



**CHOICE BASED CREDIT SYSTEM (CBCS)**  
**SCHEME OF TEACHING AND EXAMINATION FOR B.E. DEGREE COURSE**  
(Effective from the academic year 2018-19)

<b>V Semester B.E. (Common to UG programs: CSE/ISE)</b> (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Engg. & Tech.- Jan. 2018)						<b>Teaching Hours/Week</b>				<b>Examination</b>			
<i>Sl No</i>	<i>Course and Course Code</i>		<i>Course Title</i>	<i>Teaching Dept.</i>	<i>Board of Exam.</i>	<i>L</i>	<i>T</i>	<i>P</i>	<i>C</i>	<i>Duration in Hrs.</i>	<i>CIE</i>	<i>SEE</i>	<i>Total Marks</i>
01	PC	18CS501	Computer Networks	CSE/ISE	CSE/ISE	3	1	-	4	3	50	50	100
02	PC	18ISI502	Advanced Java and J2EE	ISE	ISE	3	-	2	4	3	50	50	100
03	PC	18CS503	Introduction to Automata Theory and Computation	CSE/ISE	CSE/ISE	3	1	-	4	3	50	50	100
04	PC	18CS504	Database Management Systems	CSE/ISE	CSE/ISE	3	-	-	3	3	50	50	100
05	PE	18IS5PE5x	Professional Elective-I	ISE	ISE	3	-	-	3	3	50	50	100
06	OE	18CS5OE6x	Open Elective-I	CSE/ISE	CSE/ISE	3	-	-	3	3	50	50	100
07	PC	18ISL507	Operating Systems Lab	ISE	ISE	-	-	2	1	3	50	50	100
08	PC	18CSL508	Database Lab with Mini Project	CSE/ISE	CSE/ISE	-	-	2	1	3	50	50	100
09	HS	18SK501	Skill Development-III	HS	HS	-	-	2	1	3	50	50	100
Total						18	2	08	24	27	450	450	900

**Professional Elective-I:**

18IS5PE51: UNIX System Programming  
18IS5PE52: Management Information System  
18IS5PE53: Natural Language Processing  
18IS5PE54: Application Development using Python

**Open Elective I: Offered by Dept. of Computer Science and Engg.**

18CS5OE61: Data Structures and Algorithms  
18CS5OE62: Data Base Management System  
18CS5OE63: Operating System

**Note: Open Elective: The strength should be Min of 25 and Max of 55 to 60. In Place of Open Elective at V Sem , the students are encouraged to take Online course (Swayam / MOOC / NPTEL / MIT – Coursera .....). with the approval from Academic Committee of the Department, HEAD and DEAN (Academics) .**



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: COMPUTER NETWORKS**

**Subject Code: 18CS501**

**L-T-P-C: 3-1-0-4**

**Course Objectives:**

Sl. No	Course Objectives
1	To gain the knowledge of routing principles and routing algorithms in network layer.
2	Discuss transport layer services and protocols.
3	Acquire the knowledge of application layer protocols.
4	Appreciate the concepts of Network Security and Multimedia.

UNIT	Description	Hours
I	<b>Network Layer</b> Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual-Circuit and Datagram Networks. Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast routing, Multicast routing, Anycast Routing. Congestion Control Algorithms: Approaches to Congestion Control, Traffic-aware routing, Admission control, Traffic throttling, Load Shedding	11
II	<b>Network Layer continued</b> Quality of Service: Application requirements, Traffic shaping, Packet scheduling, Admission control, Internetworking: How networks differ, How networks can be connected, Tunneling, Internetwork routing, Packet fragmentation. The Network Layer in the Internet: The IP version 4 protocol, IP addresses, IP version 6, Internet control protocols.	10
III	<b>Transport Layer</b> Services Provided to the Upper Layers, Transport Service Primitives, Berkeley Sockets, Elements of Transport protocols: Addressing, Connection establishment, Connection release, Error control and Flow control, Multiplexing, Crash recovery, Introduction to UDP, Remote Procedure Call. Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.	11
IV	<b>Transport layer continued, Standard Client Server Protocols</b> TCP Connection Management Modeling, TCP Sliding window, TCP Timer Management, TCP Congestion Control. World wide web, Hypertext transfer protocol, FTP: Two Connections, Control Connection, Data Connection, Security for FTP. Electronic mail: Architecture, Web based mail, E-Mail security. TELNET: Local versus Remote logging. Domain Name System: Name space, DNS in the Internet, Caching, Resource Records, DNS messages, Security of DNS.	10



<b>V</b>	<b>Network Security, Multimedia</b> Introduction: Security Goals, Attacks, Services and Techniques. Confidentiality: Symmetric Key Ciphers, Asymmetric Key Ciphers. Other aspects of security: Message Integrity, Message Authentication, Digital Signatures, Entity Authentication, Key Management. Multimedia Data, Multimedia in the Internet: Streaming stored audio/video, Streaming live audio/video, Real-time interactive audio/video. Real-time interactive protocols: Rationale for new protocols, RTP, RTCP, SIP, H.323.	<b>10</b>
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**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Computer Networks	Andrew S. Tanenbaum and David J Wetherall.	5 <sup>th</sup> Edition, Pearson Education, 2019, ISBN 978-93-325-1874-2
<b>2</b>	Data Communications and Networking	Behrouz A. Forouzan	5 <sup>th</sup> Edition, Tata McGraw-Hill, 2019 ISBN-13: 978-1-25-906475-3

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Computer Networking- A Top- Down approach	James F Kurose and Keith W Ross	6 <sup>th</sup> Edition, Pearson Education, 2017 ISBN-13: 978-0-13-285620-1
<b>2</b>	Data and Computer Communications	William Stallings	10 <sup>th</sup> Edition, Pearson Education, 2013, ISBN-13: 978-0-13-350648-8
<b>3</b>	Communication Networks – Fundamental Concepts and Key architectures	Alberto Leon-Garcia and Indra Widjaja	2 <sup>nd</sup> Edition, 2004, Tata McGraw-Hill, ISBN-13:978-0-07-059501-9

**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Analyze various routing algorithms in network layer.
<b>CO2</b>	Interpret transport layer services.
<b>CO3</b>	Distinguish the various functionalities of application layer.
<b>CO4</b>	Outline the concepts of advanced networking technologies and network security.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: ADVANCED JAVA AND J2EE**

**Subject Code: 18ISI502**

**L-T-P-C: 3-0-2-4**

**Course Objectives:**

Sl. No	Course Objectives
1	Know the different streamlined approaches to handling common programming tasks.
2	Understand console based, GUI based and web based applications.
3	To familiarize the Data Base and connectivity through the Java database connectivity (JDBC) and to introduce the basics of J2EE.
4	Learn to create, debug and run multi-tier and enterprise-level applications.

UNIT	Description	Hours
I	<b>Autoboxing and Annotations (Metadata):</b> <b>Wrappers:</b> Definition of Wrappers, Type wrappers: Character, Boolean, The Numeric Type wrappers, <b>Autoboxing:</b> Autoboxing and Methods, Autoboxing / Unboxing occurs in Expressions, Autoboxing / Unboxing, Boolean and character values, Autoboxing / Unboxing helps prevent errors, A word of Warning. <b>Annotations (Metadata):</b> Annotation Basics, Specifying a Retention Policy, Obtaining Annotations at Run Time by Use of Reflection, The AnnotatedElement Interface, Using Default Values, Marker Annotations, Single-Member Annotations, The Built-In Annotations, Type Annotations, Repeating Annotations: Some Restrictions.	8
II	<b>Multithreaded Programming:</b> Definition of multithreaded programming and threads, The Main Thread; Creating a Thread; Creating Multiple Threads; Using is Alive() and join(); Thread Priorities; Synchronization; Inter-thread Communication; Suspending, Resuming and Stopping Threads; Obtaining a Thread's state.	8



<b>III</b>	<p><b>Applets and Event Handling:</b>  <b>Applets:</b> Two Types of Applet; Applet Basics; Applet Architecture; An Applet Skeleton; Simple Applet Display Methods; Requesting Repainting; Using the Status Window; The HTML Applet Tag;  <b>Event Handling:</b> Two event handling mechanisms; The delegation event model; Event classes: The MouseEvent class, The MouseWheelEvent Class; Sources of events; Event listener interfaces: The MouseListener Interface, The MouseMotionListener Interface, The MouseWheelListener Interface; Using the delegation event model: Handling Mouse Event; Adapter classes; Inner classes.</p>	<b>7</b>
<b>IV</b>	<p><b>Java Database Access:</b>  <b>JDBC:</b> The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Connection Pool; Statement Objects; ResultSet; Transaction Processing;</p>	<b>8</b>
<b>V</b>	<p><b>SERVLETS and JSP</b>  <b>Servlet:</b> Background; The Life Cycle of a Servlet; Servlet Development Options, Using Tomcat; A simple Servlet; The Servlet API; The javax.servlet Package; Reading Servlet Parameter; The javax.servlet.http package; Handling HTTP Requests and Responses, Using Cookies, Session Tracking. <b>JSP:</b> Java Server Pages: JSP, JSP Tags, Request string.</p>	<b>8</b>

**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Java - The Complete Reference	Herbert Schildt	9 <sup>th</sup> Edition and 2014, Tata McGraw Hill, ISBN: 978-0-07-180856-9
2	J2EE - The Complete Reference	Jim Keogh	23 <sup>rd</sup> Reprint and 2008, Tata McGraw Hill, ISBN-13:978-0-07—52912-0.

