NEW HORIZON
COLLEGE OF ENGINEERING
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade, Accredited by NBA

DEPARTMENT OF COMPUTR SCIENCE AND ENGINEERING

Academic Year 2022-2023

Scheme& Syllabus

Fifth and Sixth Semesters

2020-2024 Batch (175 Credits)

SCHEME OF FIFTH SEMESTER

Academic Batch: 2020-24

Academic Year: 2022-23

Sl. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	20CSE51	Analysis and Design of Algorithms	CSE	3	0	0	0	3	3	50	50	100
2	20CSE52	Operating System	CSE	3	0	0	0	3	3	50	50	100
3	20CSE53	Database Management System	CSE	3	0	0	0	3	3	50	50	100
4	20CSE54	Finite Automata and Compiler Design	CSE	3	0	0	0	3	3	50	50	100
5	20CSE55x	Professional Elective-I	CSE	3	0	0	0	3	3	50	50	100
6	20CSL56	Python Programming Lab	CSE	0	0	2	0	2	4	25	25	50
7	20CSL57	Analysis and Design of Algorithms Lab	CSE	0	0	2	0	2	4	25	25	50
8	20CSL58	Database Management System Lab	CSE	0	0	2	0	2	4	25	25	50
9	20CSE59	Mini Project using Python	CSE	0	0	2	0	2	4	25	25	50
TOTAL								**23**	**31**	**350**	**350**	**700**

S. NO	COURSE CODE	PROFESSIONAL ELECTIVE-I
1	20CSE551	Parallel Processing
2	20CSE552	Advanced Data Structures
3	20CSE553	Digital Image and Video Processing
4	20CSE554	Computational Intelligence

SCHEME OF SIXTH SEMESTER

Academic Batch: 2020-24

Academic Year: 2022-23

S. No	Course Code	Course	BOS	Credit Distribution				Overall Credits	Contact hours	Marks		
				L	T	P	S			CIE	SEE	Total
1	20CSE61	Web Frameworks and Technologies	CSE	3	0	0	0	3	3	50	50	100
2	20CSE62	Computer Networks	CSE	3	0	0	0	3	3	50	50	100
3	20CSE63	Data Mining and Machine Learning	CSE	3	0	0	0	3	3	50	50	100
4	20CSE64x	Professional Elective-II	CSE	3	0	0	0	3	3	50	50	100
5	20CSE65x	Professional Elective-III	CSE	3	0	0	0	3	3	50	50	100
6	20NHOP6xx	Open Elective-I	-	3	0	0	0	3	3	50	50	100
7	20CSL66	Web Frameworks and Technologies Lab	CSE	0	0	1.5	0	1.5	3	25	25	50
8	20CSL67	Computer Networks Lab	CSE	0	0	1.5	0	1.5	3	25	25	50
9	20CSE68	Mini Project in Web Frame Works or Operating System	CSE	0	0	2	0	2	4	25	25	50
TOTAL								**23**	**28**	**375**	**375**	**750**

Professional Elective - II		**Open Elective - I**		
Course Code	**Course**	**Course Code**	**Course**	**BOS**
20CSE641	Social Network Analysis	20NHOP601	Big Data Analytics using HP Vertica-I	CSE
20CSE642	Soft Computing	20NHOP602	VM Ware Virtualization Essentials-I	ISE
20CSE643	Agile Methodologies	20NHOP604	Big Data Analytics using HP Vertica-II	CSE
20CSE644	Cloud Computing	20NHOP605	VM Ware Virtualization Essentials-II	ISE
Professional Elective - III		20NHOP607	SAP	MEE
20CSE651	Semantic Web	20NHOP608	Schneider-Industrial Automation	EEE
20CSE652	Web of Things	20NHOP609	Cisco-Routing and Switching-I	ECE

20CSE653	Quantum Cryptography	20NHOP610	Data Analytics	CSE
20CSE654	Software Agents	20NHOP611	Machine learning	MEE
20CSE655	Advanced Java	20NHOP612	CISCO-Routing and switching-II	ECE
		20NHOP613	IIOT Embedded Systems	MEE
		20NHOP614	Block chain	CSE
		20NHOP615	Product Life Cycle Management	MEE
		20NHOP617A	Network Security & Cryptography	ECE
		20NHOP618A	Physical Design	ECE
		20NHOP619A	AI Data Analysis with Python	AI & ML

ANALYSIS AND DESIGN OF ALGORITHMS

Course Code	**: 20CSE51**	**Credits**	**: 03**
L:T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

20CSE51.1	Analyze and evaluate algorithms to solve complex problems by determining various design techniques
20CSE51.2	Apply brute force and divide and conquer design techniques toassess an algorithm and formulate solution
20CSE51.3	Apply greedy strategy and dynamic programming strategy to solve graph and knapsack problems
20CSE51.4	Apply decrease &conquer and transform &conquer design technique to solve searching and sorting problems
20CSE51.5	Apply backtracking and branch &bound technique to assess an algorithm and formulate solution
20CSE51.6	Interpret P, NP & NP-complete classes to analyze the limitations of an algorithm

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE51.1	3	3	-	3	-	-	-	-	-	-	-	3	3	3
20CSE51.2	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSE51.3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSE51.4	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSE51.5	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSE51.6	3	3	-	3	-	-	-	-	-	-	-	3	3	3

Module No	Module Contents	Hours	COs
1	**INTRODUCTION TO ALGORITHMS & GROWTH OF FUNCTIONS** Algorithm introduction, Role of algorithms in computing, Fundamentals of Algorithmic problem solving, Fundamentals of Analysis of Algorithms, Analysis Framework, Asymptotic notations, Standard notations and common functions, Important problem types – Searching, sorting, string processing, graph problems, combinatorial problems, Recurrences, Mathematical Analysis of Recursive and Non Recursive Algorithms	**8**	**CO1**
2	**BRUTE FORCE and DIVIDE & CONQUER** **BRUTE FORCE:** Brute force string matching algorithms –NAÏVE string matching algorithms, Rabin Karp algorithm & Knuth Morris Pratt algorithm, Exhaustive Search – Travelling Salesman problem, Knapsack problem, Assignment problem **DIVIDE & CONQUER:** Merge Sort and its analysis, Quick sort – its performance and analysis	**9**	**CO2**
3	**GREEDY METHOD & DYNAMIC PROGRAMMING** **GREEDY METHOD:** Introduction, Job scheduling problem, Minimum Spanning tree algorithms – Kruskals& Prims, Shortest Path algorithm – Dijkstra's,	**9**	**CO3**

	Huffman Trees, Knapsack problems, Travelling Salesman problem **DYNAMIC PROGRAMMING:** Introduction, Computing Binomial Coefficients, Transitive closure - Warshall's and Floyds algorithm		
4	**DECREASE & CONQUER, TRANSFORM & CONQUER** **DECREASE & CONQUER:** Introduction – Decrease by constant, decrease by constant factor, variable size decrease, Breadth First search traversal, Depth First search traversal, Topological sorting **TRANSFORM & CONQUER:** Introduction, Balanced Search trees – AVL trees & 2-3 trees, Red Black Trees	**9**	**CO4**
5	**COPING WITH LIMITATIONS OF ALGORITHMIC POWER:** Introduction, lower bound arguments, decision trees, P, NP & NP complete problems **BACKTRACKING:** Introduction, N Queens problem, subset sum problem, **BRANCH & BOUND:** Introduction, Travelling Salesman problem, Knapsack problem, Assignment problem	**9**	**CO5**

Text Book:

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", SECOND Edition, PEARSON Education

Reference Book:

1. Thomas H Cormen, Charles E Leiserson, Ronald R Rivest& Clifford Stein, "Introduction to Algorithms", THIRD Edition, Eastern Economy Edition

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	**Tests**	**Assignments**	**Quizzes**
Marks (Out of 50)	**25**	**15**	**10**
Remember	-	-	-
Understand	05	-	-
Apply	10	7.5	05
Analyze	5	7.5	05
Evaluate	5	-	-
Create	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 50)	**50**
Remember	05
Understand	05
Apply	20
Analyze	10
Evaluate	10
Create	-

OPERATING SYSTEMS

Course Code: 20CSE52 **Credits: 03**
L: T:P:S: 3:0:0:0 **CIE Marks:50**
Exam Hours: 3 **SEE Marks: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

CO #	COURSE OUTCOME
20CSE52.1	Identify the roles and functions of traditional and modern operating systems.
20CSE52.2	Analyze the concept of process and its management which includes process scheduling algorithms.
20CSE52.3	Evaluate the problems related to concurrency, different synchronization mechanisms and deadlock handling.
20CSE52.4	Compare and contrast various memory management techniques.
20CSE52.5	Evaluate the various file implementation techniques.
20CSE52.6	Analyze various disk storage mechanisms.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE52.1	3	-	-	-	-	-	-	-	-	3	-	3	-	-
20CSE52.2	3	3	3	3	-	-	-	-	-	-	-	-	3	3
20CSE52.3	3	3	3	3	-	-	-	-	-	-	-	-	3	3
20CSE52.4	3	3	3	3	-	-	-	-	-	3	-	-	3	3
20CSE52.5	3	3	3	3	-	-	-	-	-	-	-	-	3	3
20CSE52.6	3	3	3	3	-	-	-	-	-	3	-	-	3	3

Module No.	Module Contents	Hours	COs
1	**Introduction and Operating System Services:** Basics of Operating Systems: Definition - Operating System structure; Operating System operations – Dual-Mode and Multi-Mode; Kernel Data Structure – Lists, Stacks, and Queues, Trees; Computing Environments – Mobile Computing, Distributed Systems, Client-Server Computing, Peer-to-Peer, Virtualization, Cloud Computing, Real-Time Embedded Systems. Operating System Services; System Calls; Types of System Calls; Operating System Design and Implementation – Design Goals – Mechanisms and Policies – Implementation; Operating System structure – Layered Structure – Microkernels, Modules, Hybrid Systems – Mac OS X, iOS, Android.	**8**	**CO1**
2	**Process Management:** **Process:** Process Concept – The Processes, Process States, PCB; Process Scheduling – Scheduling Queues, Schedulers, Context Switch; Operation; Operation on Process; Inter-Process Communication – Shared-Memory System, Message Passing System. **CPU Scheduling:** Basic Concepts, CPU-I/O Burst Cycle; CPU Scheduler – Pre-emptive Scheduling, Dispatcher; Scheduling Criteria; Scheduling Algorithms – FCFS Scheduling, SJF Scheduling, Round-Robin Scheduling, Priority Scheduling	**9**	**CO2**
3	**Process Synchronization:** Background; The Critical Section Problem; Peterson's Solution; Synchronization Hardware; Mutex Locks; Semaphores – Semaphore Usage, Semaphore Implementation, Deadlock and Starvation; Classical Problems of Synchronization – The Reader-Writer Problem, Dining-	**10**	**CO3**

	Philosopher Problem. **Deadlocks:** System Model; Deadlock Characterization – Necessary Conditions, Resource-Allocation Graph; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from Deadlock		
4	**Memory Management:** **Main Memory:** Background; Swapping; Contiguous Memory Allocation – Memory Protection, Memory Allocation, Fragmentation; Paging – Basic Method, Hardware Support, Protection; Structure of Page Table – Hierarchical Paging, Hash-Page Table; Segmentation – Basic Method, Segmentation Hardware. **Virtual Memory:** Background; Demand Paging; Page Replacement – Basic Page Replacement – FIFO Page Replacement, Optimal Page Replacement, LRU Page Replacement; Allocation of Frames – Minimum Number of Frames, Allocation Algorithms, Global Vs Local; Thrashing – Causes of Thrashing	**9**	**CO4**
5	**File System Interface and Implementation:** **File-System Interface:** File Structure; Access methods – Sequential Access, Direct Access, Other Access Methods; **Implementation:** Overview, Partitions and Mounting, Directory Implementation – Linear List, Hash Table; Allocation Methods – Contiguous Allocation, Linked Allocation, Indexed Allocation; Free Space Management – Bit-Vector, Linked List, Grouping, Counting. **Mass Storage Structures:** Overview; Disk Structure; Disk Scheduling – FCFS, SSTF, SCAN Scheduling, CSCAN Scheduling, LOOK Scheduling, Selection of Disk Scheduling Algorithm.	**8**	**CO5, CO6**

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons, Inc., 9th Edition, 2012, ISBN 9781118063330.

