

EASWARI ENGINEERING COLLEGE

(Autonomous)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

REGULATION 2017

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

PEO1	Graduates will possess the ability to think logically and have capacity to understand technical problems and to design optimal solutions for a successful career in industry, academia and research.
PEO2	Graduates will have foundation in mathematical, scientific and computer science and engineering fundamentals necessary to formulate, analyze and solve engineering problems.
PEO3	Graduates will have the potential to apply their expertise and current technologies across multiple disciplines to solve real world challenges and research issues.
PEO4	Graduates will have the ability to work as a team and will be able to promote the design and implementation of products and services with an understanding of its impact on economical, environmental, ethical, and societal considerations through their strong interpersonal skills, leadership quality and entrepreneurial skills.
PEO5	Graduates will possess an urge to learn continuously and to be responsive to the demands of the progressive industrial world by carrying out researches in frontier areas of computer science and engineering.

PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.
2. To apply software engineering principles and practices for developing quality software for scientific and business applications.
3. To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Contribution 1: Reasonable 2: Significant

SEMESTER I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
PRACTICALS								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
TOTAL				31	19	0	12	25

SEMESTER II

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8252	Physics for Information Science	BS	3	3	0	0	3
4.	BE8255	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	CS8251	Programming in C	PC	3	3	0	0	3
PRACTICALS								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	CS8261	C Programming Laboratory	PC	4	0	0	4	2
TOTAL				28	20	0	8	24

SEMESTER III

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8351	Discrete Mathematics	BS	4	4	0	0	4
2.	CS8351	Digital Principles and System Design	ES	4	4	0	0	4
3.	CS8391	Data Structures	PC	3	3	0	0	3
4.	CS8392	Object Oriented Programming	PC	3	3	0	0	3
5.	EC8395	Communication Engineering	ES	3	3	0	0	3
PRACTICALS								
6.	CS8381	Data Structures Laboratory	PC	4	0	0	4	2
7.	CS8383	Object Oriented Programming Laboratory	PC	4	0	0	4	2
8.	CS8382	Digital Systems Laboratory	ES	4	0	0	4	2
9.	HS8381	Interpersonal Skills/ Listening & Speaking	EEC	2	0	0	2	1
TOTAL				31	17	0	14	24

SEMESTER IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8402	Probability and Queueing Theory	BS	4	4	0	0	4
2.	CS8491	Computer Architecture	PC	3	3	0	0	3
3.	CS8492	Database Management Systems	PC	3	3	0	0	3
4.	CS8451	Design and Analysis of Algorithms	PC	3	3	0	0	3
5.	CS8493	Operating Systems	PC	3	3	0	0	3
6.	CS8494	Software Engineering	PC	3	3	0	0	3
PRACTICALS								
7.	CS8481	Database Management Systems Laboratory	PC	4	0	0	4	2
8.	CS8461	Operating Systems Laboratory	PC	4	0	0	4	2
9.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
TOTAL				29	19	0	10	24

SEMESTER V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MA8551	Algebra and Number Theory	BS	4	4	0	0	4
2.	CS8591	Computer Networks	PC	3	3	0	0	3
3.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
4.	CS8501	Theory of Computation	PC	3	3	0	0	3
5.	CS8592	Object Oriented Analysis and Design	PC	3	3	0	0	3
6.		Open Elective I	OE	3	3	0	0	3
PRACTICALS								
7.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
8.	CS8582	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	2
9.	CS8581	Networks Laboratory	PC	4	0	0	4	2
TOTAL				31	19	0	12	25

SEMESTER VI

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	CS8651	Internet Programming	PC	3	3	0	0	3
2.	CS8691	Artificial Intelligence	PC	3	3	0	0	3
3.	CS8601	Mobile Computing	PC	3	3	0	0	3
4.	CS8602	Compiler Design	PC	5	3	0	2	4
5.	CS8603	Distributed Systems	PC	3	3	0	0	3
6.		Professional Elective I	PE	3	3	0	0	3
PRACTICALS								
7.	CS8661	Internet Programming Laboratory	PC	4	0	0	4	2
8.	CS8662	Mobile Application Development Laboratory	PC	4	0	0	4	2
9.	CS8611	Mini Project	EEC	2	0	0	2	1
10.	HS8581	Professional Communication	EEC	2	0	0	2	1
TOTAL				32	18	0	14	25

SEMESTER VII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.	MG8591	Principles of Management	HS	3	3	0	0	3
2.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
3.	CS8791	Cloud Computing	PC	3	3	0	0	3
4.		Open Elective II	OE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Professional Elective III	PE	3	3	0	0	3
PRACTICALS								
7.	CS8711	Cloud Computing Laboratory	PC	4	0	0	4	2
8.	IT8761	Security Laboratory	PC	4	0	0	4	2
TOTAL				26	18	0	8	22

SEMESTER VIII

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
THEORY								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
PRACTICALS								
3.	CS8811	Project Work	EEC	20	0	0	20	10
TOTAL				26	6	0	20	16

TOTAL NO. OF CREDITS: 185

HUMANITIES AND SOCIAL SCIENCES (HS)

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	HS8251	Technical English	HS	4	4	0	0	4
3.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
4.	MG8591	Principles of Management	HS	3	3	0	0	3

BASIC SCIENCES (BS)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	MA8151	Engineering Mathematics I	BS	4	4	0	0	4
2.	PH8151	Engineering Physics	BS	3	3	0	0	3
3.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
4.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
5.	MA8251	Engineering Mathematics II	BS	4	4	0	0	4
6.	PH8252	Physics for Information Science	BS	3	3	0	0	3
7.	MA8351	Discrete Mathematics	BS	4	4	0	0	4
8.	MA8402	Probability and Queueing Theory	BS	4	4	0	0	4
9.	MA8551	Algebra and Number Theory	BS	4	4	0	0	4

ENGINEERING SCIENCES (ES)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
2.	GE8152	Engineering Graphics	ES	6	2	0	4	4
3.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
4.	BE8255	Basic Electrical, Electronics and Measurement Engineering	ES	3	3	0	0	3
5.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
6.	CS8351	Digital Principles and System Design	ES	4	4	0	0	4
7.	EC8395	Communication Engineering	ES	3	3	0	0	3
8.	CS8382	Digital Systems Laboratory	ES	4	0	0	4	2

PROFESSIONAL CORE (PC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8251	Programming in C	PC	3	3	0	0	3
2.	CS8261	C Programming Laboratory	PC	4	0	0	4	2
3.	CS8391	Data Structures	PC	3	3	0	0	3
4.	CS8392	Object Oriented Programming	PC	3	3	0	0	3
5.	CS8381	Data Structures Laboratory	PC	4	0	0	4	2
6.	CS8383	Object Oriented Programming Laboratory	PC	4	0	0	4	2
7.	CS8491	Computer Architecture	PC	3	3	0	0	3
8.	CS8492	Database Management Systems	PC	3	3	0	0	3
9.	CS8451	Design and Analysis of Algorithms	PC	3	3	0	0	3
10.	CS8493	Operating Systems	PC	3	3	0	0	3
11.	CS8494	Software Engineering	PC	3	3	0	0	3
12.	CS8481	Database Management Systems Laboratory	PC	4	0	0	4	2
13.	CS8461	Operating Systems Laboratory	PC	4	0	0	4	2
14.	CS8591	Computer Networks	PC	3	3	0	0	3
15.	EC8691	Microprocessors and Microcontrollers	PC	3	3	0	0	3
16.	CS8501	Theory of Computation	PC	3	3	0	0	3
17.	CS8592	Object Oriented Analysis and Design	PC	3	3	0	0	3
18.	EC8681	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
19.	CS8582	Object Oriented Analysis and Design Laboratory	PC	4	0	0	4	2
20.	CS8581	Networks Laboratory	PC	4	0	0	4	2
21.	CS8651	Internet Programming	PC	3	3	0	0	3
22.	CS8691	Artificial Intelligence	PC	3	3	0	0	3
23.	CS8601	Mobile Computing	PC	3	3	0	0	3
24.	CS8602	Compiler Design	PC	5	3	0	2	4
25.	CS8603	Distributed Systems	PC	3	3	0	0	3
26.	CS8661	Internet Programming Laboratory	PC	4	0	0	4	2
27.	CS8662	Mobile Application Development Laboratory	PC	4	0	0	4	2
28.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
29.	CS8791	Cloud Computing	PC	3	3	0	0	3
30.	CS8711	Cloud Computing Laboratory	PC	4	0	0	4	2
31.	IT8761	Security Laboratory	PC	4	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

SEMESTER VI

ELECTIVE – I

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8075	Data Warehousing and Data Mining	PE	3	3	0	0	3
2.	IT8076	Software Testing	PE	3	3	0	0	3
3.	IT8072	Embedded Systems	PE	3	3	0	0	3
4.	CS8072	Agile Methodologies	PE	3	3	0	0	3
5.	CS8077	Graph Theory and Applications-	PE	3	3	0	0	3
6.	IT8071	Digital Signal Processing	PE	3	3	0	0	3
7.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

SEMESTER VII

ELECTIVE – II

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8091	Big Data Analytics	PE	3	3	0	0	3
2.	CS8082	Machine Learning Techniques	PE	3	3	0	0	3
3.	CS8092	Computer Graphics and Multimedia	PE	3	3	0	0	3
4.	IT8075	Software Project Management	PE	3	3	0	0	3
5.	CS8081	Internet of Things	PE	3	3	0	0	3
6.	IT8074	Service Oriented Architecture	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

SEMESTER VII

ELECTIVE – III

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8083	Multi-core Architectures and Programming	PE	3	3	0	0	3
2.	CS8079	Human Computer Interaction	PE	3	3	0	0	3
3.	CS8073	C# and .Net Programming	PE	3	3	0	0	3
4.	CS8088	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
5.	CS8071	Advanced Topics on Databases	PE	3	3	0	0	3

6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
7.	GE8074	Human Rights	PE	3	3	0	0	3
8.	GE8071	Disaster Management	PE	3	3	0	0	3

SEMESTER VIII

ELECTIVE – IV

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	EC8093	Digital Image Processing	PE	3	3	0	0	3
2.	CS8085	Social Network Analysis	PE	3	3	0	0	3
3.	IT8073	Information Security	PE	3	3	0	0	3
4.	CS8087	Software Defined Networks	PE	3	3	0	0	3
5.	CS8074	Cyber Forensics	PE	3	3	0	0	3
6.	CS8086	Soft Computing	PE	3	3	0	0	3
7.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

SEMESTER VIII

ELECTIVE – V

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8080	Information Retrieval Techniques	PE	3	3	0	0	3
2.	CS8078	Green Computing	PE	3	3	0	0	3
3.	CS8076	GPU Architecture and Programming	PE	3	3	0	0	3
4.	CS8084	Natural Language Processing	PE	3	3	0	0	3
5.	CS8001	Parallel Algorithms	PE	3	3	0	0	3
6.	IT8077	Speech Processing	PE	3	3	0	0	3
7.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	HS8381	Interpersonal Skills/Listening & Speaking	EEC	2	0	0	2	1
2.	HS8461	Advanced Reading and Writing	EEC	2	0	0	2	1
3.	CS8611	Mini Project	EEC	2	0	0	2	1
4.	HS8581	Professional Communication	EEC	2	0	0	2	1
5.	CS8811	Project Work	EEC	20	0	0	20	10

OBJECTIVES:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.
- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.
- To understand the basic concepts of combinatorics and graph theory.
- To familiarize the applications of algebraic structures.
- To understand the concepts and significance of lattices and boolean algebra which are widely used in computer science and engineering.

UNIT I LOGIC AND PROOFS**12**

Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference - Introduction to proofs – Proof methods and strategy.

UNIT II COMBINATORICS**12**

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT III GRAPHS**12**

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES**12**

Algebraic systems – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA**12**

Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

TOTAL: 60 PERIODS**TEXTBOOKS:**

1. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.
2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

REFERENCES:

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.
2. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw HillPub. Co. Ltd., New Delhi, 3rd Edition, 2010.
3. Koshy, T. "Discrete Mathematics with Applications", Elsevier Publications, 2006.

COURSE OUTCOMES

MA8351.1	The students develop the ability to think abstractly. This means learning to use logically valid forms of argument and avoid common logical errors.
MA8351.2	The students able to think recursively means to address a problem by assuming that similar problems of a smaller nature have already been solved and figuring out how to put those solutions together to solve the larger problem. Such thinking is widely used in the analysis of algorithms.
MA8351.3	The students will acquire Graph theoretical ideas which are highly useful in computer science applications such as data mining, image capturing, networking etc.,
MA8351.4	The study of Groups and fields will make the students to use these concepts extensively in coding theory.
MA8351.5	The students will have sound knowledge in lattices which have widely applied in number theory and group theory.
MA8351.6	This subject has equipped the students to have basic knowledge and understanding in ability to think abstractly, the fields of analysis of algorithms, Graph theoretical ideas, group theory.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MA8351.1	3	3	2	2	2	-	-	-	2	1	-	1
MA8351.2	3	2	1	2	-	-	-	-	2	1	-	2
MA8351.3	3	2	3	-	2	-	1	-	2	1	-	-
MA8351.4	3	2	1	2	1	1	-	-	2	1	-	-
MA8351.5	3	2	1	-	1	-	-	-	2	1	-	-
MA8351.6	3	3	1	2	2	1	-	-	2	1	-	1
MA8351	3	3	3	2	2	1	1	-	2	1	-	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
MA8351.1	3	2	2
MA8351.2	2	1	1
MA8351.3	2	2	2
MA8351.4	3	2	1

REFERENCES:

1. G. K. Kharate, Digital Electronics, Oxford University Press, 2010
2. John F. Wakerly, Digital Design Principles and Practices, Fifth Edition, Pearson Education, 2017.
3. Charles H. Roth Jr, Larry L. Kinney, Fundamentals of Logic Design, Sixth Edition, CENGAGE Learning, 2013
4. Donald D. Givone, Digital Principles and Design, Tata Mc Graw Hill, 2003.