**Reference Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Introduction to JAVA Programming	Y. Daniel Liang	10 <sup>th</sup> Edition and 2015, Pearson Education, ISBN-13: 9781292070025.
2	The J2EE Tutorial	Stephanie Bodoff et al	2 <sup>nd</sup> Edition and 2004, Pearson Education



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<b>3</b>	Advanced JAVA programming	Uttam K Roy	Oxford University press, 2015.
<b>4</b>	Programming with Java	E Balagurusamy	McGraw-Hill, 2019, ISBN: 9353162335, 9789353162337

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Embed supplemental information; Apply Java libraries for multi-thread models to solve real world problems.
<b>CO2</b>	Design applications with graphical user interface and integrate with event handling.
<b>CO3</b>	Implement three-tier architecture applications.
<b>CO4</b>	Invoke and develop server side objects.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: INTRODUCTION TO AUTOMATA THEORY AND COMPUTATION**

**Subject Code: 18CS503**

**L-T-P-C: 3-1-0-4**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand core concepts in Automata and Theory of Computation.
2	Identify different Formal Language Classes and their Relationships.
3	Prove or disprove theorems in Automata Theory using their properties.
4	Compare finite automata, Push Down Automata and Turing Machines as Mathematical models of computation.

UNIT	Description	Hours
I	<b>Introduction to Finite Automata</b> Why study Automata Theory?, Structural representations: Grammars, Regular Expressions; The Central Concepts of automata theory: Alphabets, Strings, Languages, Problems, Set-Formers as a way to define languages; Definition of DFA, How a DFA processes strings, Simpler notations for DFA's, Extending the transition function to strings, The language of a DFA, Nondeterministic Finite Automata(NFA), An informal view of NFA, Definition of NFA, An Extended Transition Function, The language of NFA, Equivalence of DFA and NFA, Finite Automata with Epsilon-transitions.	11
II	<b>Regular Expressions and Languages, Properties of Regular Languages</b> Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions: Lexical Analysis, Finding Patterns in Text; Proving Languages Not to be Regular, Closure properties of Regular Languages, Equivalence and Minimization of Automata, Testing equivalence of states, Testing equivalence of Regular Languages, Minimization of DFA's	11
III	<b>Context-Free Grammars and Languages</b> Context-Free Grammars, An informal example, Definition of Context-Free Grammars, Derivations using a Grammar, The language of a grammar, Sentential forms, Parse Trees, Constructing Parse Trees, The yield of a Parse tree, Inferences, Derivations and Parse Trees Applications of Context-Free Grammars, Parsers, The YACC Parser-Generator, Ambiguity in Grammars and Languages, Ambiguous Grammars, Removing ambiguity from grammars, Leftmost derivations as a way to express ambiguity, Inherent ambiguity.	10
IV	<b>Pushdown Automata</b> Definition of the Pushdown Automata, Informal Definition, Formal Definition, A Graphical Notation for PDA's, Instantaneous Descriptions of a PDA, The Languages of a PDA, Acceptance by Final State, Acceptance by Empty Stack, From Empty Stack to Final State, From Final State to Empty stack, Equivalence of PDA's and CFG's, From Grammars to PDA's, From PDA's to Grammars, Definition of Deterministic PDA.	10



<b>V</b>	<b>Properties of Context-Free Languages, Introduction to Turing Machines</b> Normal Forms for CFG's, Eliminating Useless Symbols, Computing the Generating and Reachable Symbols, Eliminating $\epsilon$ - Productions, Eliminating Unit Productions, Chomsky Normal Form, The Pumping Lemma for Context-Free Languages. The Turing Machine: Notation for the Turing Machine, Instantaneous Descriptions for Turing Machines, Transition Diagrams for Turing Machines, The Language of a Turing Machine, Turing machines and Halting; Extensions to the basic Turing machines.	<b>10</b>
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**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Introduction to Automata Theory, Languages and Computation	John E Hopcroft, Rajeev Motwani, Jeffery D Ullman	3 <sup>rd</sup> Edition, Pearson Education Limited 2014 ISBN 13:978-1-292-03905-3

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Introduction to Languages and Theory of Computation	John C Martin	3 <sup>rd</sup> Edition, Tata McGraw – Hill Education, 2013 ISBN. 978-0-07-066048-9.
<b>2</b>	An Introduction to Formal Languages and Automata	Peter Linz	6 <sup>th</sup> Edition, Narosa Publishing House, 2016 ISBN: 9781284077254

**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Explain the concepts of Automata theory and its applications.
<b>CO2</b>	Develop mathematical proofs for different types of computational models.
<b>CO3</b>	Design computational models to accept a given language and simulate the design.
<b>CO4</b>	Demonstrate the relationship among different components of automata theory.





**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: DATABASE MANAGEMENT SYSTEMS**

**Subject Code: 18CS504**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	Knowledge of the architecture and functioning of Database Management Systems.
2	Understand and apply the principles of data modeling using Entity Relationship and develop a good database design.
3	Understand the use of Structured Query Language (SQL).
4	Apply normalization techniques to normalize a database and understand the need of database transaction and controlling the consequences of concurrent data access.

UNIT	Description	Hours
I	<b>Introduction:</b> An example; Characteristics of Database approach; Actors on the scene; Workers behind the scene; Advantages of using DBMS approach, when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures.	8
II	<b>Entity-Relationship Model and Relational Model:</b> Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Relational Database Design Using ER- to-Relational Mapping.	8
III	<b>Relational Algebra and SQL:</b> Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Views (Virtual Tables) in SQL.	8
IV	<b>Database Design – 1:</b> Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. Definitions of Multivalued Dependency , Fourth Normal Form, Join Dependency and Fifth Normal Form.	8



<b>V</b>	<b>Transaction Management:</b> The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; Introduction to ARIES; The write-ahead log protocol; Check pointing.	<b>7</b>
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**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Fundamentals of Database Systems	Elmasri and Navathe	7 <sup>th</sup> Edition, Pearson Education, 2017, ISBN-13: 978-9332582705
2	Database Management Systems	Raghu Ramakrishnan and Johannes Gehrke	3 <sup>rd</sup> Edition, McGraw-Hill, 2014, ISBN-13:978-9339213114.

**Reference Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Data base System Concepts	Silberschatz, Korth and Sudharshan	7 <sup>th</sup> Edition, McGrawHill, 2019 ISBN-13: 978-0078022159.
2	An Introduction to Database Systems	C.J. Date, A. Kannan, S. Swamynatham	8 <sup>th</sup> Edition, Pearson education, 2017, ISBN-13:978-817585568

**Course Outcomes:**

Course Outcome	Descriptions
<b>CO1</b>	Analyze the basic concepts of database and architecture associated with DBMS.
<b>CO2</b>	Able to employ the conceptual and relational models to design large databases.
<b>CO3</b>	Able to apply normalization, create, maintain and manipulate a relational database using SQL.
<b>CO4</b>	Able to understand the characteristics of database transactions and analyze how they affect database integrity and consistency.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: UNIX SYSTEM PROGRAMMING**

**Subject Code: 18IS5PE51**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
<b>1</b>	Understand the fundamental design of the UNIX operating system.
<b>2</b>	Learn to use UNIX Application Program Interface.
<b>3</b>	Develop system level programs in the UNIX environment.
<b>4</b>	Design and build applications over the UNIX operating system.

UNIT	Description	Hours
<b>I</b>	File Types, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel support for files, Relationship of C Stream pointers and file descriptors. General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs.	<b>9</b>
<b>II</b>	Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions. Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, wait3, wait4 Functions, Race Conditions, exec Functions, Interpreter Files, system Function.	<b>8</b>
<b>III</b>	Introduction, Terminal Logins, Network Logins, Process Group, Sessions, Controlling Terminal, Tcgetpgrp, tcsetpgrp and tcgetsid functions, Job Control. Signal Concepts, Signal function, Kill and raise functions, Signal sets, Sigpromask ,sigpending, sigaction, abort sleep functions.	<b>8</b>
<b>IV</b>	Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model. Introduction, Pipes, popen and pclose functions, FIFOs, Message Queues, Semaphores.	<b>7</b>
<b>V</b>	Socket APIs, Simple example using Socket APIs, History of RPC, RPC Programming Interface Levels, RPC Library Functions, rpcgen.	<b>7</b>

**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
<b>1</b>	Unix System Programming Using C++	Terrence Chan	Prentice Hall India, 2016 ISBN: 10: 0133315622
<b>2</b>	Advanced Programming in the UNIX Environment	W.Richard Stevens	3rd Edition, Pearson Education / PHI, 2017 ISBN: 978-0-321-63773-4



**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	The Design of the UNIX Operating System	Maurice.J.Bach	Pearson Education / PHI, 1996 ISBN: 10-0132017571
<b>2</b>	Advanced Unix Programming	Marc J. Rochkind	2nd Edition, Pearson Education, 2005 ISBN: 10: 0131411543

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Use UNIX APIs to write programs at system level.
<b>CO2</b>	Understand relationship among the processes and their interaction.
<b>CO3</b>	Design programs to handle asynchronous events.
<b>CO4</b>	Develop programs for Inter Process Communication.