REFERENCE BOOK:

1. William Stallings, "Operating Systems: Internals and Design Principles", Eighth Edition, Prentice Hall, 2015.

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	**Tests**	**Assignments**	**Quizzes**	**Co-Curricular**
Marks (out of 50)	**25**	**10**	**5**	**10**
Remember	5	-	-	-
Understand	10	-	-	-
Apply	10	5	5	5
Analyze	-	5	-	-
Evaluate	-	-	-	5
Create	-	-	-	-

SEE- Semester End Examination (50 Marks)

Bloom's Category	**Tests**
Remember	10
Understand	20
Apply	20
Analyze	-
Evaluate	-
Create	-

DATABASE MANAGEMENT SYSTEMS

Course Code	**: 20CSE53**	**Credits**	**: 03**
L: T: P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE53.1	Explain the basic concepts of DBMS by identifying, analyzing and defining database objects.
20CSE53.2	Build entity relationship diagrams and map into relational database schema.
20CSE53.3	Apply the concepts of structured query language to create, query and manipulate database with the given constraints.
20CSE53.4	Create user-defined view, trigger, and assertion to manipulate database objects and outline the concept of Indexing.
20CSE53.5	Apply and Analyze the concept of functional dependencies and normalization techniques to refine databases.
20CSE53.6	Demonstrate the concepts of NOSQL databases and familiarize with Cassandra.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE53.1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
20CSE53.2	3	3	3	-	-	-	-	-	-	-	3	-	3	-
20CSE53.3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE53.4	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE53.5	3	3	3	-	3	-	-	-	-	-	-	-	-	-
20CSE53.6	3	3	3	-	3	-	-	-	-	-	3	3	3	3

Module No	Module Contents	Hours	COs
1	**Introduction to Databases:** Definition of database, DBMS; Characteristics of Database approach; Advantages of using DBMS approach; when not to use a DBMS **Database Concept and Architecture:** Data models, schemas and instances; Data Abstraction; Three-schema architecture and data independence; Components of a DBMS - Database Designer- Database Administrator - Database Users **Introduction to Entity-Relationship Model:** Entity Types, Attributes and Keys; Relationship types, Roles and Structural Constraints; Weak Entity Types; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two; Reduction of an E-R schema to relational Tables.	**9**	**CO1**
2	**Introduction to Logical Design and Relational Model:** Domains, Attributes, Tuples, and Relations; Relational Model Constraints; Relational Database Schemas; **SQL-1:** Overview of SQL language; SQL Data Definition and Data Types; Schema change statements in SQL; Enforcing basic constraints in SQL; Basic structure of SQL queries Joins; Logical connectives - AND, OR and NOT; Addition basic operations ; Set operations; Aggregate function; Comparisons Involving NULL and Three-Valued Logic; SQL modification language; Select, Delete, Update clause.	**9**	**CO2**
3	**SQL -2:** Introduction to Nested Queries; Correlated Nested Queries; Introduction to Views: creation, implementation, update of views; Introduction to Assertion and Trigger; **Index Structures:** Indexes on Sequential Files: dense , sparse index; multilevel	**9**	**CO3**

	indexing; Hash Based Indexing: Static Hashing and dynamic hashing		
4	**Database Refinement:** Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normalization on Relational Data Base:1NF,2NF,3NF, BCNF; **Transaction Management:** The ACID Properties; Transactions and Schedules	**8**	**CO4**
5	**NOSQL Databases:** What is NoSQL, Need of NOSQL, Features OF NOSQL, CAP Theorem, ACID v/s BASE, Advantages & Disadvantages of NOSQL, Types of NOSQL: Key-Value database- Document-based database- Column-based database- Graph-based database **Introduction to Cassandra:** Architecture, Gossip protocol, Snitches, Virtual Nodes, write consistency level and write process, read consistency level and read data operation, indexing, compaction, Anti-entropy, Tombstones	**10**	**CO5**

Text Book(s):

1. Ramez Elmasri and Shamkant B. Navathe: Fundamentals of Database Systems, 7th Edition, Pearson ,2016.
2. Pramod J. Sadalage, Martin Fowler, "NoSQL Distilled", Pearson education Inc, Nov 2014

Reference Book(s):

1. Johannes Gehrke, Raghu Ramakrishnan, Database Management Systems 3rd Edition, McGraw Hill Education,2014.
2. Shashank Tiwari, "Professional NoSQL", John Wiley & Sons, Inc, 2011

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quiz	Co-Curricular	Other
Marks (Out of 50)	**25**	**15**	**10**	-	-
L1: Remember		-	-	-	-
L2: Understand	5	-	-	-	-
L3: Apply	10	7.5	5	-	-
L4: Analyze	10	7.5	5	-	-
L5: Evaluate		-	-	-	-
L6: Create		-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	20
L5: Evaluate	-
L6: Create	-

FINITE AUTOMATA AND COMPILER DESIGN

Course Code	**: 20CSE54**	**Credits**	**: 03**
L: T: P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE54.1	Design the Deterministic &Non Deterministic Finite Automata for a given language.
20CSE54.2	Design the Regular Expressions for a given language
20CSE54.3	Create PDA's and CFG's for different languages
20CSE54.4	Design Turing machines for different languages and understand phases of compiler.
20CSE54.5	Create Top-down parser for given grammars and parse the given strings
20CSE54.6	Create Bottom -Up parsing table for given grammars, generate and optimize the code.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE54.1	2	3	2	2	-	-	-	-	-	-	-	2	2	2
20CSE54.2	2	3	2	2	-	-	-	-	-	-	-	2	2	2
20CSE54.3	2	3	2	2	-	-	-	-	-	-	-	2	2	2
20CSE54.4	2	3	2	2	-	-	-	-	-	-	-	2	2	2
20CSE54.5	2	3	2	2	-	-	-	-	-	-	-	2	2	2
20CSE54.6	2	3	2	2	-	-	-	-	-	-	-	2	2	2

Module No	Module Contents	Hours	COs
1	**Introduction to Finite Automata**: Central Concepts of Automata, Types of Finite Automata-DFA,NFA,∈-NFA, Conversion of NFA to DFA using subset construction method **Regular expressions and Language**: Regular Expressions, Minimization of DFA, Chomsky Hierarchy	**9**	**CO1, CO2**
2	**Context-Free Grammars**: Writing CFG's, Parse trees, Ambiguity in grammars, Simplification of CFG's **Pushdown Automata**:Language of PDA, Writing PDA's	**9**	**CO3**
3	**Turing Machine**: Language of TM, Writing TM; Multitape TM, Multi -Track TM, NDTM; **Introduction to Compiler Design:**Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer– Specification of Tokens	**9**	**CO4**
4	**Introduction to Compiler Design**:Transition Diagrams in Recognition of Tokens **Syntax Analysis**: Role of parser, Types of parsers:**Top Down parsing**-General Strategies Recursive Descent Parser, Predictive Parser-LL(1) Parser	**9**	**CO5**
5	**Bottom Up Parsing**: Introduction to Shift reduce Parsing, LR parsing - LR (0) Item, Construction of LR (0) Parsing TableIntermediate code generation and optimization, Design of a simple Code generator	**9**	**CO6**

Text Book(s):

1. "Introduction to Automata Theory, Languages and Computation", John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman, 3 rd Edition, Pearson Education, 2011
2. "Compilers- Principles, Techniques and Tools", Alfred V Aho, Monica S.Lam, Ravi Sethi, Jeffrey D Ullman, 2nd Edition, Pearson Education, 2013

Reference Book(s):

1. "Theory of Computer Science, Automata, Languages, and Computation", K.L.P. Mishra 3 rd Edition, PHI Learning, 2009
2. "Compiler Design", K. Muneeswaran, OXFORD university Press, 2015

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	**Tests**	**Assignments**	**Quizzes**	**Co-Curricular**
Marks (Out of 50)	**25**	**15**	**10**	**-**
L1: Remember	-	-	-	-
L2: Understand	5	-	-	-
L3: Apply	10	4.5	5	-
L4: Analyze	10	3	5	-
L5: Evaluate	-	7.5	-	-
L6: Create	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	20
L5: Evaluate	-
L6: Create	

PARALLEL PROCESSING

Course Code	**: 20CSE551**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

20CSE551.1	Identify different types of multiple processors and its organization, symmetric multiprocessors and their design consideration and the concept of MESI protocol for social applications
20CSE551.2	Analyze and compare different multithreading approaches,cluster concepts and NUMA concepts.
20CSE551.3	Develop a parallel program and analyze hardware multithreading, shared memory and cache coherence for the benefit of society by following the code of ethics.
20CSE551.4	Identify and analyze the hardware and software performance issuesandmulticore organization using intel multicore
20CSE551.5	Analyze the instruction level parallelism,techniques for exposing ILP,issues and scheduling related ILP
20CSE551.6	Evaluate the advanced ILP and exploiting ILP, issues and limitation of ILP

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE551.1	1	-	-	-	-	1	-	-	-	-	-	-	1	1
20CSE551.2	-	1	-	-	-	-	-	-	-	-	-	-	1	1
20CSE551.3	-	-	1	-	1	1	-	1	-	-	-	-	1	1
20CSE551.4	-	1	-	-	-	-	-	-	1	-	-	-	1	1
20CSE551.5	1	-	-	-	-	-	-	-	-	-	-	-	1	1
20CSE551.6	-	-	-	1	-	-	-	-	1	-	-	-	1	1

Module No	Module Contents	Hours	COs
1	**Introduction:** Multiple Processor Organizations, Types of Parallel Processor Systems, Parallel Organizations, Symmetric Multiprocessors, multiprocessor OS design consideration, mainframe SMP, cache coherence the Mesi Protocol	**9**	**CO1,**
2	**Multithreading and Chip Multiprocessor:** Implicit and explicit multithreading, Approaches to explicit multithreading, Example systems, clusters, configuration, operating systems design issues, cluster computer architecture, Nonuniform Memory Access, motivation, organization, pros and cons	**9**	**CO2**
3	**Hardware Multithreading**: Vector (SIMD)processing**:** GPUs, Shared-Memory Multiprocessors, cache coherence, Message-Passing Multicomputer, Parallel Programming for Multiprocessors, Thread creation, synchronization, example program, Performance Modeling	**9**	**CO3**
4	**Multicore computers:** Hardware Performance Issues,Software Performance Issues, Multicore Organization, Intel x86 Multicore Organization, **Instruction-Level Parallelism:** Concepts and Challenges, Basic Compiler Techniques for Exposing ILP, Reducing Branch Costs with Prediction, Overcoming Data Hazards with Dynamic Scheduling, Dynamic Scheduling, Examples and the Algorithm	**9**	**CO4 CO5**
5	**Instruction-Level Parallelism and Its Exploitation**: Hardware-Based Speculation, Exploiting ILP Using Multiple Issue and Static Scheduling,	**9**	**CO6**

	Exploiting ILP Using Dynamic Scheduling, Multiple Issue, and Speculation, Advanced Techniques for Instruction Delivery and Speculation, Limits on instruction level parallelism		

TEXT BOOKS:

1. Computer Organization and Architecture, William Stallings, Pearson/PHI, Eighth edition, 2013
2. Computer Organization and Embedded Systems, Carl Hamacher, ZvonksVranesic, SafeaZaky, McGraw Hill, Sixth Edition, 2012.
3. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Elsevier, Fifth Edition, 2012.

Reference Book(s):

1, Introductionto Parallel Processing – By Sasikumar, Dinesh ShikhareAnd P. Ravi Prakash.