COURSE OUTCOMES

CS8351.1	Simplify the Boolean expressions using different methods.
CS8351.2	Design and implement combinational logic circuits.
CS8351.3	Design and implement sequential logic 33circuits.
CS8351.4	Design and implement synchronous and asynchronous sequential circuits.
CS8351.5	Write simple HDL codes for the logic circuits.
CS8351.6	Apply the concepts of logic circuits in real time applications.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8351.1	3	2	1	1	-	-	-	-	-	-	-	-
CS8351.2	3	3	2	1	-	-	-	-	-	-	-	-
CS8351.3	3	3	3	2	-	-	-	-	-	-	-	-
CS8351.4	3	3	3	2	-	-	-	-	-	-	-	-
CS8351.5	3	2	1	2	1	-	-	-	-	-	-	-
CS8351.6	3	2	3	2	-	-	-	-	-	1	-	1
CS8351	3	3	3	2	1	-	-	-	-	1	-	1

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8351.1	3	-	1
CS8351.2	3	-	2
CS8351.3	3	-	2
CS8351.4	3	-	3
CS8351.5	3	1	3
CS8351.6	2	1	3
CS8351	3	1	3

CS8391**DATA STRUCTURES****L T P C
3 0 0 3****OBJECTIVES:**

- To understand the concepts of ADTs
- To Learn linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structures

UNIT I LINEAR DATA STRUCTURES – LIST**9**

Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation – singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal).

UNIT II LINEAR DATA STRUCTURES – STACKS, QUEUES**9**

Stack ADT – Operations - Applications - Evaluating arithmetic expressions- Conversion of Infix to postfix expression - Queue ADT – Operations - Circular Queue – Priority Queue - deQueue – applications of queues.

UNIT III NON LINEAR DATA STRUCTURES – TREES**9**

Tree ADT – tree traversals - Binary Tree ADT – expression trees – applications of trees – binary search tree ADT –Threaded Binary Trees- AVL Trees – B-Tree - B+ Tree - Heap – Applications of heap.

UNIT IV NON LINEAR DATA STRUCTURES - GRAPHS**9**

Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.

UNIT V SEARCHING, SORTING AND HASHING TECHNIQUES**9**

Searching- Linear Search - Binary Search. Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education, 1997.
2. Reema Thareja, “Data Structures Using C”, Second Edition , Oxford University Press, 2011

REFERENCES:

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.
2. Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education, 1983.
3. Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
4. Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008.

COURSE OUTCOMES

CS8391.1	Strong foundation and knowledge in ADTs
CS8391.2	Implement abstract data types for linear data structures.
CS8391.3	Apply the different linear and non-linear data structures to problem solutions.
CS8391.4	Critically analyze the various sorting algorithms.
CS8391.5	Design of various linear and non-linear data structures in programming concepts

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8391.1	3	3	1	2	2	-	-	-	1	-	-	-
CS8391.2	3	2	2	1	2	-	-	-	2	-	-	-
CS8391.3	3	3	1	2	1	-	-	-	1	-	-	-
CS8391.4	2	2	2	3	3	-	-	-	1	-	-	-
CS8391.5	3	3	3	2	3	-	-	-	2	-	-	-
CS8391	3	3	3	3	3	-	-	-	2	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8391.1	2	1	1
CS8391.2	2	2	1
CS8391.3	3	1	1
CS8391.4	2	2	1
CS8391.5	2	2	1
CS8391	2	2	1

CS8392

OBJECT ORIENTED PROGRAMMING

L T P C

3 0 0 3

OBJECTIVES:

- To understand Object Oriented Programming concepts and basic characteristics of Java
- To know the principles of packages, inheritance and interfaces
- To define exceptions and use I/O streams
- To develop a java application with threads and generics classes
- To design and build simple Graphical User Interfaces

UNIT I INTRODUCTION TO OOP AND JAVA FUNDAMENTALS 10

Object Oriented Programming - Abstraction – objects and classes - Encapsulation- Inheritance - Polymorphism- OOP in Java – Characteristics of Java – The Java Environment - Java Source File -Structure – Compilation. Fundamental Programming Structures in Java – Defining classes in Java – constructors, methods -access specifiers - static members -Comments, Data Types, Variables, Operators, Control Flow, Arrays , Packages - JavaDoc comments.

UNIT II INHERITANCE AND INTERFACES 9

Inheritance – Super classes- sub classes –Protected members – constructors in sub classes- the Object class – abstract classes and methods- final methods and classes – Interfaces – defining an interface, implementing interface, differences between classes and interfaces and extending interfaces - Object cloning -inner classes, Array Lists - Strings

UNIT III EXCEPTION HANDLING AND I/O 9

Exceptions - exception hierarchy - throwing and catching exceptions – built-in exceptions, creating own exceptions, Stack Trace Elements. Input / Output Basics – Streams – Byte streams and Character streams – Reading and Writing Console – Reading and Writing Files

UNIT IV MULTITHREADING AND GENERIC PROGRAMMING 8

Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups. Generic Programming – Generic classes – generic methods – Bounded Types – Restrictions and Limitations.

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8392.1	3	2	--
CS8392.2	3	2	--
CS8392.3	3	2	--
CS8392.4	3	2	--
CS8392.5	3	2	--
CS8392	3	2	--

EC8395**COMMUNICATION ENGINEERING****L T P C****3 0 0 3****OBJECTIVES:**

- To introduce the relevance of this course to the existing technology through demonstrations, case studies, simulations, contributions of scientist, national/international policies with a futuristic vision along with socio-economic impact and issues
- To study the various analog and digital modulation techniques
- To study the principles behind information theory and coding
- To study the various digital communication techniques

UNIT I ANALOG MODULATION**9**

Amplitude Modulation – AM, DSBSC, SSBSC, VSB – PSD, modulators and demodulators – Angle modulation – PM and FM – PSD, modulators and demodulators – Super heterodyne receivers

UNIT II PULSE MODULATION**9**

Low pass sampling theorem – Quantization – PAM – Line coding – PCM, DPCM, DM, and ADPCM And ADM, Channel Vocoder - Time Division Multiplexing, Frequency Division Multiplexing

UNIT III DIGITAL MODULATION AND TRANSMISSION**9**

Phase shift keying – BPSK, DPSK, QPSK – Principles of M-ary signaling M-ary PSK & QAM – Comparison, ISI – Pulse shaping – Duo binary encoding – Cosine filters – Eye pattern, equalizers

UNIT IV INFORMATION THEORY AND CODING**9**

Measure of information – Entropy – Source coding theorem – Shannon–Fano coding, Huffman Coding, LZ Coding – Channel capacity – Shannon-Hartley law – Shannon's limit – Error control codes – Cyclic codes, Syndrome calculation – Convolution Coding, Sequential and Viterbi decoding

UNIT V SPREAD SPECTRUM AND MULTIPLE ACCESS**9**

PN sequences – properties – m-sequence – DSSS – Processing gain, Jamming – FHSS – Synchronisation and tracking – Multiple Access – FDMA, TDMA, CDMA

TOTAL: 45 PERIODS

TEXT BOOKS:

1. H Taub, D L Schilling, G Saha, "Principles of Communication Systems" 3/e, TMH 2007
2. S. Haykin "Digital Communications" John Wiley 2005

REFERENCES:

1. B.P.Lathi, "Modern Digital and Analog Communication Systems", 3rd edition, OxfordUniversity Press, 2007
2. H P Hsu, Schaum Outline Series – "Analog and Digital Communications" TMH 2006
3. B.Sklar, Digital Communications Fundamentals and Applications" 2/e Pearson Education 2007.

COURSE OUTCOMES

EC8395.1	Ability to comprehend and appreciate the significance and role of this course in the present contemporary World.
EC8395.2	Apply analog and digital communication techniques.
EC8395.3	Use data and pulse communication techniques.
EC8395.4	Analyze Source and Error control coding.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC8395.1	3	3	3	3	-	-	-	-	-	-	-	-
EC8395.2	3	3	3	3	-	-	-	-	-	-	-	-
EC8395.3	3	3	2	3	-	-	-	-	-	-	-	-
EC8395.4	3	3	3	3	-	-	-	-	-	-	-	-
EC8395	3	3	3	3	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
EC8395.1	1	-	3
EC8395.2	1	-	2
EC8395.3	1	-	3
EC8395.4	1	-	3
EC8395	1	-	3

OBJECTIVES

- To implement linear and non-linear data structures
- To understand the different operations of search trees
- To implement graph traversal algorithms
- To get familiarized to sorting and searching algorithms

LIST OF EXPERIMENTS

1. Array implementation of Stack and Queue ADTs
2. Array implementation of List ADT
3. Linked list implementation of List, Stack and Queue ADTs
4. Applications of List, Stack and Queue ADTs
5. Implementation of Binary Trees and operations of Binary Trees
6. Implementation of Binary Search Trees
7. Implementation of AVL Trees
8. Implementation of Heaps using Priority Queues.
9. Graph representation and Traversal algorithms
10. Applications of Graphs
11. Implementation of searching and sorting algorithms
12. Hashing – any two collision techniques

TOTAL: 60 PERIODS**COURSE OUTCOMES**

CS 8381.1	Students will be able to apply good programming design methods for program development.
CS 8381.2	Students will be able to develop recursive programs using trees and graphs.
CS 8381.3	Students will be able to design and implement C programs for manipulating stacks, queues, linked lists, trees, and graphs.
CS 8381.4	Students will be able to apply the different data structures to problem solutions.
CS 8381.5	Students will be able to Implement and analyze various searching and sorting algorithms.
CS 8381.6	Students will be able to develop software with teamwork in mind.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS 8381.1	1	3	1	2	2	-	-	-	1	-	-	-
CS 8381.2	2	2	2	1	2	-	-	-	2	-	-	-

CS 8381.3	2	3	1	2	1	-	-	-	1	-	-	-
CS 8381.4	2	2	2	3	3	-	-	-	1	-	-	-
CS 8381.5	2	3	3	2	3	-	-	-	2	-	-	-
CS 8381.6	3	3	2	2	2	-	-	-	1	-	-	1
CS8381	3	3	3	3	3	-	-	-	2	-	-	1

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS 8381.1	2	1	1
CS 8381.2	2	2	1
CS 8381.3	3	1	1
CS 8381.4	2	2	2
CS 8381.5	2	2	2
CS 8381.6	2	1	1
CS8381	3	2	2

CS8383

OBJECT ORIENTED PROGRAMMING LABORATORY

L T P C

0 0 4 2

OBJECTIVES

- To build software development skills using java programming for real-world applications.
- To understand and apply the concepts of classes, packages, interfaces, arraylist, exception handling and file processing.
- To develop applications using generic programming and event handling.

LIST OF EXPERIMENTS

1. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff. If the type of the EB connection is domestic, calculate the amount to be paid as follows:
 - First 100 units - Rs. 1 per unit
 - 101-200 units - Rs. 2.50 per unit

- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

2. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen to INR and vice versa), distance converter (meter to KM, miles to KM and vice versa) , time converter (hours to minutes, seconds and vice versa) using packages.
3. Develop a java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
4. Design a Java interface for ADT Stack. Implement this interface using array. Provide necessary exception handling in both the implementations.
5. Write a program to perform string operations using ArrayList. Write functions for the following
 - a. Append - add at end
 - b. Insert – add at particular index
 - c. Search
 - d. List all string starts with given letter
6. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
7. Write a Java program to implement user defined exception handling.
8. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.
9. Write a java program that implements a multi-threaded application that has three threads. First thread generates a random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.
10. Write a java program to find the maximum value from the given type of elements using a generic function.
11. Design a calculator using event-driven programming paradigm of Java with the following options.
 - a) Decimal manipulations
 - b) Scientific manipulations
12. Develop a mini project for any application using Java concepts.

TOTAL : 60 PERIODS

COURSE OUTCOMES

CS8383.1	Develop simple java programs that make use of classes and objects
CS8383.2	Construct java programs using predefined classes and packages.
CS8383.3	Make use of Inheritances and Interfaces to develop java application
CS8383.4	Model exception handling, multithreading, generic programming and file processing concepts in java
CS8383.5	Build java application for real-time problems using Event Handling

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8383.1	3	3	3	-	-	-	-	-	-	-	-	-
CS8383.2	3	3	3	-	-	-	-	-	-	-	-	-
CS8383.3	3	3	3	-	-	-	-	-	-	-	-	-
CS8383.4	3	3	3	-	-	-	-	-	-	-	-	-
CS8383.5	3	3	3	-	-	-	-	-	-	-	-	-
CS8383	3	3	3	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8383.1	3	2	-
CS8383.2	3	2	-
CS8383.3	3	2	-
CS8383.4	3	2	-
CS8383.5	3	2	-
CS8383	3	2	-

OBJECTIVES:

- To understand the various basic logic gates
- To design and implement the various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits
- To understand and code with HDL programming

LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates.
2. Design and implementation of combinational circuits using basic gates for arbitrary functions, code converters.
3. Design and implement Half/Full Adder and Subtractor.
4. Design and implement combinational circuits using MSI devices:
 - 4 – bit binary adder / subtractor
 - Parity generator / checker
 - Magnitude Comparator
 - Application using multiplexers
5. Design and implement shift-registers.
6. Design and implement synchronous counters.
7. Design and implement asynchronous counters.
8. Coding combinational circuits using HDL.
9. Coding sequential circuits using HDL.
10. Design and implementation of a simple digital system (Mini Project).

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:**LABORATORY REQUIREMENT FOR BATCH OF 30 STUDENTS HARDWARE:**

1. Digital trainer kits - 30
2. Digital ICs required for the experiments in sufficient numbers

SOFTWARE:

1. HDL simulator.

TOTAL : 60 PERIODS**COURSE OUTCOMES**

CS8382.1	Implement simplified combinational circuits using basic logic gates.
CS8382.2	Implement combinational circuits using MSI devices
CS8382.3	Implement sequential circuits like registers and counters
CS8382.4	Simulate combinational and sequential circuits using HDL

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8382.1	3	3	3	-	-	2	-	1	2	1	-	3
CS8382.2	3	3	3	-	-	2	-	1	2	1	-	3
CS8382.3	3	3	3	-	-	2	-	1	2	1	-	3
CS8382.4	3	2	3	-	-	1	-	1	2	1	-	3
CS8382	3	3	3	-	-	2	-	1	2	1	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8382.1	2	2	3
CS8382.2	2	2	3
CS8382.3	2	2	3
CS8382.4	2	2	3
CS8382	2	2	3

HS8381	INTERPERSONAL SKILLS/ LISTENING & SPEAKING	L	T	P	C
		0	0	2	1

OBJECTIVES:

The Course will enable learners to:

- Equip students with the English language skills required for the successful undertaking of academic studies with primary emphasis on academic speaking and listening skills.
- Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
- improve general and academic listening skills
- Make effective presentations.

UNIT I

Listening as a key skill- its importance- speaking - give personal information - ask for personal information - express ability - enquire about ability - ask for clarification Improving pronunciation - pronunciation basics taking lecture notes - preparing to listen to a lecture - articulate a complete idea as opposed to producing fragmented utterances.

