <p>ADO.NET Architecture, The Connection Class, The Command and Data Reader Classes, Data Binding: Basic Data binding, Data source Control, The Sql Data Source.</p>	4
<p>Unit IV</p> <p>Introduction to MVC: MVC Architecture, Understand the MVC design pattern and how it's applied in ASP.NET MVC, Understanding Model, Understanding View, Understanding Controller, Key benefits of ASP.NET MVC, Advantages of MVC based Web Application</p>	4
<p>Unit V</p> <p>File Handling, Crystal Report and E-mail handling :</p> <p>File I/O and streams , Working with directories and files, Read and write file Crystal reports, Overview to crystal reports, Creating crystal reports with wizards, Integrating with web applications, Customizing the report viewer, Adding a database or table to a report, Handling mail, Protocols , Sending mails with and without attachment</p>	6
<p>Unit VI</p> <p>Web Services :</p> <p>ASP.NET Web Services, Introduction to XML WebServices, Creating WebService, Setting the WebService attribute, Test and run your web</p>	2

List of Experiments	
Sr. No.	Experiment Name
1.	Introduction to ASP.NET
2.	Implement asp.net program to redirect user from one page to another page using different methods.
3.	Implement asp.net program for View state.
4.	Implement asp.net program for book catalog with validation controls.
5.	Implement asp.net program for registration form using validation controls.
6.	Create a web application which implement authentication and authorization features.
7.	create web application for data transfer from one page to another
8.	Write a program to develop sample application for session management using asp.net
9.	Write a program to create a web application which detects capabilities of browser
10.	Study of architecture of ADO. NET
11.	Write a program to access database using SqlDataSource in asp. Net
12.	Write a program to Display parameterized data using GridView in ASP.NET.
13.	Study of architecture of MVC
General Instructions:	
1. Install and configure Microsoft Visual Studio Community version.	
2. Perform ASP.NET program on visual studio.	
Suggested Text Books/ Reference Books/Manual	
1.	Matthew MacDonald, Professional ASP.NET 3.5 in C# 2008, [WileyAPRESS Publication]
2.	Beginner"s ASP.net 3.6 in c# and VB.net [WROX].
3.	ASP.net Complete Reference [Book by Matthew MacDonald]
4.	Professional ASP.NET MVC 5 [Book by Brad Wilson, David Matson, Jon Galloway, and Kevin Scott Allen]

Class, Part & Semester	:	Final Year B.Tech (Computer Science & Technology) Part IV, Semester VIII				
Course Title	:	Major Project Phase – II			Course Code:	: CS427L
Teaching Scheme (Hours)	:	4 hours/weeks=4x 13 weeks= 52hrs minimum			Total Credits	: 04
Evaluation Scheme (Marks)	:	CIE = Nil SEE =Nil	IPE:50 EPE:50	Total = 100	Duration of SEE	: -----
Revision:	:	Fourth			Month	: June 2023
Pre-requisites (if any)	:	CS417L				
Course Domain	:	Core				
Course Rationale: Student is evaluated during the Internal practical evaluation and External practical evaluation						
Course Objectives: The Course teacher will				Course Outcomes: Students will be able to		
1.	Help the Students to learn design and development of usable User Interface			1.	Implement proposed solution with the help of modern and emerging technologies and tools .	
2.	Guide to analyze and apply emerging technologies in development of a project			2.	Design and develop usable User Interface	
3.	Encourage Students to test the modules in Project			3.	Test the modules in Project	
4.	Guide Students to demonstrate working of project			4.	Develop good communication skills and team work and present the findings of the study conducted in the preferred domain.	
				5.	Demonstrate working of Project Report with a strong working knowledge of ethics and professional responsibility	
Curriculum Content						
	The group will continue to work on the project selected during the semester VII and submit the completed project work to the department at the end of semester VIII as mentioned below- 1. The workable project. 2. The project report in the bound journal complete in all respect with the following: -					