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**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: MANAGEMENT INFORMATION SYSTEM**

**Subject Code: 18IS5PE52**

**L-T-P-C:3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand the importance of Information Science and Information Technology in today's business.
2	Learn the various enterprise application tools used in business systems.
3	Explain the scope of e-commerce and trends in e-commerce.
4	Identify the security issues in Information Technology and how to apply the security measures.

UNIT	Description	Hours
I	<b>Foundation Concepts:</b> Information Systems in Business: Introduction, The real world of Information Systems, What is an Information System?, The fundamental role of IS in business, Trends in IS, Managerial challenges of IT. <b>System Concepts:</b> A foundation, Components of an Information System, Information System Resources, Information System activities, Recognizing Information Systems. <b>Fundamentals of strategic advantages:</b> Strategic IT, Competitive strategy concepts, The competitive advantage of IT, Strategic uses of IT, Building a customer-focused business, The value chain and strategic IS.	8
II	<b>Competing with Information Technology:</b> Reengineering business processes, Becoming an agile company Creating a virtual company, Building a knowledge-creating company. <b>E-Business Systems:</b> Introduction, Cross-functional enterprise applications, Enterprise application integration, Transaction processing systems, Enterprise collaboration systems. <b>Functional Business Systems:</b> Introduction, Marketing systems, Manufacturing systems, Human resource systems, Accounting systems, financial management systems. <b>Enterprise Business Systems I:</b> Introduction, What is CRM? The three phases of CRM, Benefits and challenges of CRM, Trends in CRM.	8
III	<b>Enterprise Business Systems II:</b> Enterprise resource planning: Introduction, What is ERP? Benefits and challenges of ERP, Trends in ERP. <b>Supply chain Management:</b> Introduction, What is SCM? The role of SCM, Benefits and challenges of SCM, Trends in SCM. <b>Electronic commerce fundamentals:</b> Introduction, The scope of e-commerce. Essential e-commerce, processes, Electronic payment processes. <b>E-Commerce applications and issues:</b> E-commerce application trends, Business-to- Consumer e-commerce, Web store requirements, Business-to-Business e-commerce, e-commerce marketplaces, Clicks and bricks in e-commerce.	8



<b>IV</b>	<b>Decision support in business:</b> Introduction, Decision support trends, Decision support systems (DSS), Management Information Systems, Online analytical processing, Using DSS, Executive information systems, Enterprise portals and decision support, Knowledge management systems, Business and Artificial Intelligence (AI), An overview of AI, Expert systems.	<b>8</b>
<b>V</b>	<b>Security, Ethical and societal challenges of IT:</b> Introduction, Ethical responsibility of business professionals, Computer crime, Privacy issues, other challenges, Health issues, societal solutions. Security management of IT: Introduction, Tools of security management, Inter networked security defenses, other security measures, System Controls and audits.	<b>7</b>

**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Management Information Systems	James A. O' Brien, George M. Marakas:	10 <sup>th</sup> Edition, Tata McGraw Hill, 2006. ISBN: 100077522176

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Management Information System, Managing the Digital Firm	Kenneth C. Laudon and Jane P. Laudon	9 <sup>th</sup> Edition, Pearson Education, 2006. ISBN: 13-789352865475

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Outline the areas, trends and managerial challenges of information system
<b>CO2</b>	Explain major strategic applications of information technology and its goals & components.
<b>CO3</b>	Learn basic process component of e-commerce systems & important trends, applications & issues in e-commerce.
<b>CO4</b>	Identify threats against & defenses; defenses needed for the performance & security of business information systems.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: NATURAL LANGUAGE PROCESSING**

**Subject Code: 18IS5PE53**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	Learn the techniques in natural language processing.
2	Be familiar with the natural language generation.
3	Be exposed to Text Mining.
4	Understand the information retrieval techniques.

UNIT	Description	Hours
I	<b>Overview and language modeling:</b> Overview: Origins and challenges of NLP Language and Grammar-Processing Indian Languages- NLP Applications-Information Retrieval. Language Modeling: Various Grammar- based Language Models-Statistical Language Model.	7
II	<b>Word level and syntactic analysis:</b> Word Level Analysis: Regular Expressions- Finite-State Automata-Morphological Parsing-Spelling Error Detection and correction-Words and Word classes-Part-of Speech Tagging. Syntactic Analysis: Context-free Grammar-Constituency- Parsing-Probabilistic Parsing.	8
III	<b>Extracting Relations from Text: From Word Sequences to Dependency Paths:</b> Introduction, Subsequence Kernels for Relation Extraction, A Dependency-Path Kernel for Relation Extraction and Experimental Evaluation. Mining Diagnostic Text Reports by Learning to Annotate Knowledge Roles: Introduction, Domain Knowledge and Knowledge Roles, Frame Semantics and Semantic Role Labeling, Learning to Annotate Cases with Knowledge Roles and Evaluations. <b>A Case Study in Natural Language Based Web Search:</b> In Fact System Overview, the GlobalSecurity.org Experience.	8
IV	<b>iSTART:</b> Evaluation of Feedback Systems, Textual Signatures: Identifying Text-Types Using Latent Semantic Analysis to Measure the Cohesion of Text Structures: Introduction, Cohesion, Coh-Matrix, Approaches to Analyzing Texts, Latent Semantic Analysis, Predictions, Results of Experiments. <b>Automatic Document Separation:</b> A Combination of Probabilistic Classification and Finite-State Sequence Modeling: Introduction, Related Work, Data Preparation, Document Separation as a Sequence Mapping Problem, Results. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.	8
V	<b>Information Retrieval and Lexical Resources:</b> Information Retrieval: Design features of Information Retrieval Systems-Classical, Non classical, and Alternative Models of Information Retrieval – valuation Lexical Resources: World Net-Frame Net-Stemmers-POS Tagger- Research Corpora.	8





**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Natural Language Processing and Information Retrieval	Tanveer Siddiqui, U.S. Tiwary	Oxford University Press, 2008 ISBN: 10: 0195692322
<b>2</b>	Natural Language Processing and Text Mining	Anne Kao and Stephen R. Poteet (Eds)	Springer-Verlag London Limited 2007 ISBN: 13: 978-1-84628-175-4

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition	Daniel Jurafsky and James H Martin	2nd Edition, Prentice Hall, 2008 ISBN: 13: 9780131873216
<b>2</b>	Natural Language Understanding	James Allen	2nd Edition, Benjamin/Cummings publishing company, 1995 ISBN: 13: 9780805303308

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Analyze the natural language text.
<b>CO2</b>	Generate the natural language.
<b>CO3</b>	Demonstrate Text mining concepts.
<b>CO4</b>	Apply information retrieval techniques.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: APPLICATION DEVELOPMENT USING PYTHON**

**Subject Code: 18IS5PE54**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
<b>1</b>	Learn the syntax and semantics of Python programming language.
<b>2</b>	Demonstrate the use of built-in functions to navigate the file system.
<b>3</b>	Implement the Object Oriented Programming concepts in Python.
<b>4</b>	Appraise the need for working with various documents like Excel, PDF, Word and Others.

UNIT	Description	Hours
<b>I</b>	<b>Manipulating Strings:</b> Working with Strings, Useful String Methods, <b>Pattern Matching with Regular Expressions:</b> Finding Patterns of Text Without Regular Expressions, Finding Patterns of Text with Regular Expressions, More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making Your Own Character Classes, The Caret and Dollar Sign Characters, The Wildcard Character, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re.IGNORECASE, re.DOTALL, and re .VERBOSE.	<b>8</b>
<b>II</b>	<b>Reading and Writing Files:</b> Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the pprint.pformat() Function, <b>Organizing Files:</b> The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, <b>Debugging:</b> Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger.	<b>8</b>
<b>III</b>	<b>Classes and objects:</b> Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying. <b>Classes and functions:</b> Time, Pure functions, Modifiers, Prototyping versus planning. <b>Classes and methods:</b> Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and Implementation. <b>Inheritance:</b> Card objects, Class attributes, Comparing cards, Decks, Printing the deck, Add, remove, shuffle and sort, Inheritance, Class diagrams, Data encapsulation.	<b>8</b>



<b>IV</b>	<b>Web Scraping:</b> Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML, Parsing HTML with the BeautifulSoup Module, Controlling the Browser with the selenium Module. <b>Working with Excel Spreadsheets:</b> Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Writing Excel Documents, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts. <b>Working with PDF and Word Documents:</b> PDF Documents, Word Documents.	<b>8</b>
<b>V</b>	<b>Working with CSV files and JSON data:</b> The csv Module, JSON and APIs, The json Module. <b>Introduction to Data Science:</b> Functional Programming, JSON and XML in Python, NumPy with Python, Pandas, Altair.	<b>7</b>

**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Automate the Boring Stuff with Python	Al Sweigart	2 <sup>nd</sup> Edition, No Starch Press, 2015. ISBN-13-978-1-59327-599-0
<b>2</b>	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	3 <sup>rd</sup> Edition, Green Tea Press, 2020. ISBN-978-1-491-93936-9

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Introduction to Python Programming	Gowrishankar S, Veena A	1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Use various methods available in python to work with strings and search for text patterns using regular expressions.
<b>CO2</b>	Apply basic operations on files and organize the files in Python.
<b>CO3</b>	Develop real world applications using Object-Oriented programming concepts available in Python.
<b>CO4</b>	Design programs to extract elements from web pages to parse them for information and manipulate various documents.