2.Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Pearson Publication,

.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular
Marks (Out of 50)	**25**	**15**	**10**	**-**
L1: Remember	-	-	-	-
L2: Understand	-	-	-	-
L3: Apply	10	7.5	5	-
L4: Analyze	5	-	-	-
L5: Evaluate	-	-	-	-
L6: Create	10	7.5	5	-

SEE – Semester End Examination: Theory (50 Marks)

Bloom's Taxonomy	Tests
Marks (Out of 50)	
Remember	5
Understand	5
Apply	15
Analyze	15
Evaluate	5
Create	5

ADVANCED DATA STRUCTURES

Course Code	**: 20CSE552**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE552.1	Summarize various basic data structures and its applications.
20CSE552.2	Select the appropriate hashing techniques to manage data effectively.
20CSE552.3	Solve real world problems using various types of priority queues
20CSE552.4	Design and implement an appropriate binary search tree for a given application.
20CSE552.5	Understand and apply the various concepts of BTrees in data storage
20CSE552.6	Analyse, Design and Develop solutions to real world problems by applying data structure concepts.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE552.1	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20CSE552.2	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20CSE552.3	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20CSE552.4	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20CSE552.5	3	3	3	3	-	-	-	-	-	-	-	3	-	-
20CSE552.6	3	3	3	3	-	-	-	-	-	-	-	3	-	-

Module No	Module Contents	Hours	Cos
1	**Data Structures Revisited:** Stacks, Stacks Using Dynamic Array,Queues, Circular Queues using Dynamic Arrays, Linked List, Singly Linked list and Chains, Linked Stacks and Queues, Polynomials, Doubly Linked List, Trees, Binary Trees, Threaded Binary Trees, Heaps, Binary Search Trees,	**9**	**CO1, CO6**
2	**Hashing:** Introduction, Static Hashing – Hash Tables, Hash Functions, Overflow Handling. Dynamic Hashing – Motivation of Dynamic Hashing, Dynamic Hashing using Directories, Directory less Dynamic Hashing. Bloom Filters – An Application - - Differential Files, Bloom Filter Design.	**9**	**CO2, CO6**
3	**Priority Queues:** Single and Double Ended Priority Queues. Leftist Trees-Height-Biased Leftist Trees, Weight-Biased Leftist Trees, Binomial Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, Interval Heaps.	**9**	**CO3, CO6**
4	**Efficient Binary Search Trees:**Optimal Binary Search Trees, AVL Trees, Red-Black Trees – Representation of a Red-Black Tree,searching a Red-Black Tree, inserting into a Red-Black Tree, Deletion from a Red-Black Tree, Joining Red-Black Trees, Splitting a Red-Black Tree, Splay Trees	**9**	**CO4, CO6**
5	**Multiway Search Trees:** m-way Search Trees, B-Trees – Definition and Properties, Number of Elements in a B-Tree, Insertion into a B-tree, Deletion from a B-Tree, B^+ Trees – Searching a B^+ Trees, Insertion into a B^+ Trees, Deletion from a B^+ Trees.	**9**	**CO5, CO6**

Text Book

1. "Fundamentals of DATA STRUCTURES in C", HOROWITZ, SAHNI, ANDERSON-FREED, SECOND EDITION, UNIVERSITIES PRESS.

Reference Book

1. "Data Structures using C ", Aaron M. Tanenbaum, YedidyahLangsam& Moshe J Augenstein, Thirteenth Impression 2014, Pearson Education
2. "Data Structures – A Pseudocode Approach with C ", Richard F Gilberg and Behrouz A Forouzan, Second edition, Fifth Indian Reprint 2015, Cengage Learning

CIE - Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	**Tests**	**Assignments**	**Quizzes**	**Co-Curricular**
Marks (Out of 50)	**25**	**15**	**10**	**-**
L1: Remember	-	-	-	-
L2: Understand	-	-	-	-
L3: Apply	10	7.5	5	-
L4: Analyze	5	-	-	-
L5: Evaluate	-	-	-	-
L6: Create	10	7.5	5	-

SEE – Semester End Examination: Theory (50 Marks)

Bloom's Taxonomy	**Tests**
Marks (Out of 50)	**50**
Remember	5
Understand	10
Apply	20
Analyze	15
Evaluate	
Create	

Digital Image and Video Processing

Course Code	**: 20CSE553**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE553.1	Examine the fundamental concepts of a digital image processing system
20CSE553.2	Identify the processing techniques including various image transformations
20CSE553.3	Illustration of Point operation and Grey-level Transformation
20CSE553.4	Use of Image Restoration and De-noising to remove Image Degradation
20CSE553.5	Classify Image Segmentation and Compression Techniques
20CSE553.6	To identify various concepts for video processing techniques

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE553.1	-	3	-	-	-	3	-	-	-	-	-	-	3	-
20CSE553.2	-	3	-	-	-	3	-	-	-	-	-	-	3	-
20CSE553.3	-	3	-	-	-	3	-	-	-	-	-	-	3	-
20CSE553.4	-	3	-	-	-	3	-	-	-	-	-	-	3	-
20CSE553.5	-	3	-	-	-	3	-	-	-	-	-	-	3	2
20CSE553.6	-	3	-	-	-	3	-	-	-	-	-	-	3	2

Module No	Module Contents	Hours	COs
1	**Introduction:** Image Sampling, Quantization, Resolution, Human Visual System, Classification of Digital Images, Image Types, Image File Formats,2D signals, Separable Sequence, Periodic Sequence, 2D convolution, 2D Z-Transforms (no derivations for properties), 2D Digital Filter.2D Convolution using graphical Method, Circular Convolution Through matrix Analysis and its applications, 2D correlation. Light and color, Color Formation, Human Perception of color, color Model, The chromaticity Diagram.	**9**	**CO1**
2	**Image Transforms:** 2D Discrete Fourier Transform, Properties of 2D-DFT, DCT, Image Enhancement in spatial Domain, Enhancement through point operation, Types of Point operation, Histogram Manipulation, Linear and Non-Linear Grey-level Transformation, Median Filter.	**9**	**CO2, CO3**
3	**Image Restoration and De-noising:** Image Degradation, Types of Image Blur, Classification of Image Restoration Techniques, Blind Deconvolution and classification, Image Denoising.	**9**	**CO4**
4	**Image Segmentation and Compression:** Classification of Image-Segmentation Techniques, Region approach to image segmentation, Clustering Techniques, Image segmentation based on Thresholding, Edge Based Segmentation, Classification of Edges, Edge Detection. Image Compression Scheme, Classification, Huffman Coding, JPEG	**9**	**CO5**
5	**Basic Steps of Video Processing:** Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.	**9**	**CO6**

Text Book(s):

1.. R. C. Gonzalez and R. E. Woods, “Digital Image Processing” 2nd edition, Pearson Education (Asia) Pte. Ltd/Prentice Hall of India, 2004.

2. Yao Wang, Joem Ostermann and Ya–quin Zhang, “Video Processing and Communication”,1st Edition, PH Int.

Reference Book(s):

1. S. Jayaraman, S Esskairajan “Digital Image Processing”, illustrated, Tata McGraw-Hill Education, 2011

2. A Murat Tekalp, “Digital Video Processing”, PERSON, 20102

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular
Marks (Out of 50)	**25**	**15**	**10**	**-**
L1: Remember	-	-	-	-
L2: Understand	-	-	-	-
L3: Apply	10	7.5	5	-
L4: Analyze	5	-	-	-
L5: Evaluate	-	-	-	-
L6: Create	10	7.5	5	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks(Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

COMPUTATIONAL INTELLIGENCE

Course Code : 20CSE554 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to:

20CSE554.1	Recognize and depict soft computing methods and their roles to build intelligent systems.
20CSE554.2	Apply fuzzy principles and thinking to deal with vulnerability and tackle real time issues.
20CSE554.3	Apply neural networks to design classification problems.
20CSE554.4	Apply genetic algorithms to generate optimized results for a particular problem.
20CSE554.5	Apply swarm intelligent systems technologies in a variety of engineering applications.
20CSE554.6	Apply computational Intelligence techniques primarily for machine learning

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE554.1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
20CSE554.2	3	3	3	3	-	-	-	-	-	-	-	-	3	-
20CSE554.3	3	3	3	3	-	-	-	-	-	-	-	-	3	-
20CSE554.4	3	3	3	-	-	-	-	-	-	-	-	-	3	-
20CSE554.5	3	3	3	-	-	-	-	-	-	-	-	-	3	-
20CSE554.6	3	3	-	-	-	-	-	-	-	-	-	-	3	-

Module No	Module Contents	Hours	COs
1	**Introduction to Computational Intelligence:** Computational intelligence paradigms - Artificial Neural Networks, Evolutionary Computation, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems; Short History.	7	CO1
2	**Fuzzy systems:** Introduction, Fuzzy Sets-Formal Definitions, Membership functions, Fuzzy Operators, Fuzzy Set Characteristics, Fuzziness and Probability; Fuzzy Logic and Reasoning- Linguistic Descriptions, Fuzzy Rules; Fuzzy Inferencing- Fuzzification, Inferencing, Defuzzification.	10	CO2
3	**Artificial Neural Networks:** Introduction, Artificial Neurons, Activation Functions, Learning Rules, Neural Network Architectures, Supervised Learning Neural Networks: Multi-Layer Feed Forward Neural Networks, Simple Recurrent Neural Networks, Time-Delay Neural Networks. Unsupervised Learning Neural Networks: Self-Organizing Feature Maps.	10	CO3
4	**Evolutionary Computation:** Generic Evolutionary Algorithm, Representation, Initial Population, Fitness Function, Selection, Reproduction Operators, Cross Over (Different Types), Mutation, Inversion, Deletion, Constraints Handling, Stopping Conditions.	8	CO4
5	**Computational Swarm Intelligence:** Particle Swarm Optimization - Basic Particle Swarm Optimization, Social Network Structures, BasicVariations, BasicPSO Parameters, Single-Solution Particle Swarm Optimization -	10	CO5, CO6

	Guaranteed Convergence PSO, Social-Based Particle Swarm Optimization, Hybrid Algorithms, Applications		

TEXT BOOKS:

1. A.P. Engelbrecht, Computational Intelligence: An Introduction, 2nd Edition, John Wiley & Sons, 2012.
2. N.P Padthy, Artificial Intelligence and Intelligent System, Oxford Press New Delhi.
3. Machine Learning-by Tom M.Mitchell , McGraw Hill Education ,2013

REFERENCE BOOK(S):

1. Hung T. Nguyen, Elbert A. Walker, a First Course in Fuzzy Logic, 2nd Edition.
2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, McGraw Hill, 1997.
3. Yegnanarayanan B, Artificial Neural Networks, PHI. 6. David E Goldbeg, Genetic Algorithms in Search, Optimization and Machine Learning, Pearson Education, 2006
4. Elaine Rich, Kevin Knight- Artificial Intelligence Mitchell Melanie, An Introduction to Genetic Algorithm Prentice Hall 1998
5. Introduction to Machine Learning-EthemAlpaydin, 3rd Edition, PHI publications.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular
Marks (Out of 50)	**25**	**15**	**10**	**-**
L1: Remember	-	-	-	-
L2: Understand	5	2.5	2	-
L3: Apply	10	10	6	-
L4: Analyze	5	2.5	2	-
L5: Evaluate	5	-	-	-
L6: Create	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

PYTHON PROGRAMMING LAB

Course Code : 20CSL56 **Credits : 02**
L: T: P:0 : 0:0:2:0 **CIE Marks: 25**
Exam Hours : 3 **SEE Marks: 25**

Course Outcomes: At the end of the Course, the Student will be able to

20CSL56.1	Understand the basics of Python programming and to Implement programs using decision making statements, lists, tuples, and dictionaries and Functions.
20CSL56.2	Analyze the various string manipulation functions and data structures available in Python.
20CSL56.3	Analyze data by writing Python programs using Pandas, Numpy,Scipy.
20CSL56.4	Design and develop python applications using GUI concept and database programming in Python.