UNIT II

Listen to a process information- give information, as part of a simple explanation - conversation starters: small talk - stressing syllables and speaking clearly - intonation patterns - compare and contrast information and ideas from multiple sources- converse with reasonable accuracy over a wide range of everyday topics.

UNIT III

Lexical chunking for accuracy and fluency- factors influence fluency, deliver a five-minute informal talk - greet - respond to greetings - describe health and symptoms - invite and offer - accept - decline - take leave - listen for and follow the gist- listen for detail

UNIT IV

Being an active listener: giving verbal and non-verbal feedback - participating in a group discussion - summarizing academic readings and lectures conversational speech listening to and participating in conversations - persuade.

UNIT V

Formal and informal talk - listen to follow and respond to explanations, directions and instructions in academic and business contexts - strategies for presentations and interactive communication - group/pair presentations - negotiate disagreement in group work.

TOTAL :30 PERIODS

TEXT BOOKS:

1. Brooks, Margret. Skills for Success. Listening and Speaking. Level 4 Oxford University Press, Oxford: 2011.
2. Richards, C. Jack. & David Bholke. Speak Now Level 3. Oxford University Press, Oxford: 2010

REFERENCES:

1. Bhatnagar, Nitin and Mamta Bhatnagar. Communicative English for Engineers and Professionals. Pearson: New Delhi, 2010.
2. Hughes, Glyn and Josephine Moate. Practical English Classroom. Oxford University Press: Oxford, 2014.
3. Vargo, Mari. Speak Now Level 4. Oxford University Press: Oxford, 2013.
4. Richards C. Jack. Person to Person (Starter). Oxford University Press: Oxford, 2006.
Ladousse, Gillian Porter. Role Play. Oxford University Press: Oxford

COURSE OUTCOMES

HS 8381.1	Listen and respond appropriately
HS 8381.2	Participate in group discussions
HS 8381.3	Make effective presentations
HS 8381.4	Participate confidently and appropriately in conversations both formal and informal

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HS 8381.1	-	-	1	1	1	2	-	2	2	2	1	-
HS 8381.2	-	-	1	1	1	2	-	2	2	2	1	-
HS 8381.3	-	-	1	1	1	2	-	2	2	2	1	-
HS 8381.4	-	-	1	1	1	2	-	2	2	2	1	-
HS 8381	-	-	1	1	1	2	-	2	2	2	1	-

MA8402

PROBABILITY AND QUEUING THEORY

L T P C

4 0 0 4

OBJECTIVES:

- To provide necessary basic concepts in probability and random processes for applications such as random signals, linear systems in communication engineering.
- To understand the basic concepts of probability, one and two dimensional random variables and to introduce some standard distributions applicable to engineering which can describe real life phenomenon.
- To understand the basic concepts of random processes which are widely used in IT fields.
- To understand the concept of queueing models and apply in engineering.
- To understand the significance of advanced queueing models.
- To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

UNIT I PROBABILITY AND RANDOM VARIABLES

12

Probability – Axioms of probability – Conditional probability – Baye’s theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

UNIT II TWO - DIMENSIONAL RANDOM VARIABLES

12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES

12

Classification – Stationary process – Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations – Limiting distributions.

UNIT IV QUEUEING MODELS

12

Markovian queues – Birth and death processes – Single and multiple server queueing models – Little’s formula - Queues with finite waiting rooms – Queues with impatient customers : Balking and renegeing.

MA8402.5	3	3	3	3	-	-	-	-	-	-	-	-
MA8402.6	3	3	3	3	2	-	-	-	-	3	2	1
MA8402	3	3	3	3	3	2	2	1	2	3	2	1

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
MA8402.1	2	3	3
MA8402.2	3	3	3
MA8402.3	3	3	3
MA8402.4	2	3	3
MA8402.5	3	3	3
MA8402.6	3	3	3
MA8402	3	3	3

CS8491

COMPUTER ARCHITECTURE

LT P C

3 0 0 3

OBJECTIVES:

Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – decision making – MIPS Addressing.

UNIT II ARITHMETIC FOR COMPUTERS

9

Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations – Subword Parallelism

UNIT III PROCESSOR AND CONTROL UNIT

9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT IV PARALLELISIM**9**

Parallel processing challenges – Flynn’s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.

UNIT V MEMORY & I/O SYSTEMS**9**

Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB’s – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.

TOTAL :45 PERIODS**TEXT BOOKS:**

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier, 2014.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.

REFERENCES:

1. William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition, Pearson Education, 2010.
2. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012.
3. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

COURSE OUTCOMES

C8491.1	Understand the basics structure of computers, operations and instructions.
C8491.2	Design arithmetic and logic unit.
C8491.3	Understand pipelined execution and design control unit.
C8491.4	Understand parallel processing architectures.
C8491.5	Understand the various memory systems and I/O communication

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C8491.1	3	2	-	-	-	-	-	-	-	-	-	-
C8491.2	3	3	1	1	-	-	-	-	-	-	-	2
C8491.3	-	-	3	-	-	1	-	-	-	-	-	3

C8491.4	-	-	3	-	1	2	3	1	-	-	-	-
C8491.5	-	-	-	3	-	-	-	1	1	2	2	1
CS8491	3	3	3	3	1	2	3	1	1	2	2	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
C8491.1	-	-	2
C8491.2	2	-	2
C8491.3	2	-	2
C8491.4	2	-	2
C8491.5	2	-	2
CS8491	2	-	2

CS8492

DATABASE MANAGEMENT SYSTEMS

**L T P C
3 0 0 3**

OBJECTIVES

- To learn the fundamentals of data models and to represent a database system using ER diagrams.
- To study SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To understand the fundamental concepts of transaction processing- concurrency control techniques and recovery procedures.
- To have an introductory knowledge about the Storage and Query processing Techniques

UNIT I RELATIONAL DATABASES

10

Purpose of Database System – Views of data – Data Models – Database System Architecture – Introduction to relational databases – Relational Model – Keys – Relational Algebra – SQL fundamentals – Advanced SQL features – Embedded SQL– Dynamic SQL

UNIT II DATABASE DESIGN

8

Entity-Relationship model – E-R Diagrams – Enhanced-ER Model – ER-to-Relational Mapping – Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT III TRANSACTIONS**9**

Transaction Concepts – ACID Properties – Schedules – Serializability – Concurrency Control – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Transaction Recovery - Save Points – Isolation Levels – SQL Facilities for Concurrency and Recovery.

UNIT IV IMPLEMENTATION TECHNIQUES**9**

RAID – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Algorithms for SELECT and JOIN operations – Query optimization using Heuristics and Cost Estimation.

UNIT V ADVANCED TOPICS**9**

Distributed Databases: Architecture, Data Storage, Transaction Processing – Object-based Databases: Object Database Concepts, Object-Relational features, ODMG Object Model, ODL, OQL - XML Databases: XML Hierarchical Model, DTD, XML Schema, XQuery – Information Retrieval: IR Concepts, Retrieval Models, Queries in IR systems.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011.
2. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Sixth Edition, Pearson Education, 2011.

REFERENCES:

1. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
2. Raghu Ramakrishnan, —Database Management Systems, Fourth Edition, McGraw-Hill College Publications, 2015.
3. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.

COURSE OUTCOMES

C8492.1	Classify the modern and futuristic database applications based on size and complexity
C8492.2	Map ER model to Relational model to perform database design effectively
C8492.3	Write queries using normalization criteria and optimize queries
C8492.4	Compare and contrast various indexing strategies in different database systems
C8492.5	Appraise how advanced databases differ from traditional databases.
C8492.6	Design XML schema, able to write XML queries for information retrieval

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C8492.1	3	3	-	-	-	-	-	-	-	-	-	-
C8492.2	-	-	3	2	-	-	-	-	-	-	-	-
C8492.3	-	-	2	3	3	-	-	-	-	-	-	-
C8492.4	2	2	-	1	-	-	-	-	-	-	-	-
C8492.5	-	-	-	-	2	-	-	-	-	-	-	3
C8492.6	-	-	-	-	3	-	-	-	-	-	-	3
CS8492	3	3	3	2	3	-	-	-	-	-	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
C8492.1	-	-	-
C8492.2	3	-	-
C8492.3	-	-	-
C8492.4	-	-	-
C8492.5	-	-	-
C8492.6	-	3	-
CS8492	3	3	-

CS8451**DESIGN AND ANALYSIS OF ALGORITHMS****L T P C3****3 0 0 3****OBJECTIVES:**

- To understand and apply the algorithm analysis techniques.
- To critically analyze the efficiency of alternative algorithmic solutions for the same problem
- To understand different algorithm design techniques.
- To understand the limitations of Algorithmic power.

UNIT I	INTRODUCTION	9
Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithmic Efficiency – Asymptotic Notations and their properties. Analysis Framework – Empirical analysis - Mathematical analysis for Recursive and Non-recursive algorithms – Visualization		
UNIT II	BRUTE FORCE AND DIVIDE-AND-CONQUER	9
Brute Force – Computing a^n – String Matching - Closest-Pair and Convex-Hull Problems - Exhaustive Search - Travelling Salesman Problem - Knapsack Problem - Assignment problem. Divide and Conquer Methodology – Binary Search – Merge sort – Quick sort – Heap Sort - Multiplication of Large Integers – Closest-Pair and Convex - Hull Problems.		
UNIT III	DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE	9
Dynamic programming – Principle of optimality - Coin changing problem, Computing a Binomial Coefficient – Floyd’s algorithm – Multi stage graph - Optimal Binary Search Trees – Knapsack Problem and Memory functions.		
Greedy Technique – Container loading problem - Prim’s algorithm and Kruskal's Algorithm – 0/1 Knapsack problem, Optimal Merge pattern - Huffman Trees.		
UNIT IV	ITERATIVE IMPROVEMENT	9
The Simplex Method - The Maximum-Flow Problem – Maximum Matching in Bipartite Graphs, Stable marriage Problem.		
UNIT V	COPING WITH THE LIMITATIONS OF ALGORITHM POWER	9
Lower - Bound Arguments - P, NP NP- Complete and NP Hard Problems. Backtracking – n-Queen problem - Hamiltonian Circuit Problem – Subset Sum Problem. Branch and Bound – LIFO Search and FIFO search - Assignment problem – Knapsack Problem – Travelling Salesman Problem - Approximation Algorithms for NP-Hard Problems – Travelling Salesman problem – Knapsack problem.		

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.

REFERENCES:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
3. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford university press, 2016.
4. S. Sridhar, “Design and Analysis of Algorithms”, Oxford university press, 2014.
5. <http://nptel.ac.in/>

COURSE OUTCOMES

CS8451.1	CO1: Design algorithms for various computing problems.
CS8451.2	CO2: Analyze the time and space complexity of algorithms.
CS8451.3	CO3: Critically analyze the different algorithm design techniques for a given problem.
CS8451.4	CO4: Modify existing algorithms to improve efficiency.
CS8451.5	CO5: Apply suitable design strategy for algorithms.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8451.1	3	3	3	-	-	-	-	-	2	2	-	2
CS8451.2	3	3	3	-	-	-	-	-	2	2	-	2
CS8451.3	3	2	3	-	-	-	-	-	2	2	-	2
CS8451.4	3	3	2	-	-	-	-	-	2	2	-	2
CS8451.5	3	3	2	-	-	-	-	-	2	2	-	2
CS8451	3	3	3	-	-	-	-	-	2	2	-	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8451.1	3	3	3
CS8451.2	3	3	3
CS8451.3	3	3	3
CS8451.4	3	3	3
CS8451.5	3	3	3
CS8451	3	3	3

OBJECTIVES:

- To understand the basic concepts and functions of operating systems.
- To understand Processes and Threads
- To analyze Scheduling algorithms.
- To understand the concept of Deadlocks.
- To analyze various memory management schemes.
- To understand I/O management and File systems.
- To be familiar with the basics of Linux system and Mobile OS like iOS and Android.

UNIT I OPERATING SYSTEM OVERVIEW 7

Computer System Overview-Basic Elements, Instruction Execution, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System.- Computer System Organization Operating System Structure and Operations- System Calls, System Programs, OS Generation and System Boot.

UNIT II PROCESS MANAGEMENT 11

Processes - Process Concept, Process Scheduling, Operations on Processes, Inter-process Communication; CPU Scheduling - Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real time scheduling; Threads- Overview, Multithreading models, Threading issues; Process Synchronization - The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions, Monitors; Deadlock - System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Main Memory – Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging, 32 and 64 bit architecture Examples; Virtual Memory – Background, Demand Paging, Page Replacement, Allocation, Thrashing; Allocating Kernel Memory, OS Examples.

UNIT IV FILE SYSTEMS AND I/O SYSTEMS 9

Mass Storage system – Overview of Mass Storage Structure, Disk Structure, Disk Scheduling and Management, swap space management; File-System Interface - File concept, Access methods, Directory Structure, Directory organization, File system mounting, File Sharing and Protection; File System Implementation- File System Structure, Directory implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery; I/O Systems – I/O Hardware, Application I/O interface, Kernel I/O subsystem, Streams, Performance.

UNIT V CASE STUDY 9

Linux System - Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, Input-Output Management, File System, Inter-process Communication; Mobile OS - iOS and Android - Architecture and SDK Framework, Media Layer, Services Layer, Core OS Layer, File System.

TOTAL : 45 PERIODS**TEXT BOOK :**

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

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8493.1	2	-	2
CS8493.2	1	-	-
CS8493.3	1	2	2
CS8493.4	1	-	-
CS8493.5	1	1	2
CS8493.6	2	1	2
CS8493	2	2	2

CS8494

SOFTWARE ENGINEERING

L T P C
3 0 0 3

OBJECTIVES:

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures

UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process.

UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management- Classical analysis: Structured system Analysis, Petri Nets- Data Dictionary.

UNIT III SOFTWARE DESIGN 9

Design process – Design Concepts-Design Model– Design Heuristic – Architectural Design - Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.

UNIT IV TESTING AND MAINTENANCE 9

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging –Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

9

UNIT V PROJECT MANAGEMENT

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning – Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

TOTAL :45 PERIODS

TEXT BOOKS:

1. Roger S. Pressman, “Software Engineering – A Practitioner’s Approach”, Seventh Edition, Mc Graw-Hill International Edition, 2010.
2. Ian Sommerville, “Software Engineering”, 9th Edition, Pearson Education Asia, 2011.

REFERENCES:

1. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI LearningPrivateLimited, 2009.
2. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
3. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing CompanyLimited,2007.
5. <http://nptel.ac.in/>.