**Syllabus for the Academic Year – 2021 – 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: OPERATING SYSTEMS LAB**

**Subject Code: 18ISL507**

**L-T-P-C: 0-0-2-1**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand the working of UNIX APIs and system calls while creating process and threads.
2	Learn various CPU scheduling algorithms, Deadlock avoidance algorithms and Memory management schemes.

**Note: Implement the following programs using C Language.**

Lab Cycles	Description
I	<b>UNIX Part:</b> <ol style="list-style-type: none"><li>1. Design a program using fork () system call that creates a child process. The child process prints its own pid, id of its parent, does directory listing (using exec () system call) and exits. The parent process has to invoke wait () system call to wait for child process to complete and prints its own pid and id of its child process and then exists.</li><li>2. Develop a program to demonstrate the basic Pthreads API for constructing a multithreaded program that calculates the summation of a non-negative integer in a separate thread.</li><li>3. Implement a program that accepts a directory name as argument and checks whether it exists as a directory. If it doesn't exist or exists as an ordinary file, then remove the file and create the directory. Also change to that directory and display the current directory.</li></ol>
II	<ol style="list-style-type: none"><li>4. Design a program that shares a pipe between two processes. Demonstrate how the data flows from the parent to the child processes.</li><li>5. Develop a program to illustrate the race condition between parent and child processes.</li><li>6. Implement a program that creates a zombie and then calls system to execute the ps command to verify that the process is zombie.</li></ol>



<b>III</b>	<b>Operating Systems Part:</b>  7. Develop two programs (server and client) that illustrate the passing of a string via shared memory between the processes running simultaneously. The server program creates the shared memory portion and string. The client program attaches itself to the created shared memory portion and uses the string. 8. Design, develop and execute a program to simulate the working of Shortest Job First scheduling algorithm. Display the Gantt chart, compute and print the average waiting time and average turnaround time. 9. Design, develop and execute a program to simulate the working of Round Robin Scheduling algorithm with different Quantum sizes. Display the Gantt chart, compute and print the average waiting time and average turnaround time.
<b>IV</b>	10. Implement the Producer-Consumer problem with bounded buffer using semaphores. 11. Design, develop and run a program to implement the Banker's Algorithm. Demonstrate its working with different data values. 12. Implement Best fit Memory management scheme.
<b>V</b>	13. Implement LRU Page Replacement Algorithm. 14. Implement Disk Scheduling Algorithms like FCFS, SSTF, and SCAN. 15. Implement file allocation on free disk space in a contiguous manner.

**Pattern for practical exam conduction:**

In the examination, each student picks one question out of 10 questions selected by the examiner from the above question bank.

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Use various UNIX APIs for processes, threads and IPC mechanisms.
<b>CO2</b>	Implement and compare different types of CPU scheduling algorithms.
<b>CO3</b>	Develop programs on synchronization of processes and develop deadlock avoidance approach.
<b>CO4</b>	Demonstrate different memory management schemes, page replacement algorithms and file allocation techniques on secondary storage devices.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 5**

**Subject Name: DATABASE LAB WITH MINI PROJECT**

**Subject Code: 18CSL508**

**L-T-P-C: 0-0-2-1**

**Course Objectives:**

Sl. No	Course Objectives
<b>1</b>	To understand how a real world problem can be mapped to schemas
<b>2</b>	To solve different industry level problems & to learn its applications

Lab Cycles	Description
<b>I</b>	<p><b>A. Consider the following schema for a Library Database:</b></p> <p>BOOK (<u>Book_id</u>, Title, Publisher_Name, Pub_Year)            BOOK_AUTHORS (<u>Book_id</u>, Author_Name)            PUBLISHER (<u>Name</u>, Address, Phone)            BOOK_COPIES (<u>Book_id</u>, Branch_id, No-of_Copies)            CARD(Card_No)            BOOK_LENDING (<u>Book_id</u>, Branch_id, Card_No, Date_Out, Due_Date)            LIBRARY_BRANCH (<u>Branch_id</u>, Branch_Name, Address)</p> <p><b>B. Consider the following schema for Order Database:</b></p> <p>SALESMAN (<u>Salesman_id</u>, Name, City, Commission)            CUSTOMER (<u>Customer_id</u>, Cust_Name, City, Grade, <u>Salesman_id</u>)            ORDERS (<u>Ord_No</u>, Purchase_Amt, Ord_Date, <u>Customer_id</u>, <u>Salesman_id</u>)</p>
<b>II</b>	<p><b>C. Consider the schema for Movie Database:</b></p> <p>ACTOR (Act_id, Act_Name, Act_Gender)            DIRECTOR (Dir_id, Dir_Name, Dir_Phone)            MOVIES (Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)            MOVIE_CAST (Act_id, Mov_id, Role)            RATING (Mov_id, Rev_Stars)</p> <p><b>D. Consider the schema for Company Database:</b></p> <p>DEPARTMENT (DNo, DName, MgrSSN, MgrStartDate)            EMPLOYEE (SSN, Name, Address, Sex, Salary, SuperSSN, DNo)            DLOCATION (DNo,DLoc)            PROJECT (PNo, PName, PLocation, DNo)            WORKS_ON (SSN, PNo, Hours)</p> <p><b>Instructions:</b>  <b>Using given schema</b>            1. Draw an Entity-Relationship(ER) Model.</p>



	<p>2. Implement SQL Queries using DDL and DML Statements.</p> <p>3. Implement SQL Nested queries and Views.</p>
<b>III</b>	<p><b>PART B: Mini-Project</b></p> <p><b>Instructions:</b></p> <p>Open Ended Mini Project should be implemented and shall be carried out in a batch of two or three students. The students will finalize a topic in consultation with the faculty. The mini project must be carried out in the college only.</p> <p><b>The Mini Project tasks would involve:</b></p> <ul style="list-style-type: none"> <li>➤ Understand the complete domain knowledge of application and derive the complete data requirement specification of the Mini Project</li> <li>➤ The database can be created using Oracle, SQL-Server, MS-Access, DB2, NOSQL, MySQL, etc.,</li> <li>➤ Use database Programming such as Embedded SQL,/Dynamic SQL/SQLJ, PL/SQL</li> <li>➤ The front end can be created using Java , VC++, C#, Python ,VB, VAJ or any other similar tool.</li> <li>➤ For Database connectivity any suitable programming language can be used. (Java, Python etc.,)</li> <li>➤ Appreciate the importance of security for database systems.</li> <li>➤ The student must demonstrate their Mini-Project at the time of examination and submission of report.</li> </ul>

**Pattern for practical exam conduction:**

**The allotment of marks is detailed as below.**

Sl. No.	Activity	Max. Marks	
1	SQL Programming	Part-A	30
2	Mini-Project	Part-B	15
3	Viva-Voce		05
Total Max. Marks			50
Minimum Passing Marks(40% of Max. Marks)			20

**Course Outcomes:**

Course Outcome	Descriptions
<b>CO1</b>	Design database schema for a given problem-domain and enforce different constraints on a database using RDBMS.
<b>CO2</b>	Populate and query a database using SQL DML/DDL commands.
<b>CO3</b>	Design and build a GUI application.



Syllabus for the Academic Year - 2021 - 2022

Department: Information Science and Engineering

Semester: 5

Subject Name: SKILL DEVELOPMENT-III

Subject Code: 18SK501

L-T-P-C: 0-0-2-1

Course Objectives:

Sl. No	Course Objectives
1	Understand their own communication style, the essentials of good communication and develop their confidence to communicate effectively.
2	Manage stress by applying stress management skills.
3	Ability to give contribution to the planning and coordinate Teamwork.
4	Ability to analyze make problem solving decisions related to ethics.

UNIT	Description	Hours
I	<b>Communication Skills:</b> Basics, Method, Means, Process and Purpose, Basics of Business Communication, Written & Oral Communication, Listening. <b>Communication with Confidence &amp; Clarity-</b> Interaction with people, the need the uses and the methods, getting phonetically correct, using politically correct language, Debate & Extempore.	
II	<b>Assertive Communication-</b> Concept of Assertive communication, Importance and applicability of Assertive communication, Assertive Words, being assertive. <b>Presentation Skills-</b> Discussing the basic concepts of presentation skills, Articulation Skills, IQ & GK, how to make effective presentations, body language & Dress code in presentation, media of presentation.	
III	<b>Teamwork-</b> Team Work and its important elements Clarifying the advantages and challenges of teamwork Understanding bargains in team building Defining behavior to sync with teamwork Stages of Team Building Features of successful teams. <b>Body Language &amp; Proxemics - Rapport Building</b> - Gestures, postures, facial expression and body movements in different situations, Importance of Proxemics, right personal space to maintain with different people.	
IV	<b>Motivation and Stress Management:</b> Self-motivation, group motivation, leadership abilities, Stress clauses and stress busters to handle stress and de-stress; Understanding stress - Concept of sound body and mind, Dealing with anxiety, tension, and relaxation techniques. Individual Counseling & Guidance, Career Orientation. Balancing Personal & Professional Life-	





<b>V</b>	<b>Professional Practice</b> - Professional Dress Code, Time Sense, Respecting People & their Space, Relevant Behavior at different Hierarchical Levels. Positive Attitude, Self Analysis and Self-Management. <b>Professional Ethics</b> - values to be practiced, standards and codes to be adopted as professional engineers in the society for various projects. Balancing Personal & Professional Life	
	<b>Note: The respective departments should discuss case studies and standards pertaining to their domain</b>	

**Scheme of Continuous Internal Examination (CIE)**  
**Evaluation will be carried out in TWO Phases.**

Phase	Activity	Weightage
<b>I</b>	Test 1 is conducted in V Sem for 50 marks after completion of 2.5 units for 14 hours of training sessions.	50%
<b>II</b>	Test 2 is conducted in V Sem for 50 marks after completion of half of 3rd unit and complete of unit IV and V for 14 hours of training sessions.	50%
	At the end of the V semester, marks of Test 1 and Test 2 are consolidated for 50 marks and grading is done.	