Mapping of Course Outcomes to Program Outcomes

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

Exp. No	Experiment	Hours	CO
1	**Basic Python Programming** 1. Write a Python program to swap two variables. 2. Write a Python Program to Check Prime Number. 3. Write a Python Program to Find the Sum of Natural Numbers. 4. Write a Python Program to Find the Largest Among Three Numbers. 5. Write a Python Program to Print the Fibonacci sequence.	**4**	**CO1**
2	**Python Program Flow Control** a) Write a Python Program to Print the Reverse of a given number. b) Write a Python program to find those numbers which are divisible by 7 and multiple of 5, between 1500 and 2700 (both included). c) Write a Python program to print Right Angle Triangle. d) Write a Python Program to Print Pascal Triangles	**4**	**CO1**
3	**Function:** a) Illustrate an example program for python functions.	**4**	**CO1**
4	**String Manipulation:** a) Write a Python program to count the number of characters (character frequency) in a string.	**4**	**CO2**
5	**Python Data Structures** a) illustrate with a python program to show various insert and delete operations in set, tuple, dictionary and list.	**4**	**CO2**
6	**Numpy** a) Python Program to create numpy arrays in different ways and also how to index, Slice and operations on it .	**5**	**CO3**
7	**Pandas** a) Python Program to create data frame using pandas in different ways and also how to index, Slice and operations on it b) Python Program for Data Pre-Processing with statistical measuring using given Dataset. c) Python Program how to import different types of datasets.cc	**5**	**CO3**

8	**Advanced Python – OOPs Concepts** a) Write a Python class to find a pair of elements (indices of the two numbers) from a given array whose sum equals a specific target number. b) Write a Python class named Rectangle constructed by a length and width and a method which will compute the area of a rectangle.	**5**	**CO3**
9	**GUI Programming GUI Programming** a) Write a Python GUI program to add a button, Combo box, Check button,three radio buttons widgets,aListbox bar widgets in your application using tkinter module. b) Write a Python GUI program to create a Text widget using tkinter module. Insert a string at the beginning then insert a string into the current text. Delete the first and last character of the text.	**5**	**CO4**
10	**Database Programming** Write a Python program to create a small GUI application for insert, update and delete in a table using a backend and front end for creating form.	**5**	**CO4**

CIE – Continuous Internal Evaluation: LAB (25 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**25**
L1: Remember	-
L2: Understand	5
L3: Apply	10
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

SEE – Semester End Examination: Lab (25 Marks)

Blooms Taxonomy	**Marks (Out of 25)**
L1: Remember	-
L2: Understand	5
L3: Apply	10
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

ANALYSIS AND DESIGN OF ALGORITHMS LAB

Course Code : 20CSL57 | **Credits : 02**
L: T:P:S : 0:0:2:0 | **CIE Marks: 25**
Exam Hours : 3 | **SEE Marks: 25**

Course Outcomes: At the end of the Course, the Student will be able to

20CSL57.1	Analyze the complexities of various applications in different domains
20CSL57.2	Implement efficient algorithms to solve problems in various domains
20CSL57.3	Use suitable design technique to develop efficient algorithms
20CSL57.4	Compare, implement and understand when to apply various design techniques

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSL57.1	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSL57.2	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSL57.3	3	3	3	3	3	-	-	3	3	-	-	3	3	3
20CSL57.4	3	3	3	3	3	-	-	3	3	-	-	3	3	3

Exp. No	Experiment	Hours	CO
1	Write a program to find GCD of two numbers using differential algorithms	**2**	**CO1**
2	Write a program to Implement Sieve of Eratosthenes to generate Prime Numbers Between Given Range	**2**	**CO1**
3	Write a program to implement string matching using Brute force	**2**	**CO1**
4	Write a program to implement Merge Sort	**3**	**CO2, CO3**
5	Write a program to implement Quick Sort	**3**	**CO2, CO3**
6	Write a program to obtain minimum cost spanning tree using Prim's Algorithm	**3**	**CO2, CO3**
7	Write a program to obtain minimum cost spanning tree using Kruskal's Algorithm	**3**	**CO2, CO3**
8	Write a program to obtain shortest path using Djikstra's algorithm	**3**	**CO2, CO3**
9	Write a program to compute Binomial Coefficient	**3**	**CO2, CO3**
10	Write a program to obtain shortest path using Floyds algorithms	**3**	**CO2, CO3**
11	Write a program to compute Transitive closure using Warshall's algorithm	**3**	**CO2, CO3**
12	Write a program to implement Breadth First search	**3**	**CO2, CO3**
13	Write a program to implement Depth First search	**3**	**CO2, CO3**
14	Write a program to implement Topological sorting	**3**	**CO2, CO3**
15	Write a program to implement Subset Sum problem using Backtracking	**3**	**CO4**
16	Write a program to implement N Queens problem using Backtracking	**3**	**CO4**

CIE – Continuous Internal Evaluation: LAB (25 Marks

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**25**
L1: Remember	-
L2: Understand	-
L3: Apply	25
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

SEE – Semester End Examination: Lab (25 Marks)

Blooms Taxonomy	**Marks (Out of 25)**
L1: Remember	-
L2: Understand	-
L3: Apply	25
L4: Analyze	-
L5: Evaluate	-
L6: Create	-

DATABASE MANAGEMENT SYSTEMS LAB

Course Code : 20CSL58 **Credits: 02**
L: T:P:S : 0:0:2:0 **CIE Marks: 25**
Exam Hours : 3 **SEE Marks: 25**

Course Outcomes: At the end of the Course, the Student will be able to

20CSL58.1	Build ER diagrams with the given constraints and develop relational schema.
20CSL58.2	Apply the concepts of DDL to create and define database and applythe concept of DML to perform Nested Queries and joining Queries
20CSL58.3	Creation of user-defined view, Trigger, Assertion, indexes to the database and familiarize with Normalization Techniques(l3)
20CSL58.4	Build NOSQL databases and perform CRUD operations in Cassandra DB(l3)

Mapping of Course Outcomes to Program Outcomes

	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSL58.1	3	3	-	3	3	-	-	-	3	-	2	3	-	-
20CSL58.2	3	3	-	3	3	-	-	-	3	-	2	3	3	2
20CSL58.3	3	3	-	3	3	-	-	-	3	-	-	3	3	-
20CSL58.4	3	3	2	3	3	-	-	-	3	-	-	3	3	-

Exp. No	Experiment	Hours	CO
1	Understanding steps involved in installation of DBMS Drawing an ER Diagram based on given assumption and mapping them to Relational data base schema for **Student Database**	**04**	**CO1**
2	Drawing an ER Diagram based on given assumption and mapping them to Relational data base schema for **General Hospital Database**	**04**	**CO1**
3	Drawing an ER Diagram based on given assumption and mapping them to Relational data base schema for **Organization Database**	**04**	**CO1**
4	To practice and implement Data Definition Language commands and constraints	**04**	**CO2**
5	To study various DML, DCL and TCL commands and implement them on various databases	**04**	**CO2**
6	To Apply different Aggregate functions along with Group by, having and Order-by clause, using relational-logical operators, additional operators and string operations, to perform Nested Queries and joining Queries using DML commands.	**04**	**CO2**
7	To create and manipulate various database objects of the table using Views	**04**	**CO3**
8	To create and Drop Triggers for various events such as insert, update etc.	**04**	**CO3**
9	Normalizing the given database schema to the highest Normal form and justifying it in each step of conversion.	**05**	**CO3**
10	Working with Cassandra DB	**08**	**CO4**

CIE – Continuous Internal Evaluation: LAB (25 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**25**
L1: Remember	-
L2: Understand	-
L3: Apply	15
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

SEE – Semester End Examination: Lab (25 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	-
L2: Understand	-
L3: Apply	15
L4: Analyze	10
L5: Evaluate	-
L6: Create	-

MINI PROJECT USING PYTHON

Course Code	**: 20CSE59**	**Credits**	**: 02**
L: T:P:S	**: 0:0:2:0**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

COURSE OUTCOMES: At the end of the Course, the Student will be able to

CO #	COURSE OUTCOMES
20CSE59.1	Apply the python concepts required for the implementation of chosen problem statement.
20CSE59.2	Design using the basic concepts of python programming with decision making statements, lists, tuples, dictionaries etc
20CSE59.3	Design a relational database model and schema with all constraints defined /Algorithm model with constraints defined
20CSE59.4	Apply normalization in designing database/using optimization techniques in algorithm
20CSE59.5	Design and program Python applications using various tools and packages
20CSE59.6	Demonstrate their communication skill effectively with technical presentation.

Course Outcomes to Program Outcomes Articulation Matrix

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

The student shall be capable of identifying a problem related to the field of Computer Science and carry out a mini project on the problem defined by using python programming language and with database concepts. Each student expected to do the mini project individually. The code developed the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

Sample Mini Project includes:

1) Banking
2) Enterprises
3) Finance
4) Transport
5) Health care
6) Education, etc.

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Level	Bloom's Category	Review 1 (10 Marks)	Review 2 (10 Marks)	Final (5 Marks)
L1	Remember	2		1
L2	Understand	2	2	1
L3	Apply	2	2	1
L4	Analyze	2	2	1
L5	Evaluate	2	2	1
L6	Create	-	2	-

SEE – Semester End Examination (25 Marks)

Bloom's Category	Marks
Marks(out of 25)	
Remember	-
Understand	5
Apply	5
Analyze	5
Evaluate	5
Create	5

SIXTH SEMESTER

WEB FRAMEWORKS AND TECHNOLOGIES

Course Code : 20CSE61 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE61.1	Apply the fundamental concepts of HTML for web page creation.
20CSE61.2	Evaluate the basic of web knowledge with CSS to create attractive webpages
20CSE61.3	Create dynamic webpages using Java script and XML
20CSE61.4	Apply XSLT concepts in web page designing
20CSE61.5	Design forms to support page navigation using PHP
20CSE61.6	Create data base to handle queries and manipulations using PHP with mySql

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE61.1	3	-	-	-	-	-	-	-	-	-	-	3
20CSE61.2	3	3	3	2	-	-	-	2	-	-	-	-
20CSE61.3	3	3	3	2	-	-	-	2	-	-	-	-
20CSE61.4	3	3	3	2	-	-	-	2	-	-	-	-
20CSE61.5	3	3	3	2	-	-	-	2	-	-	-	-
20CSE61.6	3	3	3	2	-	-	-	-	-	-	-	-

Module No	Module Contents	Hours	COs
1	**Introduction:** Concept of WWW, Internet and WWW, Web browser, Features of Web 2.0 HTML: Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets. Style sheets: Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties,	**9**	**CO1**
2	**CSS:** Manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons	**9**	**CO2**
3	**XML**: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Using XML with application. Transforming XML using XSL and XSLT	**9**	**C03**
4	**PHP:** Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP	**9**	**C04**
5	**PHP and MySQL**: Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names,	**9**	**C05, C06**

	creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs		

Text Book(s):

1. Herbert Schildt, Java™: The Complete Reference, McGraw-Hill, Tenth Edition,201
2. Cay S. Horstmann, Core Java® SE 9 for the Impatient, Addison Wesley, Second Edition, 2018

Reference Book(s):

1. Cay S. Horstmann, Core Java™ Volume I—Fundamentals, Prentice Hall, Tenth Edition,2015
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cadenhead and Leura Lemay Pub. PearsonEducation.
3. Ken Kousen, Modern Java Recipes, O'Reilly Media, Inc.,2017

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular
Marks (Out of 50)	25	15	10	-
L1: Remember	2.5	-	-	-
L2: Understand	2.5	-	-	-
L3: Apply	5	5	5	-
L4: Analyze	5	5	5	-
L5: Evaluate	5	-	-	-
L6: Create	5	5	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of50)
L1: Remember	5
L2: Understand	5
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	10

COMPUTER NETWORKS

Course Code	**: 20CSE62**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to:

20CSE62.1	Analyze the components of data communication.
20CSE62.2	Apply the concepts of Physical and Data Link layer functionalities.
20CSE62.3	Compare and Contrast network routing algorithms
20CSE62.4	Evaluate the role of TCP/IP architecture in real time environment.
20CSE62.5	Interpret the importance of network security requirements in real time applications.
20CSE62.6	Analyze the working of real time application protocols.