COURSE OUTCOMES

CS8494.1	Identify the key activities in managing a software project.
CS8494.2	Compare different process models.
CS8494.3	Concepts of requirements engineering and Analysis Modeling.
CS8494.4	Apply systematic procedure for software design and deployment.
CS8494.5	Compare and contrast the various testing and maintenance.
CS8494.6	Manage project schedule, estimate project cost and effort required.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8494.1	3	3	3	2	3	-	-	-	-	-	3	-
CS8494.2	3	3	3	3	3	-	-	-	-	-	3	-
CS8494.3	3	3	3	3	3	-	-	-	-	-	3	-
CS8494.4	3	3	3	3	3	-	-	-	-	-	3	-
CS8494.5	3	3	3	3	3	-	-	-	-	-	3	-
CS8494.6	3	3	3	2	3	-	-	-	-	-	3	-
CS8494	3	3	3	3	3	-	-	-	-	-	3	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8494.1	3	3	--
CS8494.2	3	3	--
CS8494.3	3	3	--
CS8494.4	3	3	--
CS8494.5	3	3	--
CS8494.6	3	3	
CS8494	3	3	--

AIM:

The aim of this laboratory is to inculcate the abilities of applying the principles of the database management systems. This course aims to prepare the students for projects where a proper implementation of databases will be required.

OBJECTIVES:

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical database applications

LIST OF EXPERIMENTS

1. Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
2. Database Querying – Simple queries, Nested queries, Sub queries and Joins
3. Views, Sequences, Synonyms
4. Database Programming: Implicit and Explicit Cursors
5. Procedures and Functions
6. Triggers
7. Exception Handling
8. Database Design using ER modeling, normalization and Implementation for any application
9. Database Connectivity with Front End Tools
10. Case Study using real life database applications

TOTAL: 60 PERIODS

COURSE OUTCOMES

CS8481.1	Use typical data definitions and manipulation commands.
CS8481.2	Design applications to test Nested and Join Queries
CS8481.3	Implement simple applications that use Views
CS8481.4	Implement applications that require a Front-end Tool
CS8481.5	Critically analyze the use of Tables, Views, Functions and Procedures
CS8481.6	Normalized database design to ensure the quality

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8481.1	3	2	3	-	-	-	-	-	-	-	-	-
CS8481.2	3	-	-	2	-	-	-	-	-	-	-	-
CS8481.3	3	2	3	2	-	-	-	-	-	-	-	-
CS8481.4	2	-	-	2	-	-	-	-	-	-	-	-
CS8481.5	3	-	3	-	-	-	-	-	-	-	-	-
CS8481.6	3	-	-	2	-	-	-	-	-	-	-	-
CS8481	3	2	3	2	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8481.1	-	-	-
CS8481.2	-	-	-
CS8481.3	-	-	-
CS8481.4	-	3	-
CS8481.5	-	-	-
CS8481.6	2	-	-
CS8481	2	3	-

CS8461**OPERATING SYSTEMS LABORATORY****L T P C****0 0 4 2****OBJECTIVES**

- To learn Unix commands and shell programming
- To implement various CPU Scheduling Algorithms
- To implement Process Creation and Inter Process Communication.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms
- To implement Page Replacement Algorithms
- To implement File Organization and File Allocation Strategies

LIST OF EXPERIMENTS

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating systemfork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write C programs to simulate UNIX commands like cp, ls, grep, etc.
4. Shell Programming
5. Write C programs to implement the various CPU Scheduling Algorithms
6. Implementation of Semaphores
7. Implementation of Shared memory and IPC
8. Bankers Algorithm for Deadlock Avoidance
9. Implementation of Deadlock Detection Algorithm
10. Write C program to implement Threading & Synchronization Applications
11. Implementation of the following Memory Allocation Methods for fixed partition
 - a) First Fit
 - b) Worst Fit
 - c) Best Fit
12. Implementation of Paging Technique of Memory Management
13. Implementation of the following Page Replacement Algorithms
 - a) FIFO
 - b) LRU
 - c) LFU
14. Implementation of the various File Organization Techniques
15. Implementation of the following File Allocation Strategies
 - a) Sequential
 - b) Indexed
 - c) Linked

TOTAL: 60 PERIODS

COURSE OUTCOMES

CS8461.1	Implement Deadlock avoidance and Detection Algorithms
CS8461.2	Implement Semaphores
CS8461.3	Create processes and implement IPC
CS8461.4	Analyze the performance of the various Page Replacement Algorithms
CS8461.5	Implement File Organization and File Allocation Strategies

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8461.1	1	1	1	-	-	-	-	1	1	1	-	1
CS8461.2	2	2	2	-	-	-	-	2	2	2	-	2
CS8461.3	3	3	3	-	-	-	-	3	2	2	-	2

CS8461.4	3	3	3	-	-	-	-	3	3	3	-	3
CS8461.5	3	3	3	-	-	-	-	3	3	3	-	3
CS8461	3	3	3	-	-	-	-	3	3	3	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8461.1	1	1	1
CS8461.2	1	2	2
CS8461.3	2	2	2
CS8461.4	3	3	2
CS8461.5	3	3	3
CS8461	3	3	3

HS8461

ADVANCED READING AND WRITING

L	T	P	C
0	0	2	1

OBJECTIVES:

- Strengthen the reading skills of students of engineering.
- Enhance their writing skills with specific reference to technical writing.
- Develop students' critical thinking skills.
- Provide more opportunities to develop their project and proposal writing skills.

UNIT I

Reading - Strategies for effective reading-Use glosses and footnotes to aid reading comprehension-Read and recognize different text types-Predicting content using photos and title **Writing**-Plan before writing- Develop a paragraph: topic sentence, supporting sentences, concluding sentence – Write a descriptive paragraph

UNIT II

Reading-Read for details-Use of graphic organizers to review and aid comprehension **Writing**- State reasons and examples to support ideas in writing- Write a paragraph with reasons and examples-Write an opinion paragraph

UNIT III

Reading- Understanding pronoun reference and use of connectors in a passage- speed reading techniques-**Writing-** Elements of a good essay-Types of essays- descriptive-narrative- issue-based-argumentative-analytical.

UNIT IV

Reading- Genre and Organization of Ideas- **Writing-** Email writing- visumes – Job application-project writing-writing convincing proposals.

UNIT V

Reading- Critical reading and thinking- understanding how the text positions the reader- identify
Writing- Statement of Purpose- letter of recommendation- Vision statement

TOTAL: 30 PERIODS

TEXT BOOKS:

1. Gramer F. Margot and Colin S. Ward **Reading and Writing (Level 3)** Oxford University Press: Oxford, 2011
2. Debra Daise, CharlNorloff, and Paul Carne **Reading and Writing (Level 4)** OxfordUniversity Press: Oxford, 2011

REFERENCES:

1. Davis, Jason and Rhonda LIss.**Effective Academic Writing (Level 3)** Oxford University Press: Oxford, 2006
2. E. Suresh Kumar and et al. **Enriching Speaking and Writing Skills.** Second Edition. Orient Black swan: Hyderabad, 2012
3. Withrow, Jeans and et al. **Inspired to Write. Readings and Tasks to develop writing skills.** Cambridge University Press: Cambridge, 2004
4. Goatly, Andrew. **Critical Reading and Writing.** Routledge: United States of America,2000
5. Petelin, Roslyn and Marsh Durham. **The Professional Writing Guide: Knowing Well and Knowing Why.** Business & Professional Publishing: Australia, 2004

COURSE OUTCOMES

HS8461.1	Write different types of essays
HS8461.2	Write winning job applications
HS8461.3	Read and evaluate texts critically
HS8461.4	Display critical thinking in various professional contexts

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HS8461.1	-	1	-	-	-	-	-	-	1	1	-	-
HS8461.2	-	-	-	-	-	-	-	-	1	1	-	2
HS8461.3	-	1	-	-	-	1	-	-	-	-	-	-
HS8461.4	-	-	-	-	-	-	2	-	-	1	-	-
HS 8461	-	1	-	-	-	-	2	-	1	1	-	2

MA8551

ALGEBRA AND NUMBER THEORY

L T P C

4 0 0 4

OBJECTIVES:

- To introduce the basic notions of groups, rings, fields which will then be used to solve related problems.
- To introduce and apply the concepts of rings, finite fields and polynomials.
- To understand the basic concepts in number theory
- To examine the key questions in the Theory of Numbers.
- To give an integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

UNIT I GROUPS AND RINGS

12

Groups : Definition - Properties - Homomorphism - Isomorphism - Cyclic groups - Cosets - Lagrange's theorem. Rings: Definition - Sub rings - Integral domain - Field - Integer modulo n - Ring homomorphism.

UNIT II FINITE FIELDS AND POLYNOMIALS

12

Rings - Polynomial rings - Irreducible polynomials over finite fields - Factorization of polynomials over finite fields.

UNIT III DIVISIBILITY THEORY AND CANONICAL DECOMPOSITIONS

12

Division algorithm – Base - b representations – Number patterns – Prime and composite numbers – GCD – Euclidean algorithm – Fundamental theorem of arithmetic – LCM.

UNIT IV DIOPHANTINE EQUATIONS AND CONGRUENCES

12

Linear Diophantine equations – Congruence's – Linear Congruence's - Applications: Divisibility tests - Modular exponentiation-Chinese remainder theorem – 2 x 2 linear systems.

UNIT V CLASSICAL THEOREMS AND MULTIPLICATIVE FUNCTIONS

12

Wilson's theorem – Fermat's little theorem – Euler's theorem – Euler's Phi functions – Tau and Sigma functions.

TOTAL: 60 PERIODS

TEXTBOOKS:

1. Grimaldi, R.P and Ramana, B.V., "Discrete and Combinatorial Mathematics", Pearson Education, 5th Edition, New Delhi, 2007.
2. Koshy, T., "Elementary Number Theory with Applications", Elsevier Publications, New Delhi, 2002.

REFERENCES:

1. Lidl, R. and Pitz, G, "Applied Abstract Algebra", Springer Verlag, New Delhi, 2nd Edition, 2006.
2. Niven, I., Zuckerman.H.S., and Montgomery, H.L., "An Introduction to Theory of Numbers", John Wiley and Sons , Singapore, 2004.
3. San Ling and Chaoping Xing, "Coding Theory – A first Course", Cambridge Publications, Cambridge, 2004.

COURSE OUTCOMES

MA8551.1	Apply the basic notions of groups, rings, fields which will then be used to solve related problems.
MA8551.2	Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.
MA8551.3	Demonstrate accurate and efficient use of advanced algebraic techniques.
MA8551.4	Demonstrate accurate and efficient use of advanced algebraic techniques.
MA8551.5	Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MA8551.1	3	3	3	-	-	-	-	-	3	-	-	-
MA8551.2	3	3	3	-	-	-	-	-	3	-	-	-
MA8551.3	3	3	3	-	-	-	-	-	3	-	-	-
MA8551.4	3	3	3	-	-	-	-	-	3	-	-	-
MA8551.5	3	3	3	-	-	-	-	-	3	-	-	-
MA8551	3	3	3	-	-	-	-	-	3	-	-	-

OBJECTIVES:

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

UNIT I INTRODUCTION AND PHYSICAL LAYER 9

Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.

UNIT II DATA-LINK LAYER & MEDIA ACCESS 9

Introduction – Link-Layer Addressing – DLC Services – Data-Link Layer Protocols – HDLC – PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT III NETWORK LAYER 9

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT IV TRANSPORT LAYER 9

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP.

UNIT V APPLICATION LAYER 9

WWW and HTTP – FTP – Email – Telnet – SSH – DNS – SNMP.

TOTAL : 45 PERIODS

TEXT BOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES

1. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
2. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
5. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

COURSE OUTCOMES

CS8591.1	Understand the basic layers and its functions in computer networks.
CS8591.2	Evaluate the performance of a network.
CS8591.3	Understand the basics of how data flows from one node to another.
CS8591.4	Analyze and design routing algorithms.
CS8591.5	Design protocols for various functions in the network.
CS8591.6	Understand the working of various application layer protocols.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8591.1	3	1	2	-	-	-	-	-	-	-	-	-
CS8591.2	3	1	2	-	-	-	-	-	-	-	-	-
CS8591.3	3	1	2	-	-	-	-	-	-	-	-	-
CS8591.4	3	1	2	-	-	-	-	-	-	-	-	-
CS8591.5	3	1	2	-	-	-	-	-	-	-	-	-
CS8591.6	3	1	2	-	-	-	-	-	-	-	-	-
CS8591	3	1	2	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8591.1	2	2	2
CS8591.2	2	-	-
CS8591.3	1	2	3
CS8591.4	1	-	-
CS8591.5	1	3	2
CS8591.6	3	2	3
CS8591	3	3	3

OBJECTIVES:

- To understand the Architecture of 8086 microprocessor.
- To learn the design aspects of I/O and Memory Interfacing circuits.
- To interface microprocessors with supporting chips.
- To study the Architecture of 8051 microcontroller.
- To design a microcontroller based system

UNIT I THE 8086 MICROPROCESSOR 9

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

UNIT II 8086 SYSTEM BUS STRUCTURE 9

8086 signals – Basic configurations – System bus timing – System design using 8086 – I/O programming – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations – Coprocessor, Closely coupled and loosely Coupled configurations – Introduction to advanced processors.

UNIT III I/O INTERFACING 9

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller – Programming and applications Case studies: Traffic Light control, LED display , LCD display, Keyboard display interface and Alarm Controller.

UNIT IV MICROCONTROLLER 9

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V INTERFACING MICROCONTROLLER 9

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- StepperMotor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Yu-Cheng Liu, Glenn A.Gibson, “Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design”, Second Edition, Prentice Hall of India, 2007. (UNIT I- III)
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, “The 8051 Microcontroller and Embedded Systems: Using Assembly and C”, Second Edition, Pearson education, 2011. (UNIT IV-V)

REFERENCES:

1. Doughlas V.Hall, “Microprocessors and Interfacing, Programming andHardware”,TMH,2012
2. A.K.Ray,K.M.Bhurchandi,”Advanced Microprocessors and Peripherals “3rd edition, TataMcGrawHill,2012

COURSE OUTCOMES

EC8691.1	Design and implement programs on 8086 microprocessor.
EC8691.2	Understand the functionality of 8086 system bus.
EC8691.3	Design I/O circuits.
EC8691.4	Design Memory Interfacing circuits.
EC8691.5	Design and implement 8051 microcontroller based systems.
EC8691.6	Understand the concept of programming a microcontroller.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC8691.1	3	1	2	-	1	-	-	-	-	-	-	-
EC8691.2	2	2	1	1	-	-	-	-	-	-	-	-
EC8691.3	3	2	2	2	-	-	-	-	-	-	-	-
EC8691.4	3	1	2	2	-	-	-	-	-	-	-	-
EC8691.5	3	1	2	1	1	-	-	-	-	-	-	-
EC8691.6	3	2	1	2	-	-	-	-	-	-	-	1
EC8691	3	2	2	2	1	-	-	-	-	-	-	1

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
EC8691.1	3	2	-
EC8691.2	2	1	-
EC8691.3	3	1	1
EC8691.4	3	2	1
EC8691.5	3	2	-
EC8691.6	3	-	1
EC8691	3	2	1

OBJECTIVES:

- To understand the language hierarchy
- To construct automata for any given pattern and find its equivalent regular expressions
- To design a context free grammar for any given language
- To understand Turing machines and their capability
- To understand undecidable problems and NP class problems

UNIT I AUTOMATA FUNDAMENTALS 9

Introduction to formal proof – Additional forms of Proof – Inductive Proofs – Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata – Finite Automata with Epsilon Transitions

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expressions – FA and Regular Expressions – Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata.