**Reference Books:**

Sl. No.	Reference Book title	Author	Volume and Year of Edition
<b>1</b>	The 7 Habits of Highly Effective People	Stephen R Covey	Free Press, 2004 Edition, ISBN: 0743272455
<b>2</b>	How to win friends and influence people	Dale Carnegie	General Press, 1st Edition, 2016, ISBN: 9789380914787
<b>3</b>	Crucial Conversation: Tools for Talking When Stakes are High	Kerry Patterson, Joseph Grenny, Ron Mcmillan	McGraw-Hill Publication, 2012 Edition, ISBN: 9780071772204
<b>4</b>	Aptimithra: Best Aptitude Book	Ethnus	Tata McGraw Hill, 2014 Edition, ISBN: 9781259058738

**Course Outcomes**

Course outcome	Descriptions
<b>CO1</b>	Develop professional skill to suit the industry requirement
<b>CO2</b>	Analyze problems using quantitative and reasoning skills
<b>CO3</b>	Develop leadership and interpersonal working skills
<b>CO4</b>	Demonstrate verbal communication skills with appropriate body language.



**CHOICE BASED CREDIT SYSTEM (CBCS)**  
**SCHEME OF TEACHING AND EXAMINATION FOR B.E. DEGREE COURSE**  
(Effective from the academic year 2018-19)

<b>VI Semester B.E. (Common to UG programs: CSE/ISE)</b> (Subjects and Syllabus as per AICTE-Model Curriculum for UG Course in Engg. & Tech.- Jan. 2018)					<b>Teaching Hours/week</b>				<b>Examination</b>				
<i>SI No</i>	<i>Course and Course Code</i>		<i>Course Title</i>	<i>Teaching Dept.</i>	<i>Board of Exam.</i>	<i>L</i>	<i>T</i>	<i>P</i>	<i>C</i>	<i>Duration in Hrs.</i>	<i>CIE</i>	<i>SEE</i>	<i>Total Marks</i>
01	PC	18IS601	Software Engineering	ISE	ISE	3	1	-	4	3	50	50	100
02	PC	18CSI602	Web Technologies	CSE/ISE	CSE/ISE	3	-	2	4	3	50	50	100
03	PC	18CS603	Artificial Intelligence and Machine Learning	CSE/ISE	CSE/ISE	3	1	-	4	3	50	50	100
04	PE	18IS6PE4x	Professional Elective-II	ISE	ISE	3	-	-	3	3	50	50	100
05	OE	18CS6OE5x	Open Elective-II	CSE/ISE	CSE/ISE	3	-	-	3	3	50	50	100
06	PC	18IS6MP01	Mini Project	ISE	ISE	-	-	4	2	3	50	50	100
07	PC	18ISL607	Computer Networks Lab	ISE	ISE	-	-	2	1	3	50	50	100
08	PC	18CSL608	Machine Learning Lab	CSE/ISE	CSE/ISE	-	-	2	1	3	50	50	100
09	HS	18SK601	Skill Development-IV	HS	HS	-	-	2	1	3	50	50	100
Total						15	02	12	23	27	450	450	900

**Professional Elective-II:**

- 18IS6PE41: Internet of Things
- 18IS6PE42: NoSQL Database
- 18IS6PE43: Wireless Sensor Networks
- 18IS6PE44: Computer Vision and Robotics

**Open Elective II: Offered by Dept. of Computer Science and Engg.**

- 18CS6OE51: Object Oriented Programming
- 18CS6OE52: Python Programming
- 18CS6OE53: Artificial Intelligence

**Note: Open Elective: The strength should be Min of 25 and Max of 55 to 60. In Place of Open Elective at V Sem , the students are encouraged to take Online course (Swayam / MOOC / NPTEL / MIT – Coursera .....). with the approval from Academic Committee of the Department, HEAD and DEAN (Academics) .**



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: SOFTWARE ENGINEERING**

**Subject Code: 18IS601**

**L-T-P-C: 3-1-0-4**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand systematic and disciplined approach for software development.
2	Analyze and Develop different customer requirements and SRS.
3	Compare different software testing strategies and Appreciate Project management activities.

UNIT	Description	Hours
I	<b>Software And Software Engineering:</b> The Nature of Software, the Unique Nature of Web Apps, Software Engineering, the Software Process, Software Engineering Practice. <b>The Software Process: Process Models:</b> A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models: The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models.	11
II	<b>Introduction to agility:</b> What Is Agility?, Agility and the Cost of Change, What Is an Agile Process, Other Agile Process Models, A tool set for the Agile Process. <b>Requirements Engineering And Modeling:</b> Requirements Engineering, Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling. Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Requirements Modeling for WebApps – How Much Analysis is Enough, Requirements Modeling Input, Requirements Modeling Output, Functional Model for WebApps.	11
III	<b>Design Concepts:</b> Design within the Context of Software Engineering, the Design Process, Design Concepts, The Design Model. <b>Architectural Design:</b> Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.	10



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
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<b>IV</b>	<b>Software Testing Strategies:</b> A Strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging.	<b>10</b>
<b>V</b>	<b>Project Management Concepts:</b> The management spectrum, People, Product, Process, Project, W5HH principle. <b>Estimation For Software Projects:</b> Observations on estimation, project planning process, software scope and reliability, Resources, Project estimation, decomposition techniques, empirical estimation models.	<b>10</b>

**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Software Engineering - A Practitioners approach.	Roger .G. Pressman	8th Edition, 2019 Tata McGrawhill. ISBN-13: 978-0073375977

**Reference Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	An Integrated Approach to Software Engineering.	Pankaj Jolate	Narosa Publications, 3 <sup>rd</sup> Edition, 2018 ISBN: 978-1-4684-9312-2
2	Software Engineering.	Ian Sommerville	10th Edition, 2018, Pearson Education Ltd. ISBN-13:978-0137035151

**Course Outcomes:**

Course Outcome	Description
<b>CO1</b>	Understand Software Development Life Cycle (SDLC) and Client Requirements using various Requirements Modelling Techniques.
<b>CO2</b>	Design and develop Software Models, Architecture and Code.
<b>CO3</b>	Perform Software Testing using conventional Verification and Validation Techniques.
<b>CO4</b>	Develop project planning, Cost estimation and adopt Management skills and abilities.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: WEB TECHNOLOGIES**

**Subject Code: 18CSI602**

**L-T-P-C: 3-0-2-4**

**Course Objectives:**

<b>Sl. No.</b>	<b>Course Objectives</b>
<b>1</b>	Illustrate the Semantic Structure and Compose different tags using XHTML.
<b>2</b>	Define and use user-defined tags for creating a XML framework.
<b>3</b>	Design Client-Side programs using JavaScript.
<b>4</b>	Design Server Side programs using PHP and to infer PHP's capabilities to access database.

<b>UNIT</b>	<b>Description</b>	<b>Hours</b>
<b>I</b>	<b>INTRODUCTION to XHTML</b> HTML v/s XHTML, Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms.	<b>8</b>
<b>II</b>	<b>Introduction to XHTML and XML</b> The audio Element, The video Element, Organisation Elements, The time Element, Syntactic Differences between HTML and XHTML. XML: Introduction, Uses of XML, The Syntax of XML, XML Document Structure.	<b>8</b>
<b>III</b>	<b>The Basics of JavaScript</b> Overview of JavaScript, Object Orientation and JavaScript, General Syntactic Characteristics, Primitives, Operations, and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions , Constructors, Pattern Matching Using Regular Expressions, Handling Errors in Scripts.	<b>8</b>



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<b>IV</b>	<b>JavaScript and HTML Documents</b> The Document Object Model, Element Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Button Elements, Handling Events from Text Box and Password Elements.	<b>8</b>
<b>V</b>	<b>Introduction to PHP</b> Origins and Uses of PHP, Overview of PHP, General Syntactic Characteristics, Primitives, Operations, and Expressions, Output, Control Statements, Arrays, Functions, Constructors, Pattern Matching, Form Handling, Cookies, Session Tracking, Database Access with PHP and MySQL.	<b>7</b>

**Text Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Programming the World Wide Web	Robert W. Sebesta	8 <sup>th</sup> Edition, 2014, Pearson Education. ISBN13: 9780133775983

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Professional JavaScript for Web Developers	Nicholas C Zakas,	3 <sup>rd</sup> Edition, Wrox/ Wiley India, 2012. ISBN: 97811180266694
<b>2</b>	Fundamentals of Web Development,	Randy Connolly, Ricardo Hoar,	Pearson Education, Inc., 2005. ISBN: 9780133407150
<b>3</b>	Open Source Web Development with LAMP	James Lee and Brent Ware,	Pearson Education, Inc., 2009. ISBN: 9780201770612



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(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Develop Web Pages, Host web sites and Deploy web based applications using various web technologies.
<b>CO2</b>	Develop web pages using XHTML and understand web services.
<b>CO3</b>	Implement, invoke and develop server side objects using PHP to generate and display the contents dynamically.
<b>CO4</b>	Implement client side programming to develop interactive web pages using JavaScript.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: ARTIFICIAL INTELLEGEENCE AND MACHINE  
LEARNING**

**L-T-P-C: 3-1-0-4**

**Subject Code: 18CS603**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand Artificial Intelligence concept and its problem space.
2	Learn the field of Machine Learning, describing a variety of learning paradigms, algorithms, theoretical results, and applications.
3	Study the basics of supervised and unsupervised learning
4	Illustrate ML algorithm and their use in appropriate applications.