Mapping of Course Outcomes to Program Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE62.1	3	3	3	3	3	3	-	3	3	3	-	3
20CSE62.2	3	3	3	3	3	3	-	3	3	3	-	3
20CSE62.3	3	3	3	3	3	3	-	3	3	3	-	3
20CSE62.4	3	3	3	3	3	3	-	3	3	3	-	3
20CSE62.5	3	3	3	3	3	3	-	3	3	3	-	3
20CSE62.6	3	3	3	3	3	3	-	3	3	3	-	3

Sl. No	Module Contents	Hours	Cos
1	**Introduction:** Introduction: Data Communication-Components, Data Representation, Data Flow; Networks-Network Criteria, Physical structures, Network Types-LAN, WAN, Networking devices **Network Models**- Protocol Layering-principles of protocol layering-logical connection; TCP/IP Protocol Suite-Layered Architecture, Layers in the TCP/IP Protocol suite, Description of each layer, Encapsulation and Decapsulation and Addressing, OSI Model, TCP/IP vs OSI model	**9**	**CO1**
2	**Physical Layer**- Digital Transmission-Characteristics, DDC -Line coding schemes-Unipolar, Polar, Bipolar, Multilevel-2B1Q, Multitransition-MLT3, Block Coding-4B/5B, scrambling-B8ZS, HDB3, TransmissionModes-Parallel Transmission, serial transmission. **Data Link Layer:** Data Link Control- Framing-Character Oriented, Bit Oriented, HDLC	**9**	**CO2**
3	**IP ADDRESSING AND ROUTING** Datagrams and Virtual Circuits-Connectionless Packet Switching-virtual packet switching, Routing in Packet Networks-Routing algorithm classification, Hierarchical routing, Specialized routing,Shortest path routing: Bellman-Ford algorithm, Dijkstra's algorithm, source routing Vs Hop by Hop Routing, Link state Vs distance vector. **TCP/IP architecture**, The Internet Protocol-IP packet, IP addressing, Subnet Addressing, CIDR, ARP, RARP, Fragmentation and reassembly, Ipv6-Header Format, Network Addressing, Migration Issues from Ipv4 to IPv6, UDP, TCP-TCP operation and Reliable stream, TCP Protocol-TCP segment, TCP checksum, Connection Establishment, TCP connection Termination.	**12**	**CO3, CO4**
4	**NETWORK SECURITY**: Network Security: Overview of Network Security, Overview of Security Methods, Secret-Key Encryption Protocols, Public-Key Encryption Protocols, Authentication-SHA.	**7**	**CO5**

5	**APPLICATIONS, NETWORK MANAGEMENT:** Application layer overview, Domain Name System (DNS), Remote Login Protocols, E-mail, File Transfer and FTP, World Wide Web and HTTP	**8**	**CO6**

Text Books:

1. Behrouz A. Forouzan: Data Communication and Networking, 5th Edition Tata McGraw-Hill, 2013. (M1,2,5)
2. Communication Networks – Fundamental Concepts & key architectures, Alberto Leon Garcia & Indra Widjaja, 2nd Edition, Tata McGraw-Hill, 2004, India. (M3)
3. Computer & Communication Networks, Nadir F Mir, Pearson Education, 2014, India. (M4,5)

Reference Books:

1.W. Stallings, Data& Computer Communication Prentice-Hall, 9th edition, 2014.
2, A.S. Tanenbaum, Computer networks, Prentice-Hall, 5th edition, 2014.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular
Marks (Out of 50)	25	15	10	-
L1: Remember	2.5	-	-	-
L2: Understand	2.5	-	-	-
L3: Apply	5	5	5	-
L4: Analyze	5	5	5	-
L5: Evaluate	5	-	-	-
L6: Create	5	5	-	-

SEE – Semester End Examination: Theory(50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

DATA MINING AND MACHINE LEARNING

Course Code : 20CSE63 **Credits: 03**
L:T:P:S : 3:0:0:0 **CIE Marks: 50**
Exam Hours : 3 **SEE Marks: 50**

Course Outcomes: At the end of the Course, the student will be able to

CO #	COURSE OUTCOME
20CSE63.1	Understand Data mining principles and analyze various Pre-processing techniques
20CSE63.2	Analyze the concepts of association rules and decision tree classification for large data.
20CSE63.3	Classify supervised and unsupervised techniques and understand basic concepts of Concept learning
20CSE63.4	Apply regression, Bayesian Learning and SVM classification techniques on large data.
20CSE63.5	Apply K means and hierarchical clustering techniques.
20CSE63.6	Apply Neural network and instance-based learning using KNN and RF

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE63.1	3	3	-	-	3	-	-	-	-	-	3	3	3	3
20CSE63.2	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE63.3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE63.4	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE63.5	3	3	3	-	3	-	-	-	-	-	3	3	3	3
20CSE63.6	3	3	3	-	3	-	-	-	-	-	3	3	3	3

Module No	Module Contents	Hours	COs
1	**Introduction:** What is Data, Data-Types, What is data mining. **Data Pre-processing:** overview, Data cleaning, Data integration, Data reduction, Data transformation and data discretization.	**8**	**CO1**
2	**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts, Confidence and Support, Apriori algorithm, FPGrowth Algorithm. **Decision Tree Learning:** Decision tree representation, Appropriate problems for decision tree learning, Basic decision tree learning algorithm.	**10**	**CO2**
3	**Introduction to Machine Learning:** Introduction, Supervised Learning, Unsupervised learning, Reinforcement learning, Well posed learning, Perspective and Issues in Machine Learning. **Concept Learning:** Concept learning task, Concept learning as search, Find-S	**10**	**CO3**

	algorithm, Version space, Candidate Elimination algorithm.		
4	**Regression:** Linear Regression, Multiple Regression, Logistic Regression, Weighted Regression. **Bayesian Learning:** Introduction, Bayes theorem, Naive Bayes classifier Bayesian belief networks **Support Vector Machine:** Support Vector Machine, Kernel function and Kernel SVM.	**9**	**CO4**
5	**Clustering:** k-means, Hierarchical Clustering **Artificial Neural Networks:** Neural Network representation, Perceptrons, Multi Layer Networks and Back propagation algorithm. **Instance Based Learning:** Introduction, k-nearest Neighbour Learning, Random Forest classifier	**8**	**CO5, CO6**

Text Books:

1. Machine Learning-by Tom M.Mitchell ,McGraw Hill Education ,2013
2. Data Mining Concepts &Techniques –by JaiweiHan ,MichelineKamber,Jian Pei3rd Edition,MK publisher

Reference Books:

1. Discovering Knowledge in Data: An introduction to Data Mining, Daniel T. Larose,John Wiley, 2nd Edition, 2014
2. Introduction to Machine Learning-Ethem Alpaydin,3rdEdition,PHI publications.
3. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition,PrenticeHall of India, 2006.

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	**Tests**	**Assignments**	**Quizzes**
Marks (Out of 50)	**25**	**15**	**10**
L1: Remember	-	-	
L2: Understand	5		5
L3: Apply	5	7.5	5
L4: Analyze	5	7.5	
L5: Evaluate	10	-	-
L6: Create	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	-
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	20
L6: Create	-

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SOCIAL NETWORK ANALYSIS

Course Code	**: 20CSE641**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE641.1	Infer and identify the various concepts in social media and also learn to use social media in an ethical manner
20CSE641.2	Make use of graph theory approach to model social networks.
20CSE641.3	Analyze the social networks to draw insights on the interactions between/within social groups.
20CSE641.4	Evaluate the structure of a social network and identify the influential entities.
20CSE641.5	Interpret the fundamental principles for analysing social media marketing and its importance.
20CSE641.6	Select and utilize data analysis methods for addressing real world problems.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE641.1	3	-	-	-	-	3	-	3	3	-	-	3
20CSE641.2	3	-	-	-	-	3	-	3	3	-	-	3
20CSE641.3	3	-	-	-	-	3	-	3	3	-	-	3
20CSE641.4	3	-	-	-	-	3	-	3	3	-	-	3
20CSE641.5	3	-	-	-	-	3	-	3	3	-	-	3
20CSE641.6	3	-	-	-	-	3	-	3	3	-	-	3

Module No	Module Contents	Hours	COs
1	**INTRODUCTION** Understand What Social Networking is, Social Media Characteristics, What is Social Media and Why It is Important, Types of Social Media, Core Values, Challenges, Advantages and Disadvantages, Future of Social Networking, Various social networking sites - FACEBOOK, INSTAGRAM, TWITTER, LINKEDIN - Why and how they matter, Key Features, Marketing - What You Need to Know.	**7**	**CO1**
2	**BUILDING A NETWORK** Networks as Graphs – Actors, Ties, Networks, Multiplex Networks, Weighted Ties, Group, Geodesic Distance, Graph Connectivity, Degree of an Actor – Indegree and Outdegree, Types of nodes – Carrier, Transmitter, Receiver, Isolate, Representation of Social Network Data – Sociomatrix and Edge List, Matrix Permutuation and Blocks, Network Relationships &Reciprocity, Transitivity, Popularity Structural Equivalence, Clique, Star.	**10**	**CO2**

3	**STRENGTH OF WEAK TIES & HOMOPHILY** Granovetter's strength of weak ties, Triads, Clustering Coefficient and Neighbourhood Overlap, Structure of Weak Ties, Bridges and Local Bridges, Embeddedness, Structural Holes, Social Capital, Tie Strength, Social Media and Passive Engagement, Betweenness measures and Graph Partitioning, Finding Communities in a Graph, Girvan Newman Algorithm, Strong and Weak Relationship, Introduction to Homophily, Selection and Social Influence, Foci Closure and Membership Closure.	**10**	**CO3**
4	**NETWORK PROPERTIES** Network Density, Properties of Nodes – Degree Centrality, Closeness Centrality, Betweenness Centrality, Centrality of a Network - Network Degree Centrality, Network Closeness Centrality, Network Betweenness Centrality, Page rank centrality	**10**	**CO4**
5	**SOCIAL MEDIA ANALYSIS** Four Dimension of Analysis, Criteria of Effectiveness, Metrics, Social Network Analysis, Semantic Analysis, Online Sentiment Analysis, Tools, Social Media Management, Centrality Measures, Opinion Mining, Feature Based Sentiment Analysis. **Case studies:** Appropriate case studies will be discussed relevant to the industries	**7**	**CO5, CO6**

Literature:

1) James M Cook, University of Maine at Augusta "What is a Social Network"
2) Robert A Hanneman, Department of Sociology, University of California, Riverside, "Introduction to Social Network methods".
3) Christina Falci, Department of Sociology, University of Nebraska, Lincoln, "Social Network Analysis"
4) Matthew Ganis&AvinashKohirkar, "Social Media Analytics"
5) Bobbi J Carothers, American Evaluation Association, Denver, Colorado, "Network Analysis from Start to finish: Techniques, Tools and Tips for Evaluating your Network"
6) Matthew Denny, Institute for Social Science Research, University of Massachusetts, AMHERST, "Social Network Analysis"
7) Timothy Baldwin, University of Melbourne, "Semantic Analysis of Social Media"
8) The Social Media Analytics Compass: What and How to Measure http://www.razorsocial.com/social-media-analytics-tools/
9) https://www.youtube.com/watch?v=P33xa4l4GTM
10) Overview of SNA https://www.youtube.com/watch?v=fgr_g1q2ikA
11) https://www.teachengineering.org/activities/view/uno_graphtheory_lesson01_activity1
12) The History of Social Media: social Networking Evolution! http://historycooperative.org/ the-history-of-social-media/
13) Social Media Fact Sheet http://www.pewinternet.org/fact-sheet/social-media/
14) https://www.meaningcloud.com/solutions/media-analysis
15) https://www.enotes.com/homework-help/what-hypotheses-social-media-intimate-relationship-488912

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Co-Curricular NPTEL	Other
Marks (Out of 50)	**25**	**25**	**-**
L1: Remember	5	-	-
L2: Understand	5	-	-
L3: Apply	5	10	-
L4: Analyze	5	5	-
L5: Evaluate	5	5	-
L6: Create	-	5	-

SEE –Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

SOFT COMPUTING

Course Code	**: 20CSE642**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

CO #	COURSE OUTCOME
20CSE642.1	Analyze the techniques for problem solving using soft computing.
20CSE642.2	Examine the various types of Neuro fuzzy models
20CSE642.3	Interpret the importance of layers and basic structure of CNN
20CSE642.4	Apply basic principles of deep learning for training CNN under various case studies
20CSE642.5	Identify the significance of NLP in real world problems.
20CSE642.6	Analyze the use of different swarm intelligence algorithms to design real world problems.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE642.1	3	3	-	-	-	-	-	-	-	-	-	3	-	3
20CSE642.2	3	3	3	-	3	-	-	-	-	-	-	3	3	3
20CSE642.3	3	3	3	-	3	-	-	-	-	-	-	3	3	3
20CSE642.4	3	3	3	-	3	-	-	-	-	-	-	3	3	3
20CSE642.5	3	3	3	-	3	-	-	-	-	-	-	3	3	3
20CSE642.6	3	3	3	-	3	-	-	-	-	-	-	3	3	3

Correlation levels: 1-Slight (Low) 2-Moderate (Medium) 3-Substantial (High)