UNIT III CONTEXT FREE GRAMMAR AND LANGUAGES 9

CFG – Parse Trees – Ambiguity in Grammars and Languages – Definition of the Pushdown Automata – Languages of a Pushdown Automata – Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT FREE LANGUAGES 9

Normal Forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY 9

Non Recursive Enumerable (RE) Language – Undecidable Problem with RE – Undecidable Problems about TM – Post's Correspondence Problem, The Class P and NP.

TEXT BOOK:

1. J.E.Hopcroft, R.Motwani and J.D Ullman, "Introduction to Automata Theory, Languages and Computations", Second Edition, Pearson Education, 2003.

REFERENCES:

1. H.R.Lewis and C.H.Papadimitriou, "Elements of the theory of Computation", Second Edition, PHI, 2003.
2. J.Martin, "Introduction to Languages and the Theory of Computation", Third Edition, TMH, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

COURSE OUTCOMES

CS8501.1	Ability to apply basic mathematical foundations and techniques for problem solving
CS8501.2	Ability to specify languages for problem definition and design Finite State Machine
CS8501.3	Ability to apply grammars and design Pushdown Automata
CS8501.4	Ability to apply normal forms and design Turing machine
CS8501.5	Derive whether a problem is decidable or not
CS8501.6	Ability to analyze the complexity of the computational functions

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8501.1	3	2	-	-	-	-	-	-	-	-	-	-
CS8501.2	3	3	-	-	-	-	-	-	-	-	-	-
CS8501.3	3	3	-	-	-	-	-	-	-	-	-	-
CS8501.4	3	3	2	-	-	-	-	-	-	-	-	-
CS8501.5	2	3	3	-	-	-	-	-	-	-	-	-
CS8501.6	3	3	3	-	-	-	-	-	-	-	-	-
CS8501	3	3	3	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8501.1	3	-	-
CS8501.2	3	-	-
CS8501.3	2	-	-
CS8501.4	3	3	-
CS8501.5	3	3	3
CS8501.6	3	3	3
CS8501	3	3	3

OBJECTIVES:

- To understand the fundamentals of object modeling
- To understand and differentiate Unified Process from other approaches.
- To design with static UML diagrams.
- To design with the UML dynamic and implementation diagrams.
- To improve the software design with design patterns.
- To test the software against its requirements specification

UNIT I UNIFIED PROCESS AND USE CASE DIAGRAMS 9

Introduction to OOAD with OO Basics - Unified Process – UML diagrams – Use Case –Case study – the Next Gen POS system, Inception -Use case Modelling – Relating Use cases – include, extend and generalization – When to use Use-cases

UNIT II STATIC UML DIAGRAMS 9

Class Diagram— Elaboration – Domain Model – Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class Hierarchies – Aggregation and Composition - Relationship between sequence diagrams and use cases – When to use Class Diagrams

UNIT III DYNAMIC AND IMPLEMENTATION UML DIAGRAMS 9

Dynamic Diagrams – UML interaction diagrams - System sequence diagram – Collaboration diagram – When to use Communication Diagrams - State machine diagram and Modelling –When to use State Diagrams - Activity diagram – When to use activity diagrams

Implementation Diagrams - UML package diagram - When to use package diagrams - Component and Deployment Diagrams – When to use Component and Deployment diagrams

UNIT IV DESIGN PATTERNS 9

GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling – High Cohesion – Controller

Design Patterns – creational – factory method – **structural** – Bridge – Adapter – **behavioural** – Strategy – observer –Applying GoF design patterns – Mapping design to code

UNIT V TESTING 9

Object Oriented Methodologies – Software Quality Assurance – Impact of object orientation on Testing – Develop Test Cases and Test Plans

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Craig Larman, “Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development”, Third Edition, Pearson Education, 2005.
2. Ali Bahrami - Object Oriented Systems Development - McGraw Hill International Edition - 1999

REFERENCES:

1. Erich Gamma, a n d Richard Helm, Ralph Johnson, John Vlissides, “Design patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 1995.
2. Martin Fowler, “UML Distilled: A Brief Guide to the Standard Object Modeling Language”, Third edition, Addison Wesley, 2003.

COURSE OUTCOMES

CS8592.1	Express software design with UML diagrams
CS8592.2	Design software applications using OO concepts.
CS8592.3	Identify various scenarios based on software requirements
CS8592.4	Transform UML based software design into pattern based design using design patterns
CS8592.5	Understand the various testing methodologies for OO software

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8592.1	3	-	-	-	-	2	-	-	2	-	-	-
CS8592.2	3	-	3	-	3	2	-	-	-	-	-	-
CS8592.3	3	2	-	-	-	-	-	-	-	-	-	-
CS8592.4	3	2	-	-	-	-	-	-	-	-	-	-
CS8592.5	3	2	-	3	-	-	-	-	-	-	-	2
CS8592	3	3	3	3	3	2	-	-	2	-	-	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8592.1	-	-	-
CS8592.2	-	-	-
CS8592.3	-	3	-
CS8592.4	-	-	-
CS8592.5	2	3	-
CS8592	2	3	2

OBJECTIVES:**The student should be made to:**

- Classify the various soft computing frame works
- Be familiar with the design of neural networks, fuzzy logic and fuzzy systems
- Learn mathematical background for optimized genetic programming
- Be exposed to neuro-fuzzy hybrid systems and its applications

UNIT I INTRODUCTION TO SOFT COMPUTING 9

Soft Computing Constituents-From Conventional AI to Computational Intelligence- Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks - basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.

UNIT II NEURAL NETWORKS 9

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN-associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network –unsupervised learning networks: Kohonen self-organizing feature maps, LVQ — CP networks, ART network.

UNIT III FUZZY LOGIC 9

Membership functions: features, fuzzification, methods of membership value assignments-Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT IV GENETIC ALGORITHM 9

Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts - operators – Encoding scheme – Fitness evaluation – crossover - mutation - genetic programming – multilevel optimization – real life problem- advances in GA .

UNIT V HYBRID SOFT COMPUTING TECHNIQUES & APPLICATIONS 9

Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd,2011.

REFERENCES:

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.
3. David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5. Simon Haykin, "Neural Networks Comprehensive Foundation" Second Edition, Pearson Education, 2005.

COURSE OUTCOMES

OEC 552.1	Apply various soft computing concepts for practical applications.
OEC 552.2	Choose and design suitable neural network for real time problems
OEC 552.3	Use fuzzy rules and reasoning to develop decision making and expert system
OEC 552.4	Explain the importance of optimization techniques and genetic programming
OEC 552.5	Review the various hybrid soft computing techniques and apply in real time problems

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OEC 552.1	3	3	3	3	3	3	1	1	1	1	1	3
OEC 552.2	3	3	3	3	3	3	1	1	1	1	1	3
OEC 552.3	3	3	3	3	3	3	1	1	1	1	1	3
OEC 552.4	3	3	3	3	3	3	1	1	1	1	1	3
OEC 552.5	3	3	3	3	3	3	1	1	1	1	1	3
OEC 552	3	3	3	3	3	3	1	1	1	1	1	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
OEC 552.1	3	2	2
OEC 552.2	3	2	2
OEC 552.3	3	2	2
OEC 552.4	3	2	2
OEC 552.5	3	2	2
OEC 552	3	2	2

OMD553**TELEHEALTH TECHNOLOGY****L T P C
3 0 0 3****OBJECTIVES:****The student should be made to:**

- Learn the key principles for telemedicine and health.
- Understand telemedical technology.
- Know telemedical standards, mobile telemedicine and its applications

UNIT I TELEMEDICINE AND HEALTH 9

History and Evolution of telemedicine, Organs of telemedicine, Global and Indian scenario, Ethical and legal aspects of Telemedicine - Confidentiality, Social and legal issues, Safety and regulatory issues, Advances in Telemedicine.

UNIT II TELEMEDICAL TECHNOLOGY 9

Principles of Multimedia - Text, Audio, Video, data, Data communications and networks, PSTN, POTS, ANT, ISDN, Internet, Air/ wireless communications Communication infrastructure for telemedicine — LAN and WAN technology. Satellite communication, Mobile communication.

UNIT III TELEMEDICAL STANDARDS 9

Data Security and Standards: Encryption, Cryptography, Mechanisms of encryption, phases of Encryption. Protocols: TCP/IP, ISO-OSI, Standards to be followed DICOM, HL7, H. 320 series Video Conferencing, Security and confidentiality of medical records, Cyber laws related to telemedicine

UNIT IV MOBILE TELEMEDICINE 9

Tele radiology: Image Acquisition system Display system, Tele pathology, Medical information storage and management for telemedicine- patient information, medical history, test reports, medical images, Hospital information system

UNIT V TELEMEDICAL APPLICATIONS**9**

Telemedicine — health education and self care. · In t r o d u c t i o n to robotics surgery, Telesurgery. Telecardiology, Teleoncology, Telemedicine in neurosciences, Business aspects - Project planning and costing, Usage of telemedicine.

TOTAL : 45 PERIODS**TEXT BOOK:**

1. Norris, A.C. “Essentials of Telemedicine and Telecare”, Wiley, 2002

REFERENCES:

1. Wootton, R., Craig, J., Patterson, V. (Eds.), “Introduction to Telemedicine. Royal Society of Medicine” Press Ltd, Taylor & Francis 2006
2. O'Carroll, P.W., Yasnoff, W.A., Ward, E., Ripp, L.H., Martin, E.L. (Eds), “Public Health Informatics and Information Systems”, Springer, 2003.
3. Ferrer-Roca, O., Sosa - Iudicissa, M. (Eds.), Handbook of Telemedicine. IOS Press(Studies in Health Technology and Informatics, Volume 54, 2002.
4. Simpson, W. Video over IP. A practical guide to technology and applications. Focal PressElsevier, 2006.
5. Bommel, J.H. van, Musen, M.A. (Eds.) Handbook of Medical Informatics. Heidelberg, Germany: Springer, 1997
6. Mohan Bansal " Medical Informatics", Tata McGraw-Hill, 2004.

COURSE OUTCOMES

OMD553.1	Apply multimedia technologies in telemedicine.
OMD553.2	Explain Protocols behind encryption techniques for secure transmission of data.
OMD553.3	Apply telehealth in healthcare.
OMD553.4	Understand the role of telemedicine in the development of rural area healthcare.
OMD553.5	Understand ethical and legal aspects of telemedicine.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OMD553.1	3	3	3	3	3	3	1	1	1	1	1	3
OMD553.2	3	3	3	3	3	3	1	1	1	1	1	3
OMD553.3	3	3	3	3	3	3	1	1	1	1	1	3
OMD553.4	3	3	3	3	3	3	1	1	1	1	1	3
OMD553.5	1	-	-	-	1	1	1	3	1	1	1	3
OMD553	3	3	3	3	3	3	1	3	1	1	1	3

8051 Experiments using kits and MASM

14. Basic arithmetic and Logical operations
15. Square and Cube program, Find 2's complement of a number
16. Unpacked BCD to ASCII

TOTAL: 60 PERIODS

LAB EQUIPMENT FOR A BATCH OF 30 STUDENTS:

HARDWARE:

8086 development kits - 30 nos
Interfacing Units - Each 10 nos
Microcontroller - 30 nos

SOFTWARE:

Intel Desktop Systems with MASM - 30
nos8086 Assembler
8051 Cross Assembler

COURSE OUTCOMES

EC8681.1	Write ALP Programs for fixed and Floating Point and Arithmetic operations
EC8681.2	Interface different I/Os with processor
EC8681.3	Generate waveforms using Microprocessors
EC8681.4	Execute Programs in 8051
EC8681.5	Explain the difference between simulator and Emulator

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC8681.1	3	3	3	-	-	-	-	3	3	3	-	3
EC8681.2	3	3	3	-	-	-	-	3	3	3	-	3
EC8681.3	3	3	3	-	-	-	-	3	3	3	-	3
EC8681.4	3	3	3	-	-	-	-	3	3	3	-	3
EC8681.5	3	3	3	-	-	-	-	3	3	3	-	3
EC8681	3	3	3	-	-	-	-	3	3	3	-	3

OBJECTIVES:

- To capture the requirements specification for an intended software system
- To draw the UML diagrams for the given specification
- To map the design properly to code
- To test the software system thoroughly for all scenarios
- To improve the design by applying appropriate design patterns.

Draw standard UML diagrams using an UML modeling tool for a given case study and map design to code and implement a 3 layered architecture. Test the developed code and validate whether the SRS is satisfied.

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the usecase diagram
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios

SUGGESTED DOMAINS FOR MINI-PROJECT:

1. Passport automation system.
2. Book bank
3. Exam registration
4. Stock maintenance system.
5. Online course reservation system
6. Airline/Railway reservation system
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference management system
13. BPO management system
14. Library management system
15. Student information system

TOTAL: 60 PERIODS

COURSE OUTCOMES

CS8582.1	Perform OO analysis and design for a given problem specification.
CS8582.2	Identify and map basic software requirements in UML mapping
CS8582.3	Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns
CS8582.4	Test the compliance of the software with the SRS.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8582.1	3	3	-	-	-	2	-	-	2	-	-	-
CS8582.2	3	3	3	-	3	3	-	3	-	-	-	3
CS8582.3	3	3	-	-	-	-	-	-	3	3	-	-
CS8582.4	3	-	-	-	3	-	-	-	-	-	-	3
CS8582	3	3	3	-	3	3	-	3	3	3	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8582.1	3	3	3
CS8582.2	3	3	3
CS8582.3	2	3	2
CS8582.4	3	3	3
CS8582	3	3	3

OBJECTIVES:

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

LIST OF EXPERIMENTS

1. Learn to use commands like tcpdump, netstat, ifconfig, nslookup and traceroute. Capture ping and traceroute PDUs using a network protocol analyzer and examine.
2. Write a HTTP web client program to download a web page using TCP sockets.
3. Applications using TCP sockets like:
 - Echo client and echo server
 - Chat
 - File Transfer
4. Simulation of DNS using UDP sockets.
5. Write a code simulating ARP /RARP protocols.
6. Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
7. Study of TCP/UDP performance using Simulation tool.
8. Simulation of Distance Vector/ Link State Routing algorithm.
9. Performance evaluation of Routing protocols using Simulation tool.
10. Simulation of error correction code (like CRC).