UNIT	Description	Hours
I	<b>Introduction to Artificial Intelligence :</b> History of Artificial Intelligence, What Is Artificial Intelligence? Emergence of AI, Cognitive Science and AI. <b>Logical Intelligence:</b> Propositional Logic: Basics of Propositional Logic, Syntax, Semantics, Tautologies and Logical Implication, Logical Arguments, Derivation Systems, Resolution, Normal Forms, Derivations Using Resolution, Resolution Algorithm, Artificial Intelligence Applications: Knowledge-Based Systems, Wumpus World. <b>First-Order Logic:</b> Basics of First-Order Logic, Syntax, Semantics, Validity and Logical Implication, Derivation Systems, Modus Ponens for First-Order Logic. Artificial Intelligence Applications: Wumpus World Revisited, Planning	10
II	<b>Certain Knowledge Representation:</b> Taxonomic Knowledge: Semantic Nets, Model of Human Organization of Knowledge. Frames: Frame Data Structure, Planning a Trip Using Frames. Non-monotonic Logic: Circumscription, Default Logic, Difficulties. <b>Introduction to Machine Learning:</b> What is machine learning?, What kind of problems can be tackled using machine learning, A Simple Machine-Learning Task: Training Sets and Classifiers, Minor Digression: Hill-Climbing Search, Hill Climbing in Machine Learning, Some Difficulties with Available Data	10





<b>III</b>	<p><b>Bayesian Classifiers</b> The Single-Attribute Case, Vectors of Discrete Attributes, Probabilities of Rare Events: Exploiting the Expert’s Intuition, How to Handle Continuous Attributes, Gaussian “Bell” Function: A Standard pdf, Approximating PDFs with Sets of Gaussians.</p> <p><b>Nearest-Neighbor Classifiers</b> The k-Nearest-Neighbor Rule, Measuring Similarity, Irrelevant Attributes and Scaling Problems, Performance Considerations, Weighted Nearest Neighbors, Removing Dangerous Examples, Removing Redundant Examples.</p>	<b>11</b>
<b>IV</b>	<p><b>Linear and Polynomial Classifiers</b> The Essence, The Additive Rule: Perceptron Learning, The Multiplicative Rule: WINNOW, Domains with More Than Two Classes, Polynomial Classifiers, Specific Aspects of Polynomial Classifiers,</p> <p><b>Artificial Neural Networks</b> Multilayer Perceptrons as Classifiers, Neural Network’s Error, Backpropagation of Error, Special Aspects of Multilayer Perceptrons, Architectural Issues.</p>	<b>11</b>
<b>V</b>	<p><b>Decision Trees</b> Decision Trees as Classifiers, Induction of Decision Trees, How Much Information Does an Attribute Convey?, Binary Split of a Numeric Attribute, Pruning, Converting the Decision Tree into Rules.</p> <p><b>Unsupervised Learning</b> Cluster Analysis, A Simple Algorithm: k-Means, More Advanced Versions of k-Means, Hierarchical Aggregation.</p>	<b>10</b>

**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Artificial Intelligence With an Introduction to Machine Learning	Richard E. Neapolitan Xia Jiang	Second edition, Chapman and Hall/CRC, May 2018, ISBN-13: 9781138502383 ISBN-10: 1138502383
2	An Introduction to Machine Learning	Miroslav Kubat	Second Edition, Springer, ISBN 978-3-319-63913-0 (eBook) ISBN 978-3-319-63912-3

**Reference Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Machine Learning	Tom M. Mitchell	India Edition 2013, McGraw Hill Education, ISBN: 13:9780070428072, 10:0070428077.



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
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<b>2</b>	Machine Learning – An Algorithmic Perspective	Stephen Marsland	Chapman and Hall/CRC; 2 edition (17 November 2014) ISBN-10:1466583282 ISBN-13:978-1466583283
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**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Appraise the theory of Artificial intelligence and Machine Learning
<b>CO2</b>	Understand the types of problems that machine learning algorithms can solve today.
<b>CO3</b>	Illustrate the working of AI and ML Algorithms.
<b>CO4</b>	Apply a variety of machine learning algorithms to data sets.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: INTERNET OF THINGS**

**Subject Code: 18IS6PE41**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	Understand the genesis, impact of IoT applications and architectures in real world.
2	Illustrate diverse methods of deploying smart objects and connect them to network.
3	Infer the role of Data Analytics and Security in IoT.
4	Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry

UNIT	Description	Hours
I	What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack.	8
II	Smart Objects: The “Things” in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: IoT Access Technologies- IEEE 802.15.4, LoRaWAN, NB-IoT and Other LTE Variations.	8
III	IP as the IoT Network Layer: The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Application Protocols for IoT: The Transport Layer, IoT Application Transport Methods.	8
IV	Data and Analytics for IoT: An Introduction to Data Analytics for IoT, Big Data Analytics Tools and Technology, Securing IoT: A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary.	7
V	IoT Physical Devices and Endpoints: Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints: RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware	8



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(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



	Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities: Smart City Use-Case Examples.	
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**Text Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	1stEdition, 2017, Pearson Education (Cisco Press Indian Reprint). ISBN: 978-9386873743
2	Internet of Things	Srinivasa K G	CENGAGE Learning India, 2017, ISBN: 978-9386858955

**Reference Books:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Internet of Things (A Hands-on-Approach)	Vijay Madiseti and ArshdeepBahga	1stEdition, VPT, 2014. ISBN: 978-8173719547
2	Internet of Things with Arduino Cookbook	Marco Schwatz	Packt Publications, 2016 ISBN:978-1-78528-658-2
3	The Internet of Things: Key Applications and Protocols	Olivier Hersent, David Boswarthick, Omar Elloumi	Wiley publications, 2018 ISBN:978-81-265-5765-3

**Course Outcomes:**

Course Outcome	Description
CO1	Explain the various concepts and architecture of IoT and the technologies behind IoT.
CO2	Interpret the impact and challenges posed by IoT networks leading to new architectural models.



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



<b>CO3</b>	Appraise the role of data analytics and security in IoT.
<b>CO4</b>	Create and run the programs on Aurdino UNO and RaspberryPi to implement IoT applications.



**Syllabus for the Academic Year – 2020 – 2021**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: NOSQL DATABASE**

**Subject Code: 18IS6PE42**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

<b>Sl. No</b>	<b>Course Objectives</b>
<b>1</b>	Define, compare and use the four types of NoSQL Databases (Document-oriented, Key-Value Pairs, Column-oriented and Graph).
<b>2</b>	Understand the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
<b>3</b>	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.

<b>UNIT</b>	<b>Description</b>	<b>Hours</b>
<b>I</b>	Why NoSQL? The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, A (Mostly) Standard Model, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Aggregate Data Models; Aggregates, Example of Relations and Aggregates, Consequences of Aggregate Orientation, Key-Value and Document Data Models, Column-Family Stores, Summarizing Aggregate-Oriented Databases. More Details on Data Models; Relationships, Graph Databases, Schemaless Databases, Materialized Views, Modeling for Data Access.	<b>8</b>
<b>II</b>	Distribution Models; Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication. Consistency, Update Consistency, Read Consistency, Relaxing Consistency, The CAP Theorem, Relaxing Durability, Quorums. Version Stamps, Business and System Transactions, Version Stamps on Multiple Nodes.	<b>8</b>
<b>III</b>	Map-Reduce, Basic Map-Reduce, Partitioning and Combining, Composing Map-Reduce Calculations, A Two Stage Map-Reduce Example, Incremental Map-Reduce Key-Value Databases, What Is a Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preference, Shopping Cart Data, When Not to Use, Relationships among Data, Multioperation Transactions, Query by Data, Operations by Sets.	<b>8</b>



<b>IV</b>	Document Databases, What Is a Document Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analytics or Real-Time Analytics, Ecommerce Applications, When Not to Use, Complex Transactions Spanning Different Operations, Queries against Varying Aggregate Structure.	<b>8</b>
<b>V</b>	Graph Databases, What Is a Graph Database?, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Connected Data, Routing, Dispatch, and Location-Based Services, Recommendation Engines, When Not to Use.	<b>7</b>