Module No	Module Contents	Hours	Cos
1	**Introduction:** Artificial Intelligence – a brief review – Pitfalls of traditional AI – Why Computational Intelligence? – Computational intelligence concept - Importance of tolerance of imprecision and uncertainty - Constituent techniques – Overview of Artificial Neural Networks, Fuzzy Logic, Evolutionary Computation.	**8**	**CO1**
2	**Neuro Fuzzy Modelling**: Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid Systems, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems Simplified Fuzzy ARTMAP	**8**	**CO2**
3	**Deep Learning:** Convolutional Neural Networks : Introduction , Historical Perspective and Biological Inspiration ,Broader Observations About Convolutional Neural Networks , The Basic Structure of a Convolutional Network , Padding ,Strides ,Typical Settings ,The ReLULayePooling ,Fully Connected Layers,The Interleaving Between Layers ,Local Response Normalization , Hierarchical Feature Engineering, Training a Convolutional Network , Backpropagating Through Convolutions , Backpropagation as Convolution with Inverted/Transposed Filter , Convolution/Backpropagation as Matrix Multiplications, Data Augmentation,Case studies.	**10**	**CO3,CO4**

4	**NLP:**Natural language processing- Introducing NLP: patterns and structure in language--- Tokenised text and pattern matching --Recognising names--Parts of speech - Constituent structure - Writing production rules- . .Finite-state machines-Using the Natural Language Toolkit Corpora Computational tools for text analysis	**10**	**CO5**
5	**SWARM ALGORITHMS:** Ant System, Ant Colony System, Bees Algorithm. The Firefly algorithm - algorithm analysis - implementation – variants	**9**	**CO6**

Reference Books:

1. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.
2. Neural Networks and Deep Learning: 2018 ,Charu C. Aggarwal
3. Jason Brownlee, Clever Algorithms: Nature-Inspired Programming Recipes, Revision 2. 16th June 2012 Chapter 6
4. Yang ,Cui,XIao,Gandomi,Karamanoglu ,"Swarm Intelligence and Bio-Inspired Computing", Elsevier First Edition 2013
5. Konar A., "Computational Intelligence: Principles, Techniques and Applications", Springer Verlag, 2005
6. Introduction to natural language processing R. Kibble University of London

Continuous Internal Evaluation: Theory (50 Marks)

Bloom's Taxonomy	**Tests**	**NPTEL**
Marks (Out of 50)	**25**	**25**
Remember	-	-
Understand	5	5
Apply	10	10
Analyze	5	5
Evaluate	5	5
Create	-	-

SEE – Semester End Examination: Theory (50 Marks)

Bloom's Taxonomy	**Tests**
Marks (Out of 50)	
Remember	
Understand	10
Apply	20
Analyze	10
Evaluate	10
Create	

AGILE METHODOLOGIES

Course Code	**: 20CSE643**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE643.1	Understand the basic concepts of Agile Software Process.
20CSE643.2	Analyze the significance of agile in software development
20CSE643.3	Differentiate various agile methods
20CSE643.4	Apply agilemethodologies to various industries
20CSE643.5	Examine the different agile frameworks
20CSE643.6	Analyze the principles of Agile Testing

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE643.1	3	3	3	3	3	1	1	1	1	2	3	2
20CSE643.2	3	3	3	3	3	1	1	1	1	2	3	2
20CSE643.3	3	3	3	3	3	1	1	1	1	2	3	2
20CSE643.4	3	3	3	3	3	1	1	1	1	2	3	2
20CSE643.5	3	3	3	3	3	1	1	1	1	2	3	2
20CSE643.6	3	3	3	3	3	1	1	1	1	2	3	2

Module No	Module Contents	Hours	Cos
1	**Fundamentals of Agile:** Software is new product development – Iterative development – Risk-Driven and Client-Driven iterative planning – Time boxed iterative development – During the iteration, No changes from external stakeholders – Evolutionary and adaptive development - Evolutionary requirements analysis – Early "Top Ten" high-level requirements, Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery	**8**	**CO1**
2	**AGILE AND ITS SIGNIFICANCE** :Agile development – Classification of methods – The agile manifesto and principles – Agile project management – Embrace communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive process – Principle-based versus Rule-Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods. Key motivations for iterative development, waterfall model.	**9**	**CO2, CO3**
3	**Industry Trends:** Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects with Cloud, Balancing Agility with Discipline.	**9**	**C04**
4	**Agile framework:**Agile rapid development technologies Method Overview – Lifecycle – Work Products, Importance and Practices ofScrum, Extreme Programming and Unified Process	**9**	**C05**

5	**Agile Testing:** The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools in Agile tester	**9**	**C06**

Text Book(s):

1. CraigLarman "Agile and Iterative Development – A Manager's Guide" Pearson Education – 2004
2.Agile Software Development, Principles, Patterns, and Practices, Robert C. Martin, Prentice Hall; 1st edition, 2002

Reference Book(s):

1.Agile Testing: A Practical Guide for Testers and Agile Teams By Lisa Crispin, Janet Gregory, Addison
2.Elisabeth Hendrickson, "Agile Testing" Quality Tree Software Inc 2008

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	**Tests**	**Assignments**	**Quizzes**	**NPTEL**	**Other**
Marks (Out of 50)	**25**			**25**	
L1: Remember		-	-	-	-
L2: Understand	5	-	-	5	-
L3: Apply	10	-	-	10	-
L4: Analyze	5	-	-	5	-
L5: Evaluate	5	-	-	5	-
L6: Create		-	-		-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	-
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	10
L6: Create	-

CLOUD COMPUTING

Course Code	**: 20CSE644**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE644.1	Summarize the basic concepts of cloud computing and its architecture
20CSE644.2	Analyze the importance of Virtualization using hypervisors
20CSE644.3	Compare and contrast different cloud platform architecture
20CSE644.4	Identify appropriate services to build an application
20CSE644.5	Analyze the security issues in cloud environments
20CSE644.6	Simulate cloud environment and analyze the performance

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE644.1	3	-	-	-	-	3	3	-	3	3	-	3
20CSE644.2	3	3	-	-	-	3	3	-	3	3	-	3
20CSE644.3	3	-	-	-	-	3	3	-	3	3	-	3
20CSE644.4	3	3	3	-	-	3	3	-	3	3	-	3
20CSE644.5	3	3	3	-	-	3	3	-	3	3	-	3
20CSE644.6	3	3	3	-	-	3	3	-	3	3	-	3

Module No	Module Contents	Hours	Cos
1	**Introduction:** History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Characteristic of Cloud Computing, Cloud Concepts & Technologies – Virtualization, Load Balancing, Scalability & Elasticity,Deployment, Replication, Monitoring, Map Reduce, Identity & Access Management, Service Level Agreements, Billing. Cloud Computing Architecture: CloudArchitecture, Anatomy of the Cloud, Managing the Cloud, Migrating Application to Cloud.	**9**	**CO1**
2	**Virtual Machines and Virtualization:** Virtualization opportunities, Processor Virtualization, Memory Virtualization, Storage Virtualization, Network Virtualization, Data Virtualization, and Application Virtualization. Approaches of Virtualization: Full Virtualization, paravirtualization, Hardware-Assisted Virtualization. Hypervisors: Types of Hypervisors, High Availability (HA), Disaster Recovery (DR), Security Issues and Recommendations.	**9**	**CO2**
3	**Cloud Platform Architecture: Cloud Service Models-**Infrastructure as a Service, Characteristics of IaaS, Suitability of IaaS, Pros and Cons of IaaS. Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS. Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Other Cloud Service Models. **Cloud Deployment Models**: Private Cloud, Public Cloud, Hybrid Cloud, Community Cloud – Characteristics, Suitability, Issues, Advantages, Disadvantages. **Case study on Open Source and Commercial Clouds –**	**9**	**CO3**

	Amazon EC2, Google Compute Engine, Microsoft Azure, OpenStack		
4	**Cloud Services:** Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment & Management Services, Identity & Access Management Services, Open source private cloud software. **Cloud Security:** Introduction, Cloud Security Architecture, Authentication, Authorization, Identity and access management, data security, Key management, auditing.	**10**	**CO4, CO5**
5	**Cloud Computing Applications:** Cloud Computing for Healthcare, Cloud Computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud Computing for Education. **Cloud Sim:** Create Data center, Data broker, Virtual Machines, Cloudlet	**9**	**CO6**

Text Book:

1. Rajkumar Buyya, James Broberg, Andrzej Goscinski: Cloud Computing Principles and Paradigms, Willey2014
2.Rajkumar Buyya, Christian Vecchiola, and ThamaraiSelvi Mastering Cloud. Computing McGraw Hill Education,2013.

Reference Book(s):

1. Dan C Marinescu: Cloud Computing Theory and Practice. Elsevier(MK) 2013
2. John W Rittinghouse, James F Ransome: Cloud Computing implementation, Management and Security, CRC Press2013
3.http://www.cloudbus.org/cloudsim/

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	NPTEL	Other
Marks (Out of 50)	**25**			**25**	
L1: Remember	5	-	-	-	-
L2: Understand	5	-	-	-	-
L3: Apply	5	-	-	10	-
L4: Analyze	5	-	-	5	-
L5: Evaluate	-	-	-	10	-
L6: Create	5	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

SEMANTIC WEB

Course Code : 20CSE651 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

20CSE651.1	Understand the concept of Semantic Web
20CSE651.2	Model ontologies using Resource Description Framework (RDF)
20CSE651.3	Create ontology's in RDFS with classes and subclasses and determine resulting inference
20CSE651.4	Model and design ontologies using Web Ontology Language (OWL)
20CSE651.5	Illustrate the principles of Ontology Engineering
20CSE651.6	Apply semantic web technologies to real world applications

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE651.1	3	-	-	-	-	-	-	-	-	-	-	-
20CSE651.2	2	3	3	-	1	-	-	-	-	-	-	-
20CSE651.3	2	3	3	-	1	-	-	-	-	-	-	-
20CSE651.4	2	3	3	-	1	-	-	-	-	-	-	-
20CSE651.5	3	-	-	-	-	-	-	-	-	-	-	-
20CSE651.6	-	3	2	-	-	-	-	-	-	-	-	-

Module No.	Module Contents	Hours	COs
1	Introduction to semantic web: – WWW and its usage, Transition from traditional web to semantic web- Basic concepts of meta data- Embedding and adding meta data in web pages- meta data tools- Search engines for semantic web – Further Considerations: Web Page Markup problem, Common Vocabulary problem and Query Building problem.	**7**	**CO1**
2	Resource description frame work (RDF) : Basic elements of RDF- RDF triples-Closer Look at RDF- Fundamental rules of RDF- Relationship between DC and RDF - Relationship between XML and RDF- RDFS- Core elements of RDFS- ontology and taxonomy-Inferencing based on RDF Schema.	**12**	**CO2, CO3**
3	Web Ontology Language (OWL): Using OWL to define classes-using OWL to define properties- Ontology Matching and Distributed Information -Three Faces of OWL- Validating OWL ontology.	**9**	**CO4**
4	ONTOLOGY ENGINEERING: Introduction, constructing ontologies manually, reusing existing ontologies, Semiautomatic ontology acquisition, Ontology Mapping, Exposing relational databases.	**7**	**CO5**
5	Real world examples and applications of semantic web: Swoogle- architecture, usage and examples of using Swoogle; FOAF – Explanation, vocabulary –creating FOAF documents – overview of semantic markup – semantic web search engines.	**9**	**CO6**

TEXT BOOKS:

1. LiyangYu , “Introduction to the Semantic Web and Semantic web services” Chapman & Hall/CRC, Bocca Raton, 2007.
2. Grigorous Antoniou, Paul Groth, Frank van Harmelen and Rinke Hoekstra, “A Semantic Web Primer”, 3rd Edition, The MIT Press, 2012.

REFERENCE BOOKS:

1. Asuncion Gomez, Perez Mariano, Fernandez Lopez and Oscar Corcho, "Ontological Engineering: With Examples from the Areas of Knowledge Management, E-Commerce and the Semantic Web", Springer, New Delhi, 2011.
2. Karin K Breitman, Marco Antonio Casanova and Walter Truszkowski, “Semantic Web: Concepts, Technologies and Applications”, Springer-Verlag, London, 2010.