TOTAL: 60 PERIODS**COURSE OUTCOMES**

CS8581.1	Implement various protocols using TCP and UDP.
CS8581.2	Compare the performance of different transport layer protocols.
CS8581.3	Use simulation tools to analyze the performance of various network protocols.
CS8581.4	Analyze various routing algorithms.
CS8581.5	Implement error correction codes.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8581.1	3	3	3	-	-	-	-	3	3	3	-	3
CS8581.2	3	3	3	-	-	-	-	3	3	3	-	3
CS8581.3	3	3	3	-	-	-	-	3	3	3	-	3
CS8581.4	3	3	3	-	-	-	-	3	3	3	-	3
CS8581.5	3	3	3	-	-	-	-	3	3	3	-	3
CS8581	3	3	3	-	-	-	-	3	3	3	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8581.1	1	1	2
CS8581.2	2	2	2
CS8581.3	3	2	2
CS8581.4	3	2	2
CS8581.5	2	3	2
CS8581	3	3	3

CS8651

INTERNET PROGRAMMING

L T P C
3 0 0 3

OBJECTIVES:

- To understand different Internet Technologies.
- To learn java-specific web services architecture

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0

9

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

UNIT II CLIENT SIDE PROGRAMMING 9

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request –SQL.

UNIT III SERVER SIDE PROGRAMMING 9

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server-DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

UNIT IV PHP and XML 9

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

UNIT V INTRODUCTION TO AJAX and WEB SERVICES 9

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

TOTAL 45 PERIODS

TEXT BOOK:

1. Deitel and Deitel and Nieto, “Internet and World Wide Web - How to Program”,Prentice Hall, 5th Edition, 2011.

REFERENCES:

1. Stephen Wynkoop and John Burke “Running a Perfect Website”, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, WileyPublications, 2009.
3. Jeffrey C and Jackson, “Web Technologies A Computer Science Perspective”, Pearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., “Web Technology”, Prentice Hall of India, 2011.
5. UttamK.Roy, “Web Technologies”, Oxford University Press, 2011.

COURSE OUTCOMES

CS8651.1	Construct a basic website using HTML and Cascading Style Sheets.
CS8651.2	Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
CS8651.3	Develop server side programs using Servlets and JSP
CS8651.4	Construct simple web pages in PHP and to represent data in XML format
CS8651.5	Use AJAX and web services to develop interactive web applications

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8651.1	3	2	3	0	0	0	0	2	2	2	0	3
CS8651.2	2	2	3	0	0	0	0	1	2	2	0	3
CS8651.3	2	2	3	0	0	0	0	1	2	2	0	3
CS8651.4	2	2	3	0	0	0	0	1	2	2	0	3
CS8651.5	2	2	3	0	0	0	0	1	2	2	0	2
CS8651	3	2	3	0	0	0	0	2	2	2	0	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8651.1	3	2	3
CS8651.2	2	3	3
CS8651.3	2	3	3
CS8651.4	3	2	3
CS8651.5	2	3	3
CS8651	3	3	3

OBJECTIVES:

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

UNIT I INTRODUCTION**9**

Introduction–Definition - Future of Artificial Intelligence – Characteristics of Intelligent Agents–Typical Intelligent Agents – Problem Solving Approach to Typical AI problems.

UNIT II PROBLEM SOLVING METHODS**9**

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Searching with Partial Observations - Constraint Satisfaction Problems – Constraint Propagation - Backtracking Search - Game Playing - Optimal Decisions in Games – Alpha - Beta Pruning - Stochastic Games.

UNIT III KNOWLEDGE REPRESENTATION**9**

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining-Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering-Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV SOFTWARE AGENTS**9**

Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V APPLICATIONS**9**

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception – Planning – Moving

TOTAL :45 PERIODS**TEXT BOOKS:**

- ¹ S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
- ² I. Bratko, "Prolog: Programming for Artificial Intelligence", Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

REFERENCES:

1. M. Tim Jones, "Artificial Intelligence: A Systems Approach(Computer Science)", Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J. Nilsson, "The Quest for Artificial Intelligence", Cambridge University Press, 2009.
3. William F. Clocksin and Christopher S. Mellish," Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003.
4. Gerhard Weiss, "Multi Agent Systems", Second Edition, MIT Press, 2013.
5. David L. Poole and Alan K. Mackworth, "Artificial Intelligence: Foundations of Computational Agents", Cambridge University Press, 2010.

COURSE OUTCOMES

CS8691.1	Use appropriate search algorithms for any AI problem
CS8691.2	Represent a problem using first order and predicate logic
CS8691.3	Provide the apt agent strategy to solve a given problem
CS8691.4	Design software agents to solve a problem
CS8691.5	Design applications for NLP that use Artificial Intelligence

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8691.1	3	3	2	1	1	2	1	1	2	1	2	1
CS8691.2	2	3	2	3	3	2	2	2	2	1	1	2
CS8691.3	1	3	3	2	3	1	2	1	1	1	1	2
CS8691.4	1	2	3	2	1	2	2	2	2	2	2	1
CS8691.5	3	2	3	2	3	2	1	2	2	3	3	3
CS8691	3	3	3	3	3	2	2	2	2	3	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8691.1	3	3	2
CS8691.2	3	3	3
CS8691.3	3	3	2
CS8691.4	3	2	1
CS8691.5	3	1	3
CS8691	3	3	3

OBJECTIVES:

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunication system .
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To know the basis of transport and application layer protocols.
- To gain knowledge about different mobile platforms and application development.

UNIT I INTRODUCTION 9

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols – SDMA- TDMA- FDMA- CDMA

UNIT II MOBILE TELECOMMUNICATION SYSTEM 9

Introduction to Cellular Systems - GSM – Services & Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – Security – GPRS- UMTS – Architecture – Handover - Security

UNIT III MOBILE NETWORK LAYER 9

Mobile IP – DHCP – AdHoc– Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks (VANET) –MANET Vs VANET – Security.

UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER 9

Mobile TCP– WAP – Architecture – WDP – WTLS – WTP –WSP – WAE – WTA Architecture – WML

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone – MCommerce – Structure – Pros & Cons – Mobile Payment System – Security Issues

TOTAL 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, “Fundamentals of Mobile Computing”, PHILearning Pvt.Ltd, New Delhi – 2012

REFERENCES

1. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobilesystems", Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles ofMobile Computing”, Springer, 2003.
3. William.C.Y.Lee, “Mobile Cellular Telecommunications-Analog and Digital Systems”, Second Edition, TataMcGraw Hill Edition ,2006.
4. C.K.Toth, “AdHoc Mobile Wireless Networks”, First Edition, Pearson Education, 2002.
5. Android Developers : <http://developer.android.com/index.html>
6. Apple Developer : <https://developer.apple.com/>
7. Windows Phone DevCenter : <http://developer.windowsphone.com>
8. BlackBerry Developer : <http://developer.blackberry.com>

COURSE OUTCOMES

CS8601.1	Basic Concept of Mobile Computing was studied.
CS8601.2	Generations of telecommunication systems in wireless networks.
CS8601.3	The functionality of MAC and Network layer was determined and a routing protocol for a given Adhoc Network was indentified.
CS8601.4	The functionality of Transport and Application Layers was studied.
CS8601.5	Develop a mobile application using android/blackberry/ios/Windows SDK

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8601.1	3	2	2	2	1	2	1	-	-	2	-	2
CS8601.2	3	2	1	2	2	2	1	1	1	2	2	1
CS8601.3	3	2	1	3	1	2	1	1	1	2	-	1
CS8601.4	3	2	2	2	2	2	1	1	1	2	2	2
CS8601.5	3	2	2	2	2	2	1	1	1	2	2	2
CS8601	3	2	2	3	2	2	1	1	1	2	2	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8601.1	2	-	-
CS8601.2	3	1	2
CS8601.3	3	1	2
CS8601.4	3	1	2
CS8601.5	2	-	0
CS8601	3	1	2

OBJECTIVES:

- To learn the various phases of compiler.
- To learn the various parsing techniques.
- To understand intermediate code generation and run-time environment.
- To learn to implement front-end of the compiler.
- To learn to implement code generator.

UNIT I INTRODUCTION TO COMPILERS 9

Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

UNIT II SYNTAX ANALYSIS 12

Role of Parser – Grammars – Error Handling – Context-free grammars – Writing a grammar – Top Down Parsing - General Strategies Recursive Descent Parser Predictive Parser-LL(1) Parser-Shift Reduce Parser-LR Parser-LR (0)Item Construction of SLR Parsing Table - Introduction to LALR Parser - Error Handling and Recovery in Syntax Analyzer-YACC.

UNIT III INTERMEDIATE CODE GENERATION 8

Syntax Directed Definitions, Evaluation Orders for Syntax Directed Definitions, Intermediate Languages: Syntax Tree, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking.

UNIT IV RUN-TIME ENVIRONMENT AND CODE GENERATION 8

Storage Organization, Stack Allocation Space, Access to Non-local Data on the Stack, Heap Management - Issues in Code Generation - Design of a simple Code Generator.

UNIT V CODE OPTIMIZATION 8

Principal Sources of Optimization – Peep-hole optimization - DAG- Optimization of Basic Blocks- Global Data Flow Analysis - Efficient Data Flow Algorithm.

LIST OF EXPERIMENTS:

1. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.). Create a symbol table, while recognizing identifiers.
2. Implement a Lexical Analyzer using Lex Tool
3. Implement an Arithmetic Calculator using LEX and YACC
4. Generate three address code for a simple program using LEX and YACC.
5. Implement simple code optimization techniques (Constant folding, Strength reduction and Algebraic transformation)
6. Implement back-end of the compiler for which the three address code is given as input and the 8086 assembly language code is produced as output.

PRACTICALS	30	PERIODS
THEORY	45	PERIODS
TOTAL :	75	PERIODS

TEXT BOOK:

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2009.

REFERENCES

1. Randy Allen, Ken Kennedy, Optimizing Compilers for Modern Architectures: A Dependence based Approach, Morgan Kaufmann Publishers, 2002.
2. Steven S. Muchnick, Advanced Compiler Design and Implementation, Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2003.
3. Keith D Cooper and Linda Torczon, Engineering a Compiler, Morgan Kaufmann Publishers Elsevier Science, 2004.
4. V. Raghavan, Principles of Compiler Design, Tata McGraw Hill Education Publishers, 2010.
5. Allen I. Holub, Compiler Design in C, Prentice-Hall Software Series, 1993.

COURSE OUTCOMES

CS8602.1	Understand the different phases of Compiler.
CS8602.2	Design a lexical analyzer for a sample language.
CS8602.3	Apply different parsing algorithms to develop the parsers for a given grammar.
CS8602.4	Learn to implement code a simple code generator.
CS8602.5	Understand syntax –directed translation and run-time environment
CS8602.5	Learn to implement code optimization techniques and a simple code generator

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8602.1	3	3	2	-	2	2	-	-	-	-	2	-
CS8602.2	-	-	-	3	-	-	-	-	-	-	3	3
CS8602.3	-	-	3	3	-	-	-	-	-	-	-	3
CS8602.4	-	-	3	-	3	-	-	-	2	2	-	2
CS8602.5	-	3	-	-	-	-	-	2	2	-	-	-
CS8602.6	3	2	3	-	-	-	-	2	-	-	2	-
CS8602	3	3	3	3	3	2	-	2	2	2	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8602.1	-	3	3
CS8602.2	-	3	2
CS8602.3	-	3	3
CS8602.4	-	3	3
CS8602.5	-	-	3
CS8602.6	-	-	3
CS8602	-	3	3

CS8603

DISTRIBUTED SYSTEMS

L T P C

3 0 0 3

OBJECTIVES:

- To understand the foundations of distributed systems.
- To learn issues related to clock Synchronization and the need for global state in distributed systems.
- To learn distributed mutual exclusion and deadlock detection algorithms.
- To understand the significance of agreement, fault tolerance and recovery protocols in Distributed Systems.
- To learn the characteristics of peer-to-peer and distributed shared memory systems.

UNIT I INTRODUCTION

9

Introduction: Definition –Relation to computer system components –Motivation –Relation to parallel systems – Message-passing systems versus shared memory systems –Primitives for distributed communication –Synchronous versus asynchronous executions –Design issues and challenges. **A model of distributed computations:** A distributed program –A model of distributed executions –Models of communication networks –Global state – Cuts –Past and future cones of an event –Models of process communications. **Logical Time:** A framework for a system of logical clocks –Scalar time –Vector time – Physical clock synchronization: NTP.

UNIT II MESSAGE ORDERING & SNAPSHOTS

9

Message ordering and group communication: Message ordering paradigms –Asynchronous execution with synchronous communication –Synchronous program order on an asynchronous system –Group communication – Causal order (CO) - Total order. **Global state and snapshot recording algorithms:** Introduction –System model and definitions –Snapshot algorithms for FIFO channels

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8603.1	2	3	2	0	0	0	0	0	0	0	0	0
CS8603.2	3	3	2	0	0	0	0	0	0	0	0	0
CS8603.3	3	3	2	0	0	0	0	0	0	0	0	0
CS8603.4	3	3	2	0	0	0	0	0	0	0	0	0
CS8603.5	2	3	2	0	0	0	0	0	0	0	0	0
CS8603	3	3	2	0	0	0	0	0	0	0	0	0

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8603.1	2	0	0
CS8603.2	3	1	2
CS8603.3	3	1	2
CS8603.4	3	1	2
CS8603.5	2	0	0
CS8603	3	1	2

CS8072**AGILE METHODOLOGIES**

L	T	P	C
3	0	0	3

OBJECTIVES:

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide a good understanding of software design and a set of software technologies and APIs.
- To do a detailed examination and demonstration of Agile development and testing techniques.
- To understand the benefits and pitfalls of working in an Agile team.
- To understand Agile development and testing.