	<p>i) Problem specifications.</p> <p>ii) System definition – requirement analysis.</p> <p>iii) System design – dataflow diagrams, database design.</p> <p>iv) System implementation – algorithm, code documentation.</p> <p>v) Test results and test report.</p> <p>vi) In case of object oriented approach – appropriate process be followed.</p> <p>Oral examination will be conducted by internal and external examiners as appointed by the University.</p> <p>Note:</p> <ol style="list-style-type: none"> 1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc. 2. Two mid-term evaluations should be done, which includes presentations and demos of the work done. 3. Care should be taken to avoid copying and outsourcing of the project work.
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Class & Semester	: Final Year B.Tech (Computer Science & Technology) Part IV, Semester VIII				
Course Title	: Constitution of India			Course Code:	: HS411
Teaching Scheme (Hours)	: Lectures= 2 hr /Week			Credits	: Nil
Evaluation Scheme (Marks)	Assignments	: 50	Written Test Total	: 25	Duration of Exam : NA
	Viva voce	: 25		: 100	
Revision	: Fourth			Month	: June 2023
Pre-requisites	: It has no any pre-requisites. Every citizen of the country ought to study the course content.				
Course Domain	: Audit Course at institute level , Humanities & Social Science				
Course Rationale: As a citizen of India, every student should have basic knowledge about Indian constitution. Every student should know the importance of Fundamental rights, Fundamental duties as well as Directive Principles. This course fulfills all these requirements. This course also includes knowledge about state as well as union legislature, judiciary and executive. It helps to understand emergency provisions, electoral process and amendment procedures. This course is helpful for the students to be legally updated.					
Course Objectives: The Course Teacher will			Course Outcomes: Students will be able to		
1.	Familiarize students with the preamble		1.	Get associated with Indian Constitution	

2.	Describe fundamental rights & duties of citizens.	2.	Understand their fundamental duties and rights.
3.	Explain union and state executives.	3.	Recognize union and state executives.
4.	Discuss constitutional provisions.	4.	Interpret about constitutional provisions.
5.	Illustrate electoral process.	5.	Understand and follow the electoral process
6.	Summarize role of democracy in social welfare.	6.	Realize importance of democracy in social welfare.

Curriculum Content		Hours
<p>Unit I: Introduction to Preamble and Fundamental Rights Preamble to the constitution of India. Fundamental rights under Part – III – details of Exercise of rights, Limitations & Important cases.</p>		04
<p>Unit II: Fundamental Duties and Directive Principles. Relevance of Directive principles of State Policy under Part – IV. Fundamental duties & their significance.</p>		05
<p>Unit III: Union Legislature, Judiciary & Executive. President, Prime Minister, Parliament & the Supreme Court of India.</p>		04
<p>Unit IV: State Legislature, Judiciary & Executive. Governors, Chief Minister, State Legislator and High Courts.</p>		05
<p>Unit V: Constitutional Provisions. Provisions for Scheduled Castes & Tribes, Women & Children & Backward classes. Emergency Provisions.</p>		05
<p>Unit VI: Electoral process & Amendment procedures: Constitution of election commission, system of adult suffrage, procedure for amendment. 42nd, 44th, 74th, 76th, 86th and 91st Constitutional amendments.</p>		05
Text Books:		
<ol style="list-style-type: none"> 1. Durga Das Basu: "Introduction to the Constitution of India" (Students Edn.) Prentice – Hall EEE, 19th/20th Edn. 2001. 2. R.C.Agarwal, "Indian Political System", (1997) S.Chand and Company, New Delhi. Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., New Delhi. 3. K.L.Sharma, "Social Stratification in India: Issues and Themes", (1997), Jawaharlal Nehru University, New Delhi. 		
Reference Books:		
<ol style="list-style-type: none"> 1. An Introduction to Constitution of India" by M.V.Pylee, Vikas Publishing, 2002. Sharma, Brij Kishore, "Introduction to the Constitution of India: Prentice Hall of India, New Delhi. 2. U.R.Gahai, "(1998) Indian Political System ", New Academic Publishing House, Jalandhar. 3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd. 4. Yogendra Singh, "(1997) Social Stratification and Change in India ", Manohar, New Delhi. 		