CIE- Continuous Internal Evaluation: Theory (50 Marks)

Bloom’s Category	Tests	Assignments	Quizzes	Co-Curricular
Marks (out of 50)	**25**	**10**	**5**	**10**
Remember	-	-	-	
Understand	05	-	-	
Apply	10	-	2.5	
Analyze	05	05	2.5	5
Evaluate	05	05	-	5
Create	-	-	-	

SEE- Semester End Examination: Theory (50 Marks)

Bloom’s Category	Tests
Remember	10
Understand	10
Apply	15
Analyze	10
Evaluate	05
Create	-

WEB OF THINGS

COURSE CODE: 20CSE652 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE652.1	Compare and contrast between Internet of Things and Web of Things
20CSE652.2	Summarize the concepts of Web of Things and its architecture
20CSE652.3	Analyze the functional and technical requirements of Web of things
20CSE652.4	Summarize the components of servient architecture
20CSE652.5	Design real time implementation of Web of Things
20CSE652.6	Analyze the enabling methods to secure Web of Things

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
20CSE652.1	3	3	-	-	-	3	3	-	-	-	-	3	-	-
20CSE652.2	3	3	-	-	-	3	3	-	-	-	-	3	-	-
20CSE652.3	3	3	3	-	-	3	3	-	-	-	-	3	2	-
20CSE652.4	3	3	3	-	-	3	3	-	-	-	-	3	-	-
20CSE652.5	3	3	3	-	-	3	3	-	-	-	-	3	3	-
20CSE652.6	3	3	3	-	-	3	3	-	-	-	-	3	2	-

Module No.	Module Contents	Hours	COs
1	**Basics of the IoT and WoT:** Introduction: A brief history about Internet of Things, Defining the Internet of Things, From the Internet of Things to the Web of Things, Enter the Web of Things, Web of Things scenarios, Comparing IoT and WoT. **WoT Architecture**: Web Thing, Interaction ModelHypermedia Controls, Protocol Bindings, WoT System Components and Their Interconnectivity	**10**	**CO1 CO2**
2	**WoT Requirements:** **Functional Requirements-** Common Principles, Thing Functionalities, Search and Discovery, Description Mechanism, Description ofAttributes, Description of Functionalities,Network, Deployment, Application, Legacy Adoption **Technical Requirements-** Components in the Web of Things and the Web of Things Architecture, Devices, Applications, Digital Twins,Discovery, Security, Accessibility.	**8**	**CO3**
3	**WoT Building Blocks:** WoT Thing Description, WoT BindingTemplates, WoT Scripting API, WoT Security and Privacy Guidelines **Abstract Servient Architecture:** Behavior Implementation, WoTRuntime, WoT Scripting API, Exposed Thing and Consumed Thing Abstractions, Private Security Data, Protocol Stack Implementation, System API, Alternative Servient and WoT Implementations, Native WoT API, Thing Description for Existing Devices.	**9**	**CO4**

Module No	Module Contents	Hours	Cos
4	**Implementing web of Things** Connecting devices to the web**, Direct integration pattern** : REST on Devices -Creating a WoT server, Resource design, Representation design, Interface design, Pub/sub interface via Web Sock , **Gateway integration pattern :** CoAP example - Running a CoAP server, Proxying CoAP via a gateway, **Cloud integration pattern:** MQTT over everything - Set up your EVRYTHNG account, Create your MQTT client application, Use actions to control the power plug, Create a simple web control application	**10**	**C05**
5	**Securing and sharing web of Things** **Securing Things -** Encryption 101, Web security with TLS, Enabling HTTPS and WSS with TLS, **Authentication and access control -** Access control with REST and API tokens. OAuth: a web authorization framework, **The Social Web of Things -** A Social Web of Things authentication proxy, implementing a Social WoT authentication proxy	**8**	**CO6**

Text Book:

1. Dominique D Guinard, Vlad M Trifa, "Building the Web of Things" Manning, 2016.

Reference Book(s):

1. Quan Z. Sheng, Lina Yao, Yongrui Qin, Boualem Benatallah "Managing the Web of Things Linking the Real World to the Web" , Elsevier 2017
2. https://w3c.github.io/wot-architecture/
3. https://model.webofthings.io/
4. https://livebook.manning.com/book/building-the-web-of-things/about-this-book/

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Bloom's Category	Tests	Assignments	Quizzes	Co Curricular
Marks (out of 50)	**25**	**10**	**5**	**10**
Remember	-	-	-	-
Understand	05	-	-	-
Apply	10	-	2.5	05
Analyze	05	05	2.5	05
Evaluate	05	05	-	-
Create	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	5
L3: Apply	15
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

QUANTUM CRYPTOGRAPHY

Course Code : 20CSE653 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE653.1	Understand the basic concepts of quantum computation.
20CSE653.2	Apply the knowledge of mathematics and physics to relate with quantum mechanics.
20CSE653.3	Implement the concepts of quantum gates to design quantum circuits.
20CSE653.4	Analyse various symmetric cryptography algorithms.
20CSE653.5	Analyse Aymmetirc cryptography algorithms to provide confidentiality , integrity and authentication
20CSE653.6	Apply and compare various quantum algorithms

Mapping of CO v/s PO:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO11	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	3	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	3	3	3
CO3	3	3	3	1	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	3	3	3
CO5	3	3	3	-	-	-	-	-	-	-	-	3	3	3
CO6	3	3	3	-	-	-	-	-	-	-	-	3	3	3

Module No.	Module contents	Hours	CO's
1	**Introduction to Quantum Computation:** Quantum bits, Bloch sphere representation of a qubit, multiple qubits. **Background Mathematics and Physics:** Hilbert space, Probabilities and measurements, entanglement, density operators and correlation, basics of quantum mechanics, Measurements in bases other than computational basis.	**10**	**CO1, CO2**
2	**Quantum Circuits:** single qubit gates, multiple qubit gates, design of quantum circuits.	**08**	**CO3**
3	**Symmetric Cryptrography:** Data Encryption Standard (DES) – DES Structure – Key Generation – Simplified DES – Linear and Differential cryptanalysis –Triple DES – Advanced Encryption Standard (AES)	**09**	**CO4**
4	**ASYMMETRIC KEY CRYPTOGRAPHY**: Public Key Cryptosystems – RSA Algorithm – ElGamal Cryptosystems – Diffie-Hellman key exchange – Elliptic curve cryptography – Hash functions – Hash algorithms – Secure Hash Algorithm SHA – MD5	**09**	**CO5**
5	**Quantum Algorithms:** Deutsch's algorithm, Deutsch's-Jozsa algorithm, Shor factorization, Grover search, Quantum teleportation, no cloning theorem.	**09**	**CO6**

Text books:

1 Nielsen M. A., Quantum Computation and Quantum Information, 2002, Cambridge University Press.

2 Benenti G., Casati G. and Strini G., Principles of Quantum Computation and 2004 Information, Vol. I: Basic Concepts, Vol II: Basic Tools and Special Topics, World Scientific.

3 William Stallings, "Cryptography and Network security Principles and Practices",Pearson/PHI, Seventh Edition, 2017.

Reference:

1 Pittenger A. O., An Introduction to Quantum Computing Algorithms 2000

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular	Other
Marks (Out of 25)	**25**	**10**	**5**	**-**	**-**
L1: Remember	5	-	-	-	-
L2: Understand	5			-	-
L3: Apply	10	5	2.5	10	-
L4: Analyze	5	5	2.5	-	-
L5: Evaluate		-	-	-	-
L6: Create	-	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	10
L2: Understand	10
L3: Apply	20
L4: Analyze	10
L5: Evaluate	
L6: Create	-

SOFTWARE AGENTS

Course Code : 20CSE654 | **Credits : 03**
L: T:P:S : 3:0:0:0 | **CIE Marks : 50**
Exam Hours : 3 | **SEE Marks : 50**

Course Outcomes: At the end of the Course, the Student will be able to:

20CSE654.1	Identify and explore the advantages of agents and design the architecture for an agent
20CSE654.2	Analyze the agent in details in a view for the implementation
20CSE654.3	Analyze communicative actions with agents.
20CSE654.4	Analyze typical agents using a tool for different types of applications
20CSE654.5	Develop agents using agent-oriented programming for the societal benefits
20CSE654.6	Analyze the working of mobile Agents for the betterment of society.

Mapping of Course Outcomes to Program Outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE654.1	3	3	-	-	-	-	-	-	-	-	-	-
20CSE654.2	-	3	3	3	-	-	-	-	3	-	-	-
20CSE654.3	-	3	3	3	3	-	-	-	3	3	3	-
20CSE654.4	-	3	3	3	3	-	-	-	3	3	3	-
20CSE654.5	-	3	3	3	3	2	-	2	3	3	3	-
20CSE654.6	-	3	3	3	3	2	-	2	3	3	3	-

Module No	Module Contents	Hours	Cos
1	**An introduction to Software Agents:** What are software agents, why software agents, Simplifying Computing, Barriers to Intelligent Interoperability, Incorporating Agents as Resource Managers, Overcoming user Interface Problems, Toward Agent-Enabled System Architectures. Agents: From Direct Manipulation to Delegation Introduction, Intelligent Interfaces, Digital Butlers, Personal Filters, Digital sisters-in-Law, Artificial Intelligence, Decentralization, Why Linking works, The Theatrical Metaphor, Conclusion: Direct Manipulation and Digital Butlers, Acknowledgments. Interfaces Agents Metaphors with Character Introduction, Objections to Agents, In Defense of Anthropomorphism, Key Characteristics of Interface Agents, Agency, Responsiveness, Competence, Accessibility, Design and Dramatic Character, An R & D Agenda.	**9**	**CO1**
2	**Designing Agents:** Adaptive Functionality: Three Design Issues, The Agent Metaphor: Reactions and Expectations the Agent Conceptual Model. Direct Manipulation versus Agents: Paths to Predict able, Controllable, and Comprehensible Interfaces: Introduction, General Concerns About Intelligent Interfaces, Learning from History, What Is an Agent? Looking at the Components, Realizing a New Vision, Tree Maps, Dynamic Queries, Back to a Scientific Approach, Acknowledgements. Agents for Information Sharing and Coordination: A History and some Reflections: Information, Lens: An Intelligent Tool for Managing Electronic Messages, Semiformal	**9**	**CO2**

	Systems and Radical Tailor ability, Oval: A Radically Tailorable Tool for InformationManagementandCooperative Work, Examples of Application and Agents in Oval.		
3	**Agents that Reduce Work and Information Overload:** Introduction, Approaches to Building Agents, Training a Personal Digital Assistant, Some Example of Existing Agents, Electronic Mail Agents, Meeting Scheduling Agent, News Filtering Agent, Entertainment Selection Agent, Discussion, Acknowledgements **Software Agents for Cooperative Learning:** DevelopinganExample.	**9**	**CO3**
4	**An Overview of Agent-Oriented Programming:** Agent-Oriented Programming: Software with Mental State, Two Scenarios, On the Mental state of agents, Generic Agent Interpreter, AGENT- 0: A Simple Language and its Interpreter, KQML as an Agent Communication Language: The approach of knowledge sharing effort(KSE), The Solution of the knowledge sharing efforts, knowledge Query Manipulation Language (KQML),Implementation, Application of KQML , Other Communication Language, The Approach of Knowledge-Sharing Effect,(KSE),The Solutions of the Sharing Effect.	**9**	**CO4, CO5**
5	**Agent for Information Gathering:** Agent Organization, The Knowledge of an Agent, TheDomain Model of an Agent, Modeling other Agent, communication language and protocol, query processing, an information goal, information source selection, generating a query access plan, interleaving planning and execution , semantic query optimization, learning, caching retrieved data, related work, discursion, acknowledgement. Mobile Agents: Enabling Mobile Agents, Programming Mobile Agents, Using Mobile Agents.	**9**	**CO6**

Text Books:

1) Jeffrey M. Bradshaw "Software Agents" PHI (MIT Press)– 2012

Reference Books:

1)Developing Intelligent Agent Systems: A Practical Guide by Lin Padgham and MichaelWinikoff, JohnWiley & sons Publication 2004.