UNIT I AGILE METHODOLOGY**9**

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES**9**

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT**9**

Agile Information Systems – Agile Decision Making - Earl'S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING**9**

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE**9**

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. David J. Anderson and Eli Schragenheim, “Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results”, Prentice Hall, 2003.
2. Hazza and Dubinsky, “Agile Software Engineering, Series: Undergraduate Topics in Computer Science”, Springer, 2009.

REFERENCES:

1. Craig Larman, “Agile and Iterative Development: A Manager’s Guide”, Addison-Wesley, 2004.
2. Kevin C. Desouza, “Agile Information Systems: Conceptualization, Construction, and Management”, Butterworth-Heinemann, 2007.

COURSE OUTCOMES

CS8072.1	Realize the importance of interacting with business stakeholders in determining the requirements for a software system
CS8072.2	Perform iterative software development processes: how to plan them, how to execute them.
CS8072.3	Point out the impact of social aspects on software development success.

CS8072.4	Develop techniques and tools for improving team collaboration and software quality
CS8072.5	Perform Software process improvement as an ongoing task for development teams.
CS8072.6	Show how agile approaches can be scaled up to the enterprise level.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8072.1	3	3	3	-	-	-	-	-	-	-	-	-
CS8072.2	3	3	3	-	-	-	-	-	-	-	-	-
CS8072.3	3	3	3	-	-	-	-	-	-	-	-	-
CS8072.4	3	3	3	-	-	-	-	-	-	-	-	-
CS8072.5	3	3	3	-	-	-	-	-	-	-	-	-
CS8072.6	3	3	3	-	-	-	-	-	-	-	-	-
CS8072	3	3	3	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8072.1	3	3	3
CS8072.2	3	3	2
CS8072.3	3	3	3
CS8072.4	3	3	3
CS8072.5	3	3	3
CS8072.6	3	3	3
CS8072	3	3	3

OBJECTIVES:

- To understand data warehouse concepts, architecture, business analysis and tools
- To understand data pre-processing and data visualization techniques
- To study algorithms for finding hidden and interesting patterns in data
- To understand and apply various classification and clustering techniques using tools.

UNIT I DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING (OLAP) 9

Basic Concepts - Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors - Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT II DATA MINING – INTRODUCTION 9

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT III DATA MINING - FREQUENT PATTERN ANALYSIS 9

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns

UNIT IV CLASSIFICATION AND CLUSTERING 9

Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy.

Clustering Techniques – Cluster analysis-Partitioning Methods - Hierarchical Methods – Density Based Methods - Grid Based Methods – Evaluation of clustering – Clustering high dimensional data-Clustering with constraints, Outlier analysis-outlier detection methods.

UNIT V WEKA TOOL 9

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database - Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Jiawei Han and Micheline Kamber, “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2012.

REFERENCES:

1. Alex Berson and Stephen J.Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, 35th Reprint 2016.
2. K.P. Soman, Shyam Diwakar and V. Ajay, “Insight into Data Mining Theory and Practice”,Eastern Economy Edition, Prentice Hall of India, 2006.
3. Ian H.Witten and Eibe Frank, “Data Mining: Practical Machine Learning Tools and Techniques”, Elsevier, Second Edition.

COURSE OUTCOMES

CS8075.1	Design a Data warehouse system and perform business analysis with OLAP tools.
CS8075.2	Apply suitable pre-processing and visualization techniques for data analysis
CS8075.3	Apply frequent pattern and association rule mining techniques for data analysis
CS8075.4	Apply appropriate classification and clustering techniques for data analysis
CS8075.5	Apply and mine various datasets using weka tool.
CS8075.6	Able to analyze the data, identify the problems, and choose the relevant models and algorithms to solve the real world problems

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8075.1	3	-	-	-	-	2	-	-	-	-	-	-
CS8075.2	3	-	-	-	3	2	-	-	-	-	-	-
CS8075.3	3	2	-	-	-	-	-	-	-	-	-	-
CS8075.4	3	2	-	-	-	-	-	-	-	-	-	-
CS8075.5	3	2	-	3	-	-	-	-	-	-	-	-
CS8075.6	3	3	3	3	2	2	1	-	2	-	-	2
CS8075	3	3	3	3	2	2	1	-	2	-	-	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8075.1	-	-	3
CS8075.2	-	-	3
CS8075.3	-	3	-
CS8075.4	-	-	2
CS8075.5	2	3	-
CS8075.6	2	3	3
CS8075	2	3	3

OBJECTIVES:

- To be familiar with Web page design using HTML/XML and style sheets
- To be exposed to creation of user interfaces using Java frames and applets.
- To learn to create dynamic web pages using server side scripting.
- To learn to write Client Server applications.
- To be familiar with the PHP programming.
- To be exposed to creating applications with AJAX

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
 - a. To embed a map in a web page
 - b. To fix the hot spots in that map
 - c. Show all the related information when the hot spots are clicked.
2. Create a web page with the following.
 - a. Cascading style sheets.
 - b. Embedded style sheets.
 - c. Inline style sheets. Use our college information for the web pages.
3. Validate the Registration, user login, user profile and payment by credit card pages using JavaScript.
4. Write programs in Java using Servlets:
 - i. To invoke servlets from HTML forms
 - ii. Session tracking using hidden form fields and Session tracking for a hit count
5. Write programs in Java to create three-tier applications using servlets for conducting on-line examination for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
6. Install TOMCAT web server. Convert the static web pages of programs into dynamic web pages using servlets (or JSP) and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.
7. Redo the previous task using JSP by converting the static web pages into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database.
8. Create and save an XML document at the server, which contains 10 users Information. Write a Program, which takes user Id as an input and returns the User details by taking the user information from the XML document
9.
 - i. Validate the form using PHP regular expression.
 - ii. PHP stores a form data into database.
10. Write a web service for finding what people think by asking 500 people's opinion for any consumer product.

TOTAL: 60 PERIODS

COURSE OUTCOMES

CS8661.1	Construct Web pages using HTML/XML and style sheets.
CS8661.2	Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms.
CS8661.3	Develop dynamic web pages using server side scripting.
CS8661.4	Use PHP programming to develop web applications.
CS8661.5	Construct web applications using AJAX and web services.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8661.1	3	3	3	-	3	-	-	3	3	3	-	3
CS8661.2	3	3	3	-	3	-	-	3	3	3	-	3
CS8661.3	3	3	3	-	3	-	-	3	3	3	-	3
CS8661.4	3	3	3	-	3	-	-	3	3	3	-	3
CS8661.5	3	3	3	-	3	-	-	3	3	3	-	3
CS8661	3	3	3	-	3	-	-	3	3	3	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8661.1	2	-	-
CS8661.2	3	1	2
CS8661.3	3	1	2
CS8661.4	3	1	2
CS8661.5	2	-	0
CS8661	3	1	2

OBJECTIVES:

- To understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- To understand how to work with various mobile application development frameworks.
- To learn the basic and important design concepts and issues of development of mobile applications.
- To understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Write an application that draws basic graphical primitives on the screen.
4. Develop an application that makes use of databases.
5. Develop an application that makes use of Notification Manager
6. Implement an application that uses Multi-threading
7. Develop a native application that uses GPS location information
8. Implement an application that writes data to the SD card.
9. Implement an application that creates an alert upon receiving a message
10. Write a mobile application that makes use of RSS feed
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project)

TOTAL: 60 PERIODS**COURSE OUTCOMES**

CS8662.1	Develop mobile applications using GUI and Layouts.
CS8662.2	Develop mobile applications using Event Listener.
CS8662.3	Develop mobile applications using Databases.
CS8662.4	Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi-threading and GPS.
CS8662.5	Analyze and discover own mobile app for simple needs.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8662.1	2	3	3	2	3	2	1	3	3	1	2	2
CS8662.2	2	3	3	2	3	2	-	3	-	-	2	1
CS8662.3	2	3	3	2	3	-	1	3	-	-	2	2
CS8662.4	2	3	3	1	3	2	3	3	-	-	2	2
CS8662.5	2	2	3	1	3	-	-	3	-	-	2	2
CS8662	2	3	3	2	3	2	1	3	3	-	2	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8662.1	3	3	3
CS8662.2	3	3	1
CS8662.3	3	3	2
CS8662.4	-	-	2
CS8662.5	3	2	2
CS8662	3	2	2

CS8611 – MINI PROJECT

OBJECTIVES:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

COURSE OUTCOME

CS8611.1	Students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology
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MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8611.1	3	3	3	3	3	3	3	3	3	3	3	3
CS8611	3	3	3	3	3	3	3	3	3	3	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8611.1	3	3	3
CS8611	3	3	3

HS8581

PROFESSIONAL COMMUNICATION

L T P C
0 0 2 1

OBJECTIVES:

The course aims to:

- Enhance the Employability and Career Skills of students
- Orient the students towards grooming as a professional
- Make them Employable Graduates
- Develop their confidence and help them attend interviews successfully.

UNIT I

Introduction to Soft Skills-- Hard skills & soft skills - employability and career Skills—Grooming as a professional with values—Time Management—General awareness of Current Affairs

UNIT II

Self-Introduction-organizing the material - Introducing oneself to the audience – introducing the topic –answering questions – individual presentation practice— presenting the visuals effectively – 5 minute presentations

UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -- questioning and clarifying –GD strategies- activities to improve GD skills

UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

TOTAL : 30 PERIODS

Recommended Software

1. Open Source Software
2. Win English

REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

COURSE OUTCOMES

HS 8581.1	Listen and respond appropriately
HS 8581.2	Participate in group discussions
HS 8581.3	Make effective presentations
HS 8581.4	Participate confidently and appropriately in conversations both formal and informal

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HS 8581.1	-	-	1	1	1	2	-	2	2	2	1	-
HS 8581.2	-	-	1	1	1	2	-	2	2	2	1	-
HS 8581.3	-	-	1	1	1	2	-	2	2	2	1	-
HS 8581.4	-	-	1	1	1	2	-	2	2	2	1	-
HS 8581	-	-	1	1	1	2	-	2	2	2	1	-

OBJECTIVES:

- To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

UNIT II PLANNING 9

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

UNIT III ORGANISING 9

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management

UNIT IV DIRECTING 9

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

UNIT V CONTROLLING 9

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

TOTAL: 45 PERIODS**TEXTBOOKS:**

- Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 10th Edition, 2009.
- JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th Edition, 2004.

REFERENCES:

- Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.
- Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.
- Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill, 1998.
- Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8792.1	2	1	-
CS8792.2	2	2	2
CS8792.3	3	3	3
CS8792.4	1	3	1
CS8792.5	3	3	3
CS8792	3	3	3

CS8791

CLOUD COMPUTING

L T P C
3 0 0 3

OBJECTIVES:

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

UNIT I INTRODUCTION

9

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning.

UNIT II CLOUD ENABLING TECHNOLOGIES

10

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish-Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU – Memory – I/O Devices – Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE

8

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds - IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD 10

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges – Software-as-a-Service Security – Security Governance – Virtual Machine Security – IAM – Security Standards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS 8

Hadoop – MapReduce – Virtual Box -- Google App Engine – Programming Environment for Google App Engine — Open Stack – Federation in the Cloud – Four Levels of Federation – Federated Services and Applications – Future of Federation.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press, 2017.

REFERENCES:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi, "Mastering Cloud Computing", TataMcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing - A Practical Approach", TataMcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009.

COURSE OUTCOMES

CS8791.1	Apply grid computing techniques to solve large scale scientific problems.
CS8791.2	Apply the concept of virtualization.
CS8791.3	Use the grid and cloud tool kits.
CS8791.4	Apply the security models in the grid and the cloud environment.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8791.1	3	3	2	2	2	3	3	2	2	2	2	2
CS8791.2	3	3	2	2	2	3	3	1	2	2	3	2
CS8791.3	3	3	3	2	3	3	3	-	2	3	3	3
CS8791.4	3	3	3	2	3	3	3	2	2	2	3	3
CS8791	3	3	3	2	3	3	3	2	2	3	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8791.1	3	3	3
CS8791.2	3	3	3
CS8791.3	3	2	3
CS8791.4	3	3	2
CS8791	3	3	3

OEE752 INTRODUCTION TO RENEWABLE ENERGY SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

To Provide knowledge

- About the stand alone and grid connected renewable energy systems.
- Design of power converters for renewable energy applications.
- Wind electrical generators and solar energy systems.
- Power converters used for renewable energy systems.

UNIT I INTRODUCTION 9

Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT II ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION 9

Reference theory fundamentals-principle of operation and analysis: IG and PMSG

UNIT III POWER CONVERTERS 9

Solar: Block diagram of solar photo voltaic system -Principle of operation: line commutated converters (inversion-mode) - Boost and buck-boost converters- selection of inverter, battery sizing, array sizing Wind: Three phase AC voltage controllers

UNIT IV ANALYSIS OF WIND AND PV SYSTEMS 9

Stand alone operation of fixed and variability speed wind energy conversion systems and solar system-Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

UNIT V HYBRID RENEWABLE ENERGY SYSTEMS

Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV
Maximum Power Point Tracking (MPPT).

TOTAL : 45 PERIODS

TEXT BOOK:

1. S. N. Bhadra, D.Kastha, S.Banerjee, "Wind Electrical Systems", Oxford University Press,2005.
2. B.H.Khan Non-conventional Energy sources Tata McGraw-hill Publishing Company,New Delhi,2009.

REFERENCES:

1. Rashid .M. H "power electronics Hand book", Academic press, 2001.
2. Ion Boldea, "Variability speed generators", Taylor & Francis group, 2006.
3. Rai. G.D, "Non conventional energy sources", Khanna publishes, 1993.
4. Gray, L. Johnson, "Wind energy system", prentice hall linc, 1995.
5. Andrzej M. Trzynadlowski, „Introduction to Modern Power Electronics“, Second edition, wileyIndia Pvt. Ltd, 2012.

COURSE OUTCOMES

OEE752.1	To Understand the physics of solar radiation
OEE752.2	Ability to classify the solar energy collectors and methodologies of storing solar energy
OEE752.3	To gain knowledge in applying solar energy in a useful way
OEE752.4	To gain knowledge in wind energy and biomass with its economic aspects.
OEE752.5	To obtain knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
OEE752.1	-	3	-	-	-	2	3	-	-	-	-	3
OEE752.2	3	3	3	-	-	-	-	-	-	-	-	3
OEE752.3	-	3	3	-	-	-	-	-	-	-	-	3
OEE752.4	-	3	3	3	-	-	-	-	-	-	-	3
OEE752.5	3	-	3	3	-	1	3	-	-	3	-	3
OEE752	2.5	3	3	2.5	-	2	2	-	-	1	-	3

OBJECTIVES:

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

UNIT I INTRODUCTION**9**

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS**9**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING**9**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANT BASED LEARNING**9**

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V ADVANCED LEARNING**9**

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TOTAL :45 PERIODS**TEXT BOOK:**

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill Education (India) Private Limited, 2013.