**Text Book:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence	Sadalage, P. & Fowler	Pearson Addison Wesley, 2012 ISBN: 9780133036138

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	NoSQL For Mere Mortals	Dan Sullivan	1st Edition, Pearson Education India, 2015. ISBN: 13: 978-9332557338
<b>2</b>	Making Sense of NoSQL: A guide for Managers and the Rest of us	Dan McCreary and Ann Kelly	1st Edition, Manning Publication/Dreamtech Press, 2013. ISBN-13: 978-9351192022

**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Define, compare and use the four types of NoSQL Databases (Document-oriented, Key/Value Pairs, Column-oriented and Graph).
<b>CO2</b>	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
<b>CO3</b>	Explain the detailed architecture and define objects related to NoSQL database.
<b>CO4</b>	Describe how to load data, query data and performance tune Document-oriented NoSQL databases.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: WIRELESS SENSOR NETWORKS**

**Subject Code: 18IS6PE43**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	To understand the basic WSN technology and supporting protocols, basic sensor systems and provide a survey of sensor technology.
2	Understand the medium access control protocols and address physical layer issues.
3	Learn key routing protocols for sensor networks and main design issues.
4	Learn transport layer protocols for sensor networks, and design requirements.

UNIT	Description	Hours
I	<b>Introduction:</b> Unique Constraints and Challenges, Advantages of Sensor Networks - Energy advantage and Detection advantage, Sensor Network Applications - Habitat monitoring, Wildlife conservation through autonomous, non-intrusive sensing, Tracking chemical plumes, Ad hoc, just-in-time deployment mitigating disasters, Smart Transportation: networked sensors making roads safer and less congested, Collaborative Processing, Key Definitions of Sensor Networks, Canonical Problem: Localization and Tracking: - Tracking Scenario, Problem Formulation - Sensing model, Collaborative localization, Bayesian state estimation.	8
II	<b>Canonical Problem: Localization and Tracking contd..</b> Distributed Representation and Inference of States, Impact of choice of representation, Design in Distributed Tracking, Tracking Multiple Objects, State Space Decomposition, Data association, Sensor Models, Performance Comparison and Metrics. Networking Sensors: - Key Assumptions, Medium Access Control - The SMAC Protocol, IEEE 802.15.4 Standard and ZigBee, General Issues.	8
III	<b>Networking Sensors contd..</b> Geographic-Energy-Aware Routing, Unicast Geographic Routing, Routing on a Curve, Energy-Minimizing Broadcast, Energy- Aware Routing to a Region, Attribute-Based Routing – Directed Diffusion, Rumor Routing, Geographic Hash Tables. Infrastructure Establishment: - Topology Control, Clustering, Time Synchronization - Clocks and Communication Delays, Interval Methods, Reference Broadcasts.	8





<b>IV</b>	<b>Infrastructure Establishment contd..</b> : Localization and Localization Services - Ranging Techniques, Range-Based Localization Algorithms, Other Localization Algorithms, Location Services. Sensor Tasking and Control: - Task-Driven Sensing, Roles of Sensor Nodes and Utilities, Information Based Sensor Tasking - Sensor Selection, IDSQ: Information-Driven Sensor Querying, Cluster Leader Based Protocol, Sensor Tasking in Tracking Relations.	<b>7</b>
<b>V</b>	<b>Sensor Tasking and Control contd..</b> : Joint Routing and Information Aggregation – Moving Center of Aggregation, Multistep Information-Directed Routing, Sensor Group Management. Sensor Network Platforms and Tools: Sensor Node Hardware – Berkeley Motes, Sensor Network Programming Challenges, Node-Level Software Platforms, Operating system: Tiny OS, Imperative language: nesC, Dataflow style language: Tiny GALS, Node-Level Simulators, The NS-2 Simulator and its Sensor Network Extensions, The Simulator TOSSIM.	<b>8</b>

**Text Book:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Wireless Sensor Networks – An Information Processing Approach, Elsevier, 2004.	Feng Zhao, Leonidas Guibas	Elsevier, 2004 ISBN: 9781558609143

**Reference Books:**

<b>Sl No</b>	<b>Title</b>	<b>Author(s)</b>	<b>Edition, Publisher, Year, ISBN</b>
<b>1</b>	Protocols and Architectures for Wireless Sensor Networks	Holger Karl, Andreas Willig	John Wiley & Sons, Inc., 2005 ISBN:9780470095102
<b>2</b>	Ad Hoc Mobile Wireless Networks	Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa,	Auerbach Publications, 2008 ISBN: 9781420062212



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**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Identify different issues in wireless sensor networks and its applications.
<b>CO2</b>	Capable of analysing the protocols developed for sensor networks.
<b>CO3</b>	Design sensor networks using sensor tasking and controls.
<b>CO4</b>	Understand about various tools used for simulating sensor networks.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: COMPUTER VISION AND ROBOTICS**

**Subject Code: 18IS6PE44**

**L-T-P-C: 3-0-0-3**

**Course Objectives:**

Sl. No	Course Objectives
1	Review image processing techniques for computer vision
2	Explain shape and region analysis
3	Illustrate Hough Transform and its applications to detect lines, circles, ellipses
4	Contrast three-dimensional image analysis techniques, motion analysis and applications of computer vision algorithms

UNIT	Description	Hours
I	<b>CAMERAS:</b> Pinhole Cameras, Radiometry – Measuring Light: Light in Space, Light Surfaces, Important Special Cases, Sources, Shadows, And Shading: Qualitative Radiometry, Sources and Their Effects, Local Shading Models, Application: Photometric Stereo, Interreflections: Global Shading Models, Color: The Physics of Color, Human Color Perception, Representing Color, A Model for Image Color, Surface Color from Image Color.	8
II	<b>Linear Filters:</b> Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Edge Detection: Noise, Estimating Derivatives, Detecting Edges, Texture: Representing Texture, Analysis (and Synthesis) Using Oriented Pyramids, Application: Synthesis by Sampling Local Models, Shape from Texture.	8
III	<b>The Geometry of Multiple Views:</b> Two Views, Stereopsis: Reconstruction, Human Stereopsis, Binocular Fusion, Using More Cameras, Segmentation by Clustering: What Is Segmentation?, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction, Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering,	7



<b>IV</b>	<b>Segmentation by Fitting a Model:</b> The Hough Transform, Fitting Lines, Fitting Curves, Fitting as a Probabilistic Inference Problem, Robustness, Segmentation and Fitting Using Probabilistic Methods: Missing Data Problems, Fitting, and Segmentation, The EM Algorithm in Practice, Tracking With Linear Dynamic Models: Tracking as an Abstract Inference Problem, Linear Dynamic Models, Kalman Filtering, Data Association, Applications and Examples.	<b>8</b>
<b>V</b>	<b>Geometric Camera Models:</b> Elements of Analytical Euclidean Geometry, Camera Parameters and the Perspective Projection, Affine Cameras and Affine Projection Equations, Geometric Camera Calibration: Least-Squares Parameter Estimation, A Linear Approach to Camera Calibration, Taking Radial Distortion into Account, Analytical Photogrammetry, An Application: Mobile Robot Localization, Model- Based Vision: Initial Assumptions, Obtaining Hypotheses by Pose Consistency, Obtaining Hypotheses by pose Clustering, Obtaining Hypotheses Using Invariants, Verification, Application: Registration In Medical Imaging Systems, Curved Surfaces and Alignment.	<b>8</b>

**Text Book:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Computer Vision – A Modern Approach,	David A. Forsyth and Jean Ponce	2 <sup>nd</sup> Edition, PHI Learning (Indian Edition), 2015 ISBN-13: 978-9332550117

**Reference Book:**

Sl No	Title	Author(s)	Edition, Publisher, Year, ISBN
1	Computer and Machine Vision – Theory, Algorithms and Practicalities,	E. R. Davies	Elsevier (Academic Press), 4 <sup>th</sup> edition, 2013. ISBN-13: 978-0123869081

**Course Outcomes:**

Course Outcome	Descriptions
<b>CO1</b>	Implement fundamental image processing techniques required for computer vision.
<b>CO2</b>	Perform shape analysis.



<b>CO3</b>	Implement boundary tracking techniques.
<b>CO4</b>	Apply chain codes and other region descriptors.

**Syllabus for the Academic Year – 2020 – 2021**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: MINI PROJECT**

**Subject Code: 18IS6MP01**

**L-T-P-C: 0-0-4-2**

**Course Objectives:**

<b>Sl. No</b>	<b>Course Objectives</b>
<b>1</b>	Application of knowledge and techniques learnt in theoretical classes for software development to solve real world problems.
<b>2</b>	Gives an insight into the working of organizations/companies.
<b>3</b>	Gaining deeper understanding in specific functional areas.
<b>4</b>	Helps in exploring career opportunities in their areas of interest.

**Guidelines for the Mini Project:**

- A group of two students are required to carry out Mini Project work under the supervision of a Project Guide.
- The guide shall monitor progress of the student continuously.
- Each group is required to present the progress of the Mini Project work during the semester as per the schedule given by the department.
- A presentation shall be made by the group as per the schedule announced by the department.
- A report shall be submitted by the candidates to the department.