2)Agent-Based and Individual Based modeling: A Practical Introduction by Steven F. Rails Back and Volker Grimm, Princeton University Press, 2012

CIE – Continuous Internal Evaluation: Theory (50 Marks)

Blooms Taxonomy	Tests	Assignments	Quizzes	Co-Curricular	Other
Marks (Out of 50)	**25**	**10**	**5**	**10**	
L1: Remember	-	-	-	-	-
L2: Understand	5	-	-	-	-
L3: Apply	10	-	2.5	-	-
L4: Analyze	5	5	2.5	5	-
L5: Evaluate	5	5	-	5	-
L6: Create	-	-	-	-	-

SEE – Semester End Examination: Theory (50 Marks)

Blooms Taxonomy	Marks (Out of 50)
L1: Remember	5
L2: Understand	10
L3: Apply	10
L4: Analyze	10
L5: Evaluate	10
L6: Create	5

ADVANCED JAVA

Course Code	**: 20CSE655**	**Credits**	**: 03**
L: T:P:S	**: 3:0:0:0**	**CIE Marks**	**: 50**
Exam Hours	**: 3**	**SEE Marks**	**: 50**

Course Outcomes: At the end of the Course, the Student will be able to

20CSE655.1	To understand the Servlets concepts for building dynamic web pages by reducing the code complexity
20CSE655.2	Demonstrating JSP architecture which is used in dynamic web-based applications.
20CSE655.3	To Examine the concepts of Remote Method Invocation and JMS for server/client communication.
20CSE655.4	To infer the Java networking basics in terms of TCP/IP sockets.
20CSE655.5	Understanding the use of Enterprise Java beans in construction of enterprise software.

Mapping of Course Outcomes to Program Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSE655.1	3	3	-	-	1	-	1	-	-	-	3	2
20CSE655.2	3	3	-	-	1	-	1	-	-	-	3	2
20CSE655.3	3	3	2	2	1	-	1	-	-	-	3	2
20CSE655.4	3	3	2	2	1	-	1	-	-	-	3	2
20CSE655.5	3	31	-	-	-	-	1	-	-	-	3	2

Module	Module Contents	COs	Hours
1	**Servlets**: The Life Cycle of a Servlet,A Simple Servlet, The Servlet API, The javax. servlet Package, Reading Servlet Parameters, The javax. servlet. http Package,Handling HTTP Requests and Responses,Using Cookies,Session Tracking,	**CO1**	**9**
2	**Java Server Pages:** JSP, Installation,JSP tags, Variables and Objects, Methods, Control Statements, Loops, Request String, Parsing other information, User Sessions, Cookies, Session Objects.	**CO2**	**9**
3	**Remote Method Invocation:** Remote method invocation concept, Remo interface, Passing objects, RMI Process, Server Side, Client side, **Java Message Service:** Messaging service, MS, JMS fundamentals, flexibilit Components of JMS Program, Acknowledgement mode, Messag transactions, Message Producer, Consume, Listener, Messages, Sending ar receiving messages to/from a Queue.	**CO3**	**9**
4	**Networking**: Networking Basics, The Networking Classes and Interfaces, InetAddress, TCP/IP Client Sockets, URL, URL Connection, HttpURLConnection, TCP/IP Server Sockets, Datagrams.	**CO4**	**8**
5	**Enterprise Java Beans**: The EJB Container, EJB Classes, EJB Interfaces, Deployment descriptors, the anotomy of a Deployment Descriptor, Environmental elements, Referencing EJB, Security elements, Query elements, Relationship elements, Transaction elements, Session Java bean, Entity Java bean, Message Driven bean, The JAR file.	**CO5**	**9**

Text Books:

1. The Complete Reference: Java; Herbert Schildt; McGraw Hill Education; Ninth Edition
2. The Complete Reference: J2EE; Jim Keogh; McGraw Hill Education; First Edition

Reference books:

1. Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2nd Edition, Pearson Education, 2004

CIE- Continuous Internal Evaluation (50Marks)

Bloom's Category	**Tests**	**Assignments**	**Quizzes**	**Co Curricular**
Marks (out of 50)	**25**	**10**	**5**	**10**
Remember	-	-	-	-
Understand	10	-	-	-
Apply	5	5	2.5	5
Analyze	5	5	2.5	5
Evaluate	-	-	-	-
Create	5	-	-	-

SEE- Semester End Examination: Theory (50 Marks)

Bloom's Category	**Tests**
Remember	5
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	5

WEB FRAMEWORKS AND TECHNOLOGIES LAB

Course Code	**: 20CSL66**	**Credits**	**: 1.5**
L: T:P:S	**: 0:0:1.5:0**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

Course Outcomes: At the end of the Course, the Student will be able to

20CSL66.1	Identify various HTML tags and use them to develop the user-friendly web pages.
20CSL66.2	Create web pages at various levels to provide the different styles the CSS with its types and use them to
20CSL66.3	Create dynamic web pages using JavaScript and XML
20CSL66.4	Design dynamic web pages using PHP with MySQL database connectivity.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSL66.1	3	3	-	-	3	-	-	-	3	-	-	-
20CSL66.2	3	3	3	1	3	-	-	2	3	-	2	3
20CSL66.3	3	3	3	1	3	-	-	2	3	-	2	3
20CSL66.4	3	3	3	1	3	-	-	2	3	-	2	3

Exp. No	Experiment	Hours	Cos
1	Design LOGIN PAGE using HTML tags: Login page must contain Login field, Password field, Submit and reset buttons.	**2**	**CO1**
2	Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below). Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame. Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.	**3**	**CO1**
3	Design CATALOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following: 1. Snap shot of Cover Page. 2. Author Name. 3. Publisher. 4. Price. 5. Add to cart button.	**2**	**CO1**
4	Design a web page using CSS (Cascading Style Sheets) which includes the following: A. Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles. B. Set a background image for both the page and single elements on the page. Control the repetition of the image with the background-repeat property.	**3**	**CO2**
5	Write an HTML page that contains a selection box with a list of 5 countries In the above page when the user selects a country, its capital should be printed next to the list, and add CSS to customize the properties of the font of the capital.	**3**	**CO2**

6	Write an HTML page including java script that takes a given set of integer numbers and shows them after sorting in descending order.	**3**	**CO2**
7	Design an XML document to store information about Airline system which has the information airline number, Name, destination, year of manufacturing, price. Create sample data three airlines. Create CSS style sheet and display it.	**3**	**CO3**
8	Design an XML document to store information about patients in a hospital. Information about patients must include name (in 3 parts, first name, middle name, last name), age, room number, primary insurance company – including member identification number, group number, known medical problems, and known drug allergies. Both attributes and nested tags must be included. Create a CSS style sheet for the above XML document and use it to create a display of that document.	**3**	**CO3**
9	Create the XSLT style sheet to format all the patient elements of the XML, document of exercise 3 and use it to create a display of whole element.	**3**	**CO3**
10	Write PHP program to find transpose of a matrix and addition of two matrix	**-**	**CO4**
11	Develop PHP program to find page HITS (Number of times page visited) and to display the count	**3**	**CO4**
12	Create database using MySQL command to perform manipulation operations	**3**	**CO4**

Reference Material(s):

1. Developing Web Applications, Ralph Moseley and M. T. Savaliya, Wiley-India
2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", 1st Edition, Pearson Education India. (ISBN:978-9332575271)
3. Web Technologies, Black Book, dreamtech Press
4. Web Design, Joel Sklar, Cengage Learning
5. Developing Web Applications in PHP and AJAX, Harwani, McGrawHill

CIE – Continuous Internal Evaluation: LAB (25 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**25**
L1: Remember	-
L2: Understand	-
L3: Apply	10
L4: Analyze	5
L5: Evaluate	-
L6: Create	10

SEE – Semester End Examination: LAB (25 Marks)

Blooms Taxonomy	**Marks(Out of 50)**
L1: Remember	-
L2: Understand	-
L3: Apply	20
L4: Analyze	10
L5: Evaluate	-
L6: Create	20

Computer Networks Lab

Course Code : 20CSL67 | **Credits : 1.5**
L: T:P:S : 0:0:1.5:0 | **CIE Marks: 25**
Exam Hours : 3 | **SEE Marks: 25**

Course Outcomes: At the end of the Course, the Student will be able to

20CSL67.1	Implement the functionalities of Data Link Layer protocols
20CSL67.2	Create the socket programming interface for client server programming
20CSL67.3	Develop congestion control algorithm for networks
20CSL67.4	Design and develop efficient routing algorithms
20CSL67.5	Implement the cryptographic algorithms for network security
20CSL67.6	Evaluate the performance of Network Protocols.

Mapping of Course Outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
20CSL67.1	3	3	3	3	3	3	-	3	3	3	-	3
20CSL67.2	3	3	3	3	3	3	-	3	3	3	-	3
20CSL67.3	3	3	3	3	3	3	-	3	3	3	-	3
20CSL67.4	3	3	3	3	3	3	-	3	3	3	-	3
20CSL67.5	3	3	3	3	3	3	-	3	3	3	-	3
20CSL67.6	3	3	3	3	3	3	-	3	3	3	-	3

Exp. No	Experiment	Hours	CO
1	Write a program for error detecting code-using CRC-CCITT (16-bits).	**3**	**CO1**
2	Write a program to implement Go/Back N and Selective repeat sliding window protocol.	**3**	**CO1**
3	Write a program for implementation of stop and wait.	**3**	**CO1**
4	Using TCP/IP Sockets, write a client-serverprogram to make client sending the file nameand the server to send back the contents of the requested file if present.	**3**	**CO2**
5	Design, develop, and execute a program in C under UNIX / LINUX environment to implement a simple echo server and demonstrate its working. Both the server and client are to be connectionless and use UDP. The system works as follows: Client reads a line from the standard input and writes the line to the server; the server reads a line from its network input and echoes the line back to the client; the client reads the echoed line and prints it on its standard output.	**3**	**CO2**
6	Write a program for Congestion control using the leaky bucket algorithm	**3**	**CO3**
7	Write a program for Distance Vector Algorithm to find suitable path for transmission.	**3**	**CO4**
8	Write a program for Link State Algorithm to find suitable path for transmission	**3**	**CO4**
9	Write a program for encryption and decryption using RSA algorithm.	**3**	**CO5**
10	Write a program to implement Diffie Hellman Key exchange.	**3**	**CO5**
11	a) Simulate Capturing and analyzing Ethernet frames. b) Simulate HTTP GET/POST interaction	**3**	**CO6**

	c) Simulate capturing a bulk TCP transfer from your computer to a remote server.		
12	Simulate a) Analysis of ICMP and PING messages b) Analysis of ICMP and Trace route	**3**	**CO6**

CIE – Continuous Internal Evaluation: Lab (25 Marks)

Blooms Taxonomy	**Tests**
Marks (Out of 25)	**25**
L1: Remember	-
L2: Understand	-
L3: Apply	-
L4: Analyze	-
L5: Evaluate	25
L6: Create	-

SEE – Semester End Examination: Lab (25 Marks)

Blooms Taxonomy	**Marks (Out of 50)**
L1: Remember	10
L2: Understand	-
L3: Apply	20
L4: Analyze	-
L5: Evaluate	20
L6: Create	-

MINI PROJECT IN WEB FRAME WORKS OR OPERATING SYSTEM

Course Code	**: 20CSE68**	**Credits**	**: 02**
L: T:P:S	**: 0:0:2:0**	**CIE Marks**	**: 25**
Exam Hours	**: 3**	**SEE Marks**	**: 25**

The student shall be capable of identifying a problem related to the field of Computer Science and carry out a mini project on the problem defined. Each student expected to do the mini project individually. The code developed the project will be reviewed by a panel of experts during the course of the semester. Plagiarized projects will automatically get an **"F" GRADE** and the student will be liable for further disciplinary action. At the completion of a project the student will submit a project report, which will be evaluated by duly appointed examiner(s).

Sample Mini Project includes:

1) Enterprises
2) Transport
3) Health care
4) Education,
5) File System
6) I/O Driver etc.

CIE- Continuous Internal Evaluation (25 Marks)

Bloom's Category	Marks
Marks (out of 25)	
Remember	-
Understand	-
Apply	-
Analyze	-
Evaluate	25
Create	-

SEE – Semester End Examination (25 Marks)

Bloom's Category	Marks
Marks (out of 25)	
Remember	-
Understand	-
Apply	-
Analyze	-
Evaluate	25
Create	-