REFERENCES:

1. Ethem Alpaydin, “Introduction to Machine Learning (Adaptive Computation and Machine Learning)”, The MIT Press 2004.
2. Stephen Marsland, “Machine Learning: An Algorithmic Perspective”, CRC Press, 2009.

COURSE OUTCOMES

CS8082.1	Differentiate between supervised, unsupervised, semi-supervised machine learning approaches.
CS8082.2	Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
CS8082.3	Recognize and implement various ways of selecting suitable model parameters for different machine learning techniques.
CS8082.4	Apply the Bayesian concepts to machine learning.
CS8082.5	Analyze and suggest appropriate machine learning approaches for various types of problems.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8082.1	1	3	3	-	1	-	-	-	1	2	-	-
CS8082.2	1	3	3	-	2	-	-	-	1	2	-	-
CS8082.3	3	3	3	-	3	-	-	-	2	2	-	-
CS8082.4	3	3	3	-	3	-	-	-	3	2	-	-
CS8082.5	2	3	3	-	3	-	-	-	3	3	-	-
CS8082	3	3	3	-	3	-	-	-	3	3	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8082.1	1	3	3
CS8082.2	1	3	3
CS8082.3	3	3	3
CS8082.4	3	3	3
CS8082.5	2	3	3
CS8082	3	3	3

OBJECTIVE:

- To facilitate the understanding of Quality Management principles and process.

UNIT I INTRODUCTION**9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

UNIT II TQM PRINCIPLES**9**

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS AND TECHNIQUES I**9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

UNIT IV TQM TOOLS AND TECHNIQUES II**9**

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

UNIT V QUALITY MANAGEMENT SYSTEM**9**

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration- **ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

TOTAL: 45 PERIODS**TEXT BOOK:**

1. Dale H.Besterfield, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall(India) Pvt. Ltd., 2006.
3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. ISO9001-2015 standards

COURSE OUTCOMES

GE8077.1	Students able to identify the quality gurus and their contributions, who have made a tremendous impact on the management and control of quality.
GE8077.2	Students able to learn about influence of leadership, strategic planning and realize the importance of employee involvement.
GE8077.3	Students can able to generate innovative idea to apply statistical thinking to quality improvement and adopt in benchmarking process.
GE8077.4	Students able to understand the significance of Taguchi's quality principles and development of Total Protective Maintenance.
GE8077.5	Students able to realize the importance of implementing ISO standards in manufacturing and service sectors.
GE8077.6	Students able to understand the various levels of quality measures and standards.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
GE8077.1	3	3	3	-	-	-	-	-	-	-	3	-
GE8077.2	3	3	3	-	-	-	-	-	-	-	3	-
GE8077.3	3	3	3	-	-	-	-	-	-	-	3	-
GE8077.4	3	3	3	-	-	-	-	-	-	-	3	-
GE8077.5	3	3	3	-	-	-	-	-	-	-	3	-
GE8077.6	3	3	3	-	-	-	-	-	-	-	3	-
GE8077	3	3	3	-	-	-	-	-	-	-	3	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
GE8077.1	1	-	-
GE8077.2	-	2	-
GE8077.3	-	2	2
GE8077.4	-	-	1

GE8077.5	-	-	-
GE8077.6	-	-	1
GE8077	1	2	2

CS8073

C# AND .NET PROGRAMMING

L T P C
3 0 0 3

OBJECTIVES:

- To learn basic programming in C# and the object oriented programming concepts.
- To update and enhance skills in writing Windows applications, ADO.NET and ASP .NET.
- To study the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.
- To implement mobile applications using .Net compact framework
- To understand the working of base class libraries, their operations and manipulation of data using XML.

UNIT I C# LANGUAGE BASICS 9

.Net Architecture - Core C# - Variables - Data Types - Flow control - Objects and Types- Classes and Structs - Inheritance- Generics – Arrays and Tuples - Operators and Casts - Indexers

UNIT II C# ADVANCED FEATURES 9

Delegates - Lambdas - Lambda Expressions - Events - Event Publisher - EventListener - Strings and Regular Expressions - Generics - Collections - Memory Management and Pointers - Errors and Exceptions - Reflection

UNIT III BASE CLASS LIBRARIES AND DATA MANIPULATION 9

Diagnostics -Tasks, Threads and Synchronization - .Net Security - Localization - Manipulating XML- SAX and DOM - Manipulating files and the Registry- Transactions - ADO.NET- Peer-to-Peer Networking - P2P - Building P2P Applications - Windows Presentation Foundation (WPF).

UNIT IV WINDOW BASED APPLICATIONS, WCF AND WWF 9

Window based applications - Core ASP.NET- ASP.NET Web forms -Windows Communication Foundation (WCF)- Introduction to Web Services - .Net Remoting - Windows Service - Windows Workflow Foundation (WWF) - Activities – Workflows

UNIT V .NET FRAMEWORK AND COMPACT FRAMEWORK 9

Assemblies - Shared assemblies - Custom Hosting with CLR Objects - Appdomains - Core XAML - Bubbling and Tunneling Events- Reading and Writing XAML - .Net Compact Framework - Compact Edition Data Stores – Errors, Testing and Debugging –Optimizing performance – Packaging and Deployment – Networking and Mobile Devices

TOTAL :45 PERIODS

TEXT BOOKS:

1. Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner . —Professional C# 2012 and .NET 4.5, Wiley, 2012
2. Harsh Bhasin, —Programming in C#, Oxford University Press, 2014.

REFERENCES

1. Ian Gariffiths, Mathew Adams, Jesse Liberty, —Programming C# 4.0, O'Reilly, Fourth Edition, 2010.
2. Andrew Troelsen, Pro C# 5.0 and the .NET 4.5 Framework, Apress publication, 2012.
3. Andy Wigley, Daniel Moth, Peter Foot, —Mobile Development Handbook, Microsoft Press, 2011.

COURSE OUTCOMES

CS8073.1	Write various applications using C# Language in the .NET Framework.
CS8073.2	Develop distributed applications using .NET Framework.
CS8073.3	Create mobile applications using .NET compact

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8073.1	3	3	3	-	-	-	-	-	-	-	-	-
CS8073.2	3	3	3	-	-	-	-	-	-	-	-	-
CS8073.3	3	3	3	-	-	-	-	-	-	-	-	-
CS8073	3	3	3	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8073.1	3	2	-
CS8073.2	3	2	-
CS8073.3	3	2	-
CS8073	3	2	-

OBJECTIVES:

- To develop web applications in cloud
- To learn the design and development process involved in creating a cloud based application
- To learn to implement and use parallel programming using Hadoop

LIST OF EXPERIMENTS

1. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows 7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create *hello world* app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
8. Install Hadoop single node cluster and run simple applications like wordcount.

TOTAL : 60 PERIODS**COURSE OUTCOMES**

CS8711.1	Configure various virtualization tools such as Virtual Box, VMware workstation.
CS8711.2	Design and deploy a web application in a PaaS environment.
CS8711.3	Learn how to simulate a cloud environment to implement new schedulers.
CS8711.4	Install and use a generic cloud environment that can be used as a private cloud.
CS8711.5	Manipulate large data sets in a parallel environment.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8711.1	2	3	2	3	2	1	2	1	2	2	1	2
CS8711.2	2	2	3	2	2	-	-	2	-	2	1	2

CS8711.3	2	-	1	1	3	1	2	2	2	1	2	2
CS8711.4	2	2	3	3	2	-	-	2	2	1	1	2
CS8711.5	3	3	2	3	3	-	2	2	3	2	1	2
CS8711	3	3	3	3	3	1	2	2	3	2	2	2

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8711.1	3	3	2
CS8711.2	3	3	3
CS8711.3	3	3	2
CS8711.4	3	2	1
CS8711.5	3	1	3
CS8711	3	3	3

IT8761

SECURITY LABORATORY

L T P C
0 0 4 2

OBJECTIVES:

- To learn different cipher techniques
- To implement the algorithms DES, RSA,MD5,SHA-1
- To use network security tools and vulnerability assessment tools

LIST OF EXPERIMENTS

1. Perform encryption, decryption using the following substitution techniques
(i) Ceaser cipher, (ii) playfair cipher iii) Hill Cipher iv) Vigenere cipher
2. Perform encryption and decryption using following transposition techniques
i) Rail fence ii) row & Column Transformation
3. Apply DES algorithm for practical applications.
4. Apply AES algorithm for practical applications.
5. Implement RSA Algorithm using HTML and JavaScript

6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Calculate the message digest of a text using the SHA-1 algorithm.
8. Implement the SIGNATURE SCHEME - Digital Signature Standard.
9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
10. Automated Attack and Penetration Tools
Exploring N-Stalker, a Vulnerability Assessment Tool
11. Defeating Malware
 - i) Building Trojans ii) Rootkit Hunter

TOTAL: 60 PERIODS

REFERENCES:

1. Build Your Own Security Lab, Michael Gregg, Wiley India

COURSE OUTCOMES

IT8761.1	Develop code for classical Encryption Techniques to solve the problems.
IT8761.2	Build cryptosystems by applying symmetric and public key encryption algorithms.
IT8761.3	Construct code for authentication algorithms.
IT8761.4	Develop a signature scheme using Digital signature standard.
IT8761.5	Demonstrate the network security system using open source tools

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
IT8761.1	3	3	3	-	2	-	-	2	1	1	-	2
IT8761.2	3	3	3	-	2	-	-	2	1	1	-	2
IT8761.3	3	3	2	-	3	-	-	3	2	2	-	3
IT8761.4	3	3	2	-	3	-	-	3	2	2	-	3
IT8761.5	2	3	2	-	3	-	-	2	-	1	-	2
IT8761	3	3	3	-	3	-	-	3	2	2	-	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
IT8761.1	2	2	3
IT8761.2	-	2	-
IT8761.3	3	-	2
IT8761.4	2	1	2
IT8761.5	2	2	1
IT8761	3	2	3

GE8076

PROFESSIONAL ETHICS IN ENGINEERING

**LT P C
3 0 0 3**

OBJECTIVES:

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

UNIT I HUMAN VALUES

10

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

UNIT II ENGINEERING ETHICS

9

Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION

9

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS

9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V GLOBAL ISSUES

8

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCES:

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.
6. World Community Service Centre, ‘ Value Education’, Vethathiri publications, Erode, 2011.

COURSE OUTCOMES

GE8076 .1	Students will be able to apply the principles of human values and ethics.
GE8076.2	Students will be able to apply the concepts of Professional ideals and virtues.
GE8076 .3	Students will be able to apply the code of ethics.
GE8076 .4	Students will be able to evaluate the consequences of safety and risk.
GE8076.5	Students will be able to differentiate the responsibility and rights of Engineering professionals.
GE8076.6	Students will be able to explore the issues related to global contexts with respect to engineering practice.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
GE8076 .1	-	-	-	-	-	-	-	3	-	-	-	-
GE8076.2	-	-	-	-	-	-	-	3	-	-	-	-
GE8076 .3	-	-	-	-	-	2	-	3	-	-	-	-

GE8076.4	-	-	-	-	-	3	2	3	-	-	-	-
GE8076.5	-	-	-	-	-	3	2	-	-	-	-	-
GE8076.6	-	-	-	-	-	3	-	3	-	-	-	-
GE8076	-	-	-	-	-	3	2	3	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
GE8076.1	-	-	1
GE8076.2	-	-	2
GE8076.3	1	-	3
GE8076.4	-	-	3
GE8076.5	-	-	3
GE8076.6	-	-	3
GE8076	1	-	3

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CS8078

GREEN COMPUTING

L T P C
3 0 0 3

OBJECTIVES:

- To learn the fundamentals of Green Computing.
- To analyze the Green computing Grid Framework.
- To understand the issues related with Green compliance.
- To study and develop various case studies.

UNIT I FUNDAMENTALS

9

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

UNIT II GREEN ASSETS AND MODELING 9

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

UNIT III GRID FRAMEWORK 9

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

UNIT IV GREEN COMPLIANCE 9

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future.

UNIT V CASE STUDIES 9

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Bhuvan Unhelkar, “Green IT Strategies and Applications-Using EnvironmentalIntelligence”, CRC Press, June 2014.
2. Woody Leonhard, Katherine Murray, “Green Home computing for dummies”,August 2012.

REFERENCES:

1. Alin Gales, Michael Schaefer, Mike Ebbers, “Green Data Center: steps for theJourney”, Shroff/IBM rebook, 2011.
2. John Lamb, “The Greening of IT”, Pearson Education, 2009.
3. Jason Harris, “Green Computing and Green IT- Best Practices on regulations &industry”, Lulu.com, 2008
4. Carl speshocky, “Empowering Green Initiatives with IT”, John Wiley & Sons, 2010.
5. Wu Chun Feng (editor), “Green computing: Large Scale energy efficiency”, CRCPress

COURSE OUTCOMES

CS8078.1	Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment.
CS8078.2	Enhance the skill in energy saving practices in their use of hardware.
CS8078.3	Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders.
CS8078.4	Understand the ways to minimize equipment disposal requirements.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8078.1	3	3	3	-	-	-	-	-	-	-	-	-
CS8078.2	3	2	1	-	-	-	-	-	-	-	-	-
CS8078.3	3	3	3	-	-	-	-	-	-	-	-	-
CS8078.4	3	1	2	-	-	-	-	-	-	-	-	-
CS8078	3	3	3	-	-	-	-	-	-	-	-	-

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8078.1	3	2	2
CS8078.2	2	-	2
CS8078.3	2	1	-
CS8078.4	2	2	3
CS8078	3	2	3

CS8811 PROJECT WORK**L T P C****0 0 20 10****OBJECTIVES:**

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the

work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

TOTAL: 300 PERIODS

COURSE OUTCOME

CS8811.1	Students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
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MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS8811.1	3	3	3	3	3	3	3	3	3	3	3	3
CS8811	3	3	3	3	3	3	3	3	3	3	3	3

MAPPING OF COURSE OUTCOMES WITH THE PROGRAM SPECIFIC OUTCOMES:

CO/PSO	PSO1	PSO2	PSO3
CS8811.1	3	3	3
CS8811	3	3	3