**Evaluation Scheme:**



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



- Continuous evaluation will be assessed by respective Project Guides based on the Regularity, Technical Knowledge and Competence, Programming Skills, Communication Skills and Documentation Skills of the students.
- Students are evaluated by the team of faculty members based on the Presentation, Technical Competence, Slides Preparation, Team Working Abilities and viva voce.

**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Students will be able to practice acquired knowledge within the chosen area of technology for project development.
<b>CO2</b>	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
<b>CO3</b>	Reproduce, improve and refine technical aspects for engineering projects.
<b>CO4</b>	Work as an individual or in a team in development of technical projects.

**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: COMPUTER NETWORKS LAB**

**Subject Code: 18ISL607**

**L-T-P-C: 0-0-2-1**

**Course Objectives:**

<b>Sl. No</b>	<b>Course Objectives</b>
<b>1</b>	Understand the working of different concepts of networking.
<b>2</b>	Understand the different routing strategies and congestion control algorithms.
<b>3</b>	Simulate and demonstrate the performance of the TCP, UDP, FTP and TELNET .
<b>4</b>	Implement the data link layer and transport layer protocols.



**Note:** The following experiments shall be conducted using either C, C++, Java, NS2, NS3 or any other simulators.

Lab Cycles	Description
I	<ol style="list-style-type: none"><li>1. Write a program for error detecting code using CRC-CCITT (16-bits).</li><li>2. Write a program for frame sorting technique used in buffers.</li><li>3. Write a program for bellman-ford algorithm to find shortest path between vertices</li><li>4. Write a program for distance vector algorithm to find suitable path for transmission</li><li>5. Simulate a three nodes point-to-point network with duplex links between them. Set the queue size vary the bandwidth and find the number of packets dropped.</li></ol>
II	<ol style="list-style-type: none"><li>6. Write a program for spanning tree algorithm (Kruskal's/Prim's) to find loop less path.</li><li>7. Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.</li><li>8. Write a program on datagram socket for client/server to display the messages on client side, typed at the server side.</li><li>9. Write a program for simple RSA algorithm to encrypt and decrypt the data.</li><li>10. Simulate a four node point-to-point network, and connect the links as follows: n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets by TCP/UDP.</li></ol>
III	<ol style="list-style-type: none"><li>11. Write a program to demonstrate key exchange between sender and receiver using Diffie-Hellman key exchange.</li><li>12. Write a program for congestion control using Leaky bucket algorithm.</li><li>13. Simulate the different types of Internet traffic such as FTP a TELNET over a network and analyze the throughput.</li><li>14. Simulate an Ethernet LAN using N-nodes (6-10), change error rate and data rate and compare the throughput.</li></ol>

**Pattern for practical exam conduction:**

In the examination each student picks one question out of 10 questions selected by examiner from the above question bank.



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
(A constituent College of Siddhartha Academy of Higher Education, Tumakuru)



**Course Outcomes:**

<b>Course Outcome</b>	<b>Description</b>
<b>CO1</b>	Implement the basic Routing and Congestion control Algorithms.
<b>CO2</b>	Implement Error Detection, Correction, Encryption, Decryption and Key Management Techniques.
<b>CO3</b>	Establish Communication between Computers using Client Server approach
<b>CO4</b>	Design and Simulate different types of networks and benchmark the performance.





**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science and Engineering**

**Semester: 6**

**Subject Name: MACHINE LEARNING LAB**

**Subject Code: 18CSL608**

**L-T-P-C: 0-0-2-1**

**Course Objectives:**

<b>Sl.No</b>	<b>Course Objectives</b>
<b>1</b>	Make use of Data sets in implementing the machine learning algorithms.
<b>2</b>	Implement the machine learning concepts and algorithms in any suitable language of choice.
<b>3</b>	Understand and present the key algorithms and theory that form the core of machine learning.
<b>4</b>	Discuss how the learning performance varies with the number of training examples presented.

<b>Description</b>
<ul style="list-style-type: none"><li>• Introduction to Advanced Python programming concepts and Jupiter Notebook.</li><li>• Implement sample programs using NUMPY.</li><li>• Implement sample programs using PANDAS.</li><li>• Solve the given machine learning problem by applying the concepts discussed in the course 18CS603</li></ul>

**Scheme of Evaluation for SEE:**

Students are evaluated by the examiners based on the Presentation, Technical Competence, Slides Preparation, Team Working Abilities, Questions and Answers Session about the solution they designed in their regular practice lab.

**Course Outcomes:**

<b>Course Outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Understand the implementation procedures for the machine learning algorithms.
<b>CO2</b>	Design Python programs for various Learning algorithms.
<b>CO3</b>	Apply appropriate data sets to the Machine Learning algorithms.
<b>CO4</b>	Identify and apply Machine Learning algorithms to solve real world problems.



**Syllabus for the Academic Year – 2021 - 2022**

**Department: Information Science & Engineering**

**Semester: 6**

**Subject Name: SKILL DEVELOPMENT-IV**

**Subject Code: 18SK601**

**L-T-P-C: 0-0-2-1**

**Course Objectives:**

Sl. No	Course Objectives
1	Improve qualitative and quantitative problem-solving skills.
2	Apply critical and logical thinking process to specific problems

UNIT	Description	Hours
I	<b>Aptitude Test Preparation</b> - Importance of Aptitude tests, Key Components, Quantitative Aptitude – Problem Solving, Data Sufficiency, Data Analysis - Number Systems, Math Vocabulary, fraction decimals, digit places etc. <b>Reasoning and Logical Aptitude</b> - Introduction to puzzle and games organizing information, parts of an argument, common flaws, arguments and assumptions. Analytical Reasoning, Critical Reasoning	6
II	<b>Verbal Analogies</b> - What are Analogies, How to Solve Verbal Analogies & developing Higher Vocabulary, Grammar, Comprehension and Application, Written Ability. Non- Verbal Reasoning, Brain Teasers. Creativity Aptitude. <b>Group Discussion</b> - Theory & Evaluation : Understanding why and how is the group discussion conducted, The techniques of group discussion, Discuss the FAQs of group discussion, body language during GD.	4
III	<b>Resume Writing- Writing Resume, how to write effective resume</b> Understanding the basic essentials for a resume, Resume writing tips Guidelines for better presentation of facts. <b>Technical Documentation</b> - Introduction to technical writing-Emphasis on language difference between general and technical writing, Contents in a technical document, Report design overview & format Headings, list & special notes, Writing processes, Translating technical information, Power revision techniques, Patterns & elements of sentences, Common grammar, usage & punctuation problems.	6
IV	<b>Interview Skills</b> -a) Personal Interviews , b) Group Interviews , c) Mock Interviews - Questions asked & how to handle them, Body language in interview, Etiquette, Dress code in interview, Behavioral and technical interviews, Mock interviews - Mock interviews with different Panels. Practice on stress interviews, technical interviews, General HR interviews etc.	6



**SRI SIDDHARTHA INSTITUTE OF TECHNOLOGY- TUMAKURU**  
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<b>V</b>	Interpersonal Relations - Optimal Co-existence, Cultural Sensitivity, Gender sensitivity Adapting to the Corporate Culture- Capability & Maturity Model, Decision Making Analysis, Brainstorm. Adapting to the Corporate Culture.	<b>6</b>
	<b>Note:</b> The respective departments should discuss case studies and standards pertaining to their domain.	

**Scheme of Continuous Internal Examination (CIE)**

Evaluation will be carried out in TWO Phases.

<b>Phase</b>	<b>Activity</b>	<b>Weightage</b>
<b>I</b>	Test 1 is conducted in VI Sem for 50 marks after completion of 2.5 units for 14 hours of training sessions.	<b>50%</b>
<b>II</b>	Test 2 is conducted in VI Sem for 50 marks after completion of half of IIIrd unit and complete of unit IV and V for 14 hours of training sessions.	<b>50%</b>
	At the end of the VI semester, marks of Test 1 and Test 2 are consolidated for 50 marks and grading is done.	

**Reference Books:**

<b>Sl. No.</b>	<b>Reference Book title</b>	<b>Author</b>	<b>Volume and Year of Edition</b>
<b>1</b>	The 7 Habits of Highly Effective People	Stephen R Covey	Free Press, 2004 Edition, ISBN: 0743272455
<b>2</b>	How to win friends and influence people	Dale Carnegie	General Press, 1st Edition, 2016, ISBN: 9789380914787
<b>3</b>	Crucial Conversation: Tools for Talking When Stakes are High	Kerry Patterson, Joseph Grenny, Ron Mcmillan	McGraw-Hill Publication, 2012 Edition, ISBN: 9780071772204
<b>4</b>	Aptimithra: Best Aptitude Book	Ethnus	Tata McGraw Hill, 2014 Edition, ISBN: 9781259058738

**Course Outcomes**

<b>Course outcome</b>	<b>Descriptions</b>
<b>CO1</b>	Develop professional skill to suit the industry requirement
<b>CO2</b>	Analyze problems using quantitative and reasoning skills
<b>CO3</b>	Develop leadership and interpersonal working skills
<b>CO4</b>	Demonstrate verbal communication skills with appropriate